

## COVER SHEET FOR PROPOSAL TO THE NATIONAL SCIENCE FOUNDATION

PROGRAM ANNOUNCEMENT/SOLICITATION NO./CLOSING DATE/if not in response to a program announcement/solicitation enter NSF 04-2					<b>FOR NSF USE ONLY</b>	
NSF 04-556			05/17/04		<b>NSF PROPOSAL NUMBER</b>	
FOR CONSIDERATION BY NSF ORGANIZATION UNIT(S) (Indicate the most specific unit known, i.e. program, division, etc.)					<b>0438747</b>	
<b>EEC - PARTNRSHPIS FOR INNOVATION-PFI</b>						
DATE RECEIVED	NUMBER OF COPIES	DIVISION ASSIGNED	FUND CODE	DUNS# (Data Universal Numbering System)	FILE LOCATION	
				<b>053599908</b>		
EMPLOYER IDENTIFICATION NUMBER (EIN) OR TAXPAYER IDENTIFICATION NUMBER (TIN)		SHOW PREVIOUS AWARD NO. IF THIS IS <input type="checkbox"/> A RENEWAL <input type="checkbox"/> AN ACCOMPLISHMENT-BASED RENEWAL		IS THIS PROPOSAL BEING SUBMITTED TO ANOTHER FEDERAL AGENCY? YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> IF YES, LIST ACRONYM(S)		
936001786						
NAME OF ORGANIZATION TO WHICH AWARD SHOULD BE MADE			ADDRESS OF AWARDEE ORGANIZATION, INCLUDING 9 DIGIT ZIP CODE			
Oregon State University			Oregon State University 312 Kerr Administration Corvallis, OR. 973312140			
AWARDEE ORGANIZATION CODE (IF KNOWN)						
0032102000						
NAME OF PERFORMING ORGANIZATION, IF DIFFERENT FROM ABOVE			ADDRESS OF PERFORMING ORGANIZATION, IF DIFFERENT, INCLUDING 9 DIGIT ZIP CODE			
PERFORMING ORGANIZATION CODE (IF KNOWN)						
IS AWARDEE ORGANIZATION (Check All That Apply) (See GPG II.C For Definitions)		<input type="checkbox"/> SMALL BUSINESS	<input type="checkbox"/> MINORITY BUSINESS	<input type="checkbox"/> IF THIS IS A PRELIMINARY PROPOSAL THEN CHECK HERE		
		<input type="checkbox"/> FOR-PROFIT ORGANIZATION	<input type="checkbox"/> WOMAN-OWNED BUSINESS			
TITLE OF PROPOSED PROJECT <b>The Virtual Oregon Map: A Partnership to Enhance Geospatial Awareness and Interoperability for Improved Business Processes and Decision-Making</b>						
REQUESTED AMOUNT \$	PROPOSED DURATION (1-60 MONTHS)	REQUESTED STARTING DATE	SHOW RELATED PRELIMINARY PROPOSAL NO. IF APPLICABLE			
588,214	36 months	09/01/04				
CHECK APPROPRIATE BOX(ES) IF THIS PROPOSAL INCLUDES ANY OF THE ITEMS LISTED BELOW						
<input type="checkbox"/> BEGINNING INVESTIGATOR (GPG I.A)		<input type="checkbox"/> HUMAN SUBJECTS (GPG II.D.6)				
<input type="checkbox"/> DISCLOSURE OF LOBBYING ACTIVITIES (GPG II.C)		Exemption Subsection _____ or IRB App. Date _____				
<input type="checkbox"/> PROPRIETARY & PRIVILEGED INFORMATION (GPG I.B, II.C.1.d)		<input type="checkbox"/> INTERNATIONAL COOPERATIVE ACTIVITIES: COUNTRY/COUNTRIES INVOLVED (GPG II.C.2.g.(iv).(c))				
<input type="checkbox"/> HISTORIC PLACES (GPG II.C.2.j)						
<input type="checkbox"/> SMALL GRANT FOR EXPLOR. RESEARCH (SGER) (GPG II.D.1)						
<input type="checkbox"/> VERTEBRATE ANIMALS (GPG II.D.5) IACUC App. Date _____		<input type="checkbox"/> HIGH RESOLUTION GRAPHICS/OTHER GRAPHICS WHERE EXACT COLOR REPRESENTATION IS REQUIRED FOR PROPER INTERPRETATION (GPG I.E.1)				
PI/PD DEPARTMENT		PI/PD POSTAL ADDRESS				
Department of Geosciences		104 Wilkinson Hall				
PI/PD FAX NUMBER		Corvallis, OR 973315506				
541-737-1200		United States				
NAMES (TYPED)	High Degree	Yr of Degree	Telephone Number	Electronic Mail Address		
PI/PD NAME						
Dawn J Wright	PhD	1994	541-737-1229	dawn@dusk.geo.orst.edu		
CO-PI/PD						
Gail L Achterman	JD	1974	541-737-3437	gail.achterman@oregonstate.edu		
CO-PI/PD						
Karyle S Butcher	MS	1965	541-737-7300	Karyle.Butcher@orst.edu		
CO-PI/PD						
Tim E Fiez	PhD	1995	541-737-3437	tim.fiez@oregonstate.edu		
CO-PI/PD						
Curt Pederson	MPA	1986	503-754-0123	curt.pederson@orst.edu		

## CERTIFICATION PAGE

### Certification for Authorized Organizational Representative or Individual Applicant:

By signing and submitting this proposal, the individual applicant or the authorized official of the applicant institution is: (1) certifying that statements made herein are true and complete to the best of his/her knowledge; and (2) agreeing to accept the obligation to comply with NSF award terms and conditions if an award is made as a result of this application. Further, the applicant is hereby providing certifications regarding debarment and suspension, drug-free workplace, and lobbying activities (see below), as set forth in Grant Proposal Guide (GPG), NSF 04-2. Willful provision of false information in this application and its supporting documents or in reports required under an ensuing award is a criminal offense (U. S. Code, Title 18, Section 1001).

In addition, if the applicant institution employs more than fifty persons, the authorized official of the applicant institution is certifying that the institution has implemented a written and enforced conflict of interest policy that is consistent with the provisions of Grant Policy Manual Section 510; that to the best of his/her knowledge, all financial disclosures required by that conflict of interest policy have been made; and that all identified conflicts of interest will have been satisfactorily managed, reduced or eliminated prior to the institution's expenditure of any funds under the award, in accordance with the institution's conflict of interest policy. Conflicts which cannot be satisfactorily managed, reduced or eliminated must be disclosed to NSF.

### Drug Free Work Place Certification

By electronically signing the NSF Proposal Cover Sheet, the Authorized Organizational Representative or Individual Applicant is providing the Drug Free Work Place Certification contained in Appendix C of the Grant Proposal Guide.

### Debarment and Suspension Certification

(If answer "yes", please provide explanation.)

Is the organization or its principals presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency?

Yes

No

By electronically signing the NSF Proposal Cover Sheet, the Authorized Organizational Representative or Individual Applicant is providing the Debarment and Suspension Certification contained in Appendix D of the Grant Proposal Guide.

### Certification Regarding Lobbying

This certification is required for an award of a Federal contract, grant, or cooperative agreement exceeding \$100,000 and for an award of a Federal loan or a commitment providing for the United States to insure or guarantee a loan exceeding \$150,000.

### Certification for Contracts, Grants, Loans and Cooperative Agreements

The undersigned certifies, to the best of his or her knowledge and belief, that:

(1) No federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure of Lobbying Activities," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, Title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

AUTHORIZED ORGANIZATIONAL REPRESENTATIVE		SIGNATURE	DATE
NAME <b>Peggy S Lowry</b>		<b>Electronic Signature</b>	<b>May 17 2004 7:50PM</b>
TELEPHONE NUMBER <b>541-737-3437</b>	ELECTRONIC MAIL ADDRESS <b>Sponsored.Programs@orst.edu</b>		FAX NUMBER <b>541-737-3093</b>

\*SUBMISSION OF SOCIAL SECURITY NUMBERS IS VOLUNTARY AND WILL NOT AFFECT THE ORGANIZATION'S ELIGIBILITY FOR AN AWARD. HOWEVER, THEY ARE AN INTEGRAL PART OF THE INFORMATION SYSTEM AND ASSIST IN PROCESSING THE PROPOSAL. SSN SOLICITED UNDER NSF ACT OF 1950, AS AMENDED.

**02 INFORMATION ABOUT PRINCIPAL INVESTIGATORS/PROJECT DIRECTORS(PI/PD) and  
co-PRINCIPAL INVESTIGATORS/co-PROJECT DIRECTORS**

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Submit only ONE copy of this form for each PI/PD and co-PI/PD identified on the proposal. The form(s) should be attached to the original proposal as specified in GPG Section II.B. Submission of this information is voluntary and is not a precondition of award. This information will not be disclosed to external peer reviewers. **DO NOT INCLUDE THIS FORM WITH ANY OF THE OTHER COPIES OF YOUR PROPOSAL AS THIS MAY COMPROMISE THE CONFIDENTIALITY OF THE INFORMATION.**

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**PI/PD Name:** Dawn J Wright

**Gender:**  Male  Female  
**Ethnicity:** (Choose one response)  Hispanic or Latino  Not Hispanic or Latino

**Race:**  
(Select one or more)  
 American Indian or Alaska Native  
 Asian  
 Black or African American  
 Native Hawaiian or Other Pacific Islander  
 White

**Disability Status:**  
(Select one or more)  
 Hearing Impairment  
 Visual Impairment  
 Mobility/Orthopedic Impairment  
 Other  
 None

**Citizenship:** (Choose one)  U.S. Citizen  Permanent Resident  Other non-U.S. Citizen

**Check here if you do not wish to provide any or all of the above information (excluding PI/PD name):**

**REQUIRED: Check here if you are currently serving (or have previously served) as a PI, co-PI or PD on any federally funded project**

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**White.** A person having origins in any of the original peoples of Europe, the Middle East, or North Africa.

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Collection of this information is authorized by the NSF Act of 1950, as amended, 42 U.S.C. 1861, et seq. Demographic data allows NSF to gauge whether our programs and other opportunities in science and technology are fairly reaching and benefiting everyone regardless of demographic category; to ensure that those in under-represented groups have the same knowledge of and access to programs and other research and educational opportunities; and to assess involvement of international investigators in work supported by NSF. The information may be disclosed to government contractors, experts, volunteers and researchers to complete assigned work; and to other government agencies in order to coordinate and assess programs. The information may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, NSF-50, "Principal Investigator/Proposal File and Associated Records", 63 Federal Register 267 (January 5, 1998), and NSF-51, "Reviewer/Proposal File and Associated Records", 63 Federal Register 268 (January 5, 1998).

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**PI/PD Name:** Gail L Achterman

**Gender:**  Male  Female  
**Ethnicity:** (Choose one response)  Hispanic or Latino  Not Hispanic or Latino

**Race:**  
(Select one or more)  
 American Indian or Alaska Native  
 Asian  
 Black or African American  
 Native Hawaiian or Other Pacific Islander  
 White

**Disability Status:**  
(Select one or more)  
 Hearing Impairment  
 Visual Impairment  
 Mobility/Orthopedic Impairment  
 Other  
 None

**Citizenship:** (Choose one)  U.S. Citizen  Permanent Resident  Other non-U.S. Citizen

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**PI/PD Name:** Karyle S Butcher

**Gender:**  Male  Female

**Ethnicity:** (Choose one response)  Hispanic or Latino  Not Hispanic or Latino

**Race:**  
(Select one or more)

American Indian or Alaska Native  
 Asian  
 Black or African American  
 Native Hawaiian or Other Pacific Islander  
 White

**Disability Status:**  
(Select one or more)

Hearing Impairment  
 Visual Impairment  
 Mobility/Orthopedic Impairment  
 Other  
 None

**Citizenship:** (Choose one)  U.S. Citizen  Permanent Resident  Other non-U.S. Citizen

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**PI/PD Name:** Tim E Fiez

**Gender:**  Male  Female  
**Ethnicity:** (Choose one response)  Hispanic or Latino  Not Hispanic or Latino

**Race:**  
(Select one or more)  
 American Indian or Alaska Native  
 Asian  
 Black or African American  
 Native Hawaiian or Other Pacific Islander  
 White

**Disability Status:**  
(Select one or more)  
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**PI/PD Name:** Curt Pederson

**Gender:**  Male  Female  
**Ethnicity:** (Choose one response)  Hispanic or Latino  Not Hispanic or Latino

**Race:**  
(Select one or more)  
 American Indian or Alaska Native  
 Asian  
 Black or African American  
 Native Hawaiian or Other Pacific Islander  
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## List of Suggested Reviewers or Reviewers Not To Include (optional)

---

### **SUGGESTED REVIEWERS:**

Zorica Nedovic-Budic, U. of Illinois-UC

Barbara J. Ryan, USGS

Karen Siderlis, USGS

Carl Reed, Open GIS Consortium

### **REVIEWERS NOT TO INCLUDE:**

Not Listed

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## **The Virtual Oregon Map: A Partnership to Enhance Geospatial Awareness and Interoperability for Improved Business Processes and Decision-Making**

**Lead PIs and Institution** – Dawn Wright, Tim Fiez, Oregon State University (OSU)

**Partner Organizations - Govt Lab:** USDA Forest Service Pacific Northwest Research Lab. **Govt:** City of Corvallis GIS, Oregon Watershed Enhancement Board, Oregon Governor's Office (Natural Resources Policy), State of Oregon Dept. of Administrative Services, Willamette Council of Governments, Confederated Tribes of Umatilla Reservation.

**Private Sector:** Alsea Geospatial, ESRI, Global Mapping Technologies, Newlands & Company, Titan. **Other:** The National Map, U.S. Geological Survey

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Proposed is the development of innovations in the open source web service cataloging, viewing and distribution of place-based (geospatial) environmental data of Oregon, along with education and outreach throughout the state on how best to incorporate various data sets, images, and geospatial tools to support private and government enterprises throughout the Pacific Northwest. The Virtual Oregon map will be an innovative portal that incorporates three components: an OpenGIS (geographic information system) service metadata catalog; an OpenGIS service map viewer; and a reference set of geospatial analytical web services; Planned **innovation outcomes** include developing the capacity to deliver interoperable geospatial solutions throughout our region by training and technical assistance, mainly via a series of training workshops for government agencies, businesses, and academic faculty/staff/students; a web portal for geospatial interoperability education; a unique internship program that sends students *out*, but brings private sector and government partners *in* (to campus labs); and general public outreach through the international GIS Day.

### **Intellectual merit of the project**

Digital data sets are growing exponentially nationwide and our society has changed from being data-poor to data-rich. At the same time, our ability to *derive knowledge and management decisions* from all of these data in an analytical context remains poor. Any problems that remain in finding data are now compounded by the additional challenge of effectively filtering through large volumes of it in order to find meaningful knowledge. From an organizational perspective, although geospatial data sets are legion, there has been a general inability and often unwillingness to exchange data across boundaries, exacerbated by low levels of coordination. Government agencies, businesses, academic institution, and even non-profit organization all have a tremendous stake in the development and management of geospatial data resources. Developing and maintaining a unified community database requires an organizational structure that can build *and* link databases distributed throughout the worldwide web is sorely needed. Why geospatial data? It is: (1) critical for managing our natural resources and all public infrastructure; (2) management is more difficult for most types of geospatial data sets because of their large volumes do not lend themselves to existing database management approaches, particularly over the web; and (3) maps and imagery (especially of local features) are unusually compelling tools for teaching and public awareness. We note that the NSF PFI program has not yet funded an Oregon partnership, nor one that focuses on geospatial data in the manner that we are proposing.

### **Broader impacts of the project**

- ◆ Wide data dissemination to enhance scientific and technological understanding – Data will be broadly and easily accessible to the state of Oregon's natural resource community and to libraries, high schools, and outreach sites. Linkages will be made to parallel research in geographic information science, digital library development, and computer science.
- ◆ Advancing discovery and understanding; promoting teaching, training and learning – Our partnerships with private sector and state, local, and tribal governments will allow us to incorporate natural resource data sets into faculty resource materials. Moreover, the project advances research in each of the component disciplines by building on other recent work, an approach that will yield a number of student research topics at both undergraduate and graduate levels
- ◆ Broadening the participation of underrepresented groups – Three of the PIs are women; one is a woman of color. All will play vital roles in encouraging women and minority scientists to enter research careers. The research labs of the lead PIs have an established policy of recruiting from underrepresented groups, who consistently account for over 50% of its staff and student researchers.
- ◆ Benefiting society – Developing workshop materials and demos/tours/presentations for international GIS Day will allow us to analyze, interpret and synthesize research and education results into formats understandable and useful for non-scientists.
- ◆ Economic impact - The project heavily involves GIS development, use, and education. GIS is now an \$8 billion industry, still expanding, with 2003 software revenues that topped \$1.75 billion, an increase of 8%. ESRI, a major industry partner in this proposal, has software revenues accounting for nearly 1/2 of that total. We have a specific goal of increasing the scientific and technological capabilities of the workforce in GIS and similar geospatial technologies within the state of Oregon and to more fully meet these important needs through internships with our partners.

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# **The Virtual Oregon Map: A Partnership to Enhance Geospatial Awareness and Interoperability for Improved Business Processes and Decision-Making**

## **Narrative Description**

(8-page limit according to NSF Program Solicitation 04-556)

### **The Challenge and Need for Innovation**

Digital data sets are growing exponentially nationwide, especially with recent launches of high-resolution satellite systems (e.g., Carlson and Patel, 1997) and the increasing ease with which digital imagery, video, and sound are delivered over the Internet. Digital libraries now enable 24-hour access to digital papers, journals, books, and data [Buttenfield and Goodchild, 1996; Buttenfield, 1998]. And with the steady rise in adoption and use of geographic information systems (GIS), there has been a proliferation of geospatial data available in digital form and a considerable increase in the number of users and producers of these data, making access and effective integration a very difficult challenge [e.g., Nedovic-Bujic, 2002]. All of these developments are literally changing the way people think and work, giving rise to the notion of "digital worlds" [NSF Information Infrastructure Task Force, 1993; Negroponte, 1995].

Indeed, our society has changed from being data-poor to data-rich, but our ability to *derive knowledge and management decisions* from all of these data in an analytical context remains poor. In a perfect world, all decisions would be based on the most complete, accurate, and affordable digital data using the best possible analytical tools. Unfortunately, we all know of documented examples where decision makers were presented with incomplete data, out-of-date data or data sets created at great expense because the creators did not know of the existence of already available data. As data increase in size and complexity, decision makers must rely upon analytical tools to interpret the data. However, because of proprietary issues, complexity of the tools, or simply not knowing the tools exist, researchers and decision makers often do not take advantage of the most appropriate analysis tools.

These issues are extremely important for geospatial data and geospatial analysis. Geospatial data are pieces of information about phenomena organized in a spatial (geographic) frame. This could be a point such as location of sampling point, a line segment such as a road, an area such as the extent of a park, or a raster coverage such as a remotely sensed map of vegetation. Many, if not most, types of applied biological, sociological, and economic data have geospatial components. In many cases, an attribute such as "the Willamette River", "the Pacific Northwest", or "Multnomah County" may be used instead of specific map coordinates. Geospatial analysis involves methods that are applied to specific map coordinates, revealing important patterns and anomalies in the data, add value, and/or support decision- and policy-making.

Because of the importance of geospatial data in such a wide range of issues such as endangered species protection, business infrastructure development, and transportation planning, there is an ever growing demand for geospatial data and geospatial data analysis. In the state of Oregon over the last 2 years, nearly \$500,000 were spent for geospatial data services [Smith, 2003]. GIS departments are common in federal, state, tribal, and local governments and there are numerous commercial businesses that provide data and analysis services. While these developments are positive, the issues of providing the best and most cost effective data and tools still exist.

In part, they exist because of the multi-dimensional nature of the problems where geospatial data are applied. For example, Oregon's Department of Transportation is undertaking the rebuilding of 365 state bridges. Each bridge project requires an environmental assessment that requires data on wetlands, water quality, fish and wildlife, endangered species, historical and archeological sites, local land use and other features. Because of the wide range of data required, it is more effective for the Department of Transportation to combine data from sources that are experts on specific factors. But where do they find the data? If they do locate a suitable data set, how do they know it is the best or most up-to-date data set available? What if they decide to create a data set and then later find out that another agency had already created such a data set? What if they find a habitat analysis tool developed by a university scientist but it only runs with software X and the Department of Transportation uses software Y?

Fortunately, there are efforts underway that are addressing problems with sharing and finding geospatial data [important background discussions can be found in Katz et al., 1991; Masser, 1998; Gärtner et al., 2001; Miller and Han, 2001]. First among these efforts are solutions to the issue of finding public domain or commercial for-profit data. The United States Federal Government, state governments, commercial entities, and universities have worked to create searchable metadata catalogs that enable users to search descriptions of geospatial datasets. Notable efforts include the Federal Geographic Data Committee (FGDC), the Geospatial One-Stop (GOS) Initiative, and The National Map, all of which share the goal of building a National Spatial Data Infrastructure (NSDI) [Mapping Science Committee, 2001; Nedovic-Bujic, 2002; DeMulder et al., 2004], as well as the National Biological Information Infrastructure, and the Geography Network of the Environmental Systems Research Institute (ESRI). Oregon State University (OSU) is just completing a regional metadata clearinghouse called the Virtual Oregon Natural Resource Data Clearinghouse. This effort, led by two of the investigators on this proposal and a foundation upon which we wish to build, has created a regional warehouse of geospatial metadata that enables data owners to inform potential users of a data set's existence [Keon et al., 2002; Fiez and Wright, 2004, <http://digitalcollections.library.oregonstate.edu/virtualoregoncatalog>]. Our approach is based in part on the scientific information model of Helly et al. [2003] for distributed Earth science/natural resource data in both relational databases *and* web links. Establishing well-maintained links over distributed websites and developing methods for rapidly disseminating and integrating data sets are critical to creating a community-wide resource. While we have initially populated the database with over 1200 records, the system also allows the creators of the data to manage their own metadata records. Local or regional efforts such as our Virtual Oregon Natural Resource Data Clearinghouse are essential for populating nationwide databases such as the GOS, which harvests metadata records from local or regional clearinghouses with the expectation that they are much better positioned for cataloging local data.

While the metadata catalogs help end users find data, the data are often in proprietary formats or formats that require specialized software for viewing and manipulating. Two important developments are working to eliminate the need for expensive, proprietary software in these instances. First is the ever growing number of World Wide Web-based mapping sites. These web sites and the server side software supporting them allow users to perform basic GIS operations. For example, see the site developed by the Oregon State University Library to provide natural resources information for the Willamette River Basin of Oregon [Butcher and Fiez, 2004, <http://digitalcollections.library.oregonstate.edu/WillametteBasinExplorer>; click maps link]. Typically, the creators of these sites provide maps/data related to a specific domain. In many cases, the data needs for a specific problem are not matched by one

single web mapping site. One might need some maps from site X and some maps from site Y. While there are some existing desktop software and thick client web tools that can in some cases combine maps from several web mapping sites, the user is forced to more complicated interfaces and installation processes.

Interoperability standards are the second development that is reducing the need for proprietary software. The OpenGIS Consortium (OGC, [www.opengis.org](http://www.opengis.org)), initiated in 1994, has defined a set of standards for distributed sharing of geospatial data. Among the OGC's specifications are a set of web service-like standards called web mapping service (WMS), web feature service (WFS), and web coverage service (WCS) which provide raster maps (images), non-gridded attribute and topology information, and gridded attribute information, respectively. By establishing these standards, the OGC has removed barriers to sharing/exchanging data related to proprietary data formats and communication protocols. Through the OGC's testbed initiatives and published specifications, commercial and non-commercial software developers have created both open-source and commercial software for sharing and integration of geospatial data via WMS, WFS, and WCS protocols.

A web mapping site that consumes WMS's can build a map from multiple web servers so that the user is not restricted to using data from a single server. A WMS delivers a raster map image. As long as the requested map images are in the same projection and cover the same geospatial extent, the web mapping software can overlay the images to make a synthetic map using data from many different sites.

A web mapping site using OpenGIS services solves many issues with sharing and using data from multiple sources, especially if the user only wishes to do simple browsing and querying of the data. However, many geospatial problems require sophisticated analyses. Typically these types of analyses are done using desktop software using built in tools or custom macros. Some web mapping software can be customized by developers to do more sophisticated operations but this then again restricts users of the data to specific websites.

There are some efforts to build web services or web service-like processes that can take OpenGIS services as inputs, process them, and produce a synthetic output. For example, the Canadian National Forest Information System is developing distributed spatial analytical agents (DSAA's) that can process WMS inputs and produce a derived WMS output [Stone, 2002]. These agents will enable buffering, dissolve/merge/mask, median filter, neighbor, and area calculation operations. We do not know of a similar system in the U.S., certainly not in the Pacific Northwest.

The OpenGIS Consortium's current Web Services Phase 2 Testbed includes the development of an image handling for decision support task. This testbed task requires the development of a chain of loosely coupled image manipulation web services so one can build an image handling client that consumes raw data in the form of WCS's from multiple locations, processes them through the web service chain, and displays the resulting image.

The developments above, metadata catalogs, open standards, web mapping systems, and web service-based analysis tools, each individually contribute to the goal of information operability where one can find, use, and analyze the best data for the problem at hand. **However, to fully achieve interoperability, all of them need to come together at the same time, and it is this major innovation that we propose to address in this project.** A catalog is of no use if there are no services available. A web

mapping client is of no use if the users cannot find services to view. Even more important, those with data must be brought into the system development because in the end, the utility of an interoperability data system depends on delivering data, information, to end users.

These challenges have also been identified by the University Consortium for Geographic Information Science (UCGIS, [www.ucgis.org](http://www.ucgis.org)), a non-profit consortium of over 70 of the nation's leading universities and research institutions in geospatial theory, methods, technology, and data and the academic voice of the geographic information science community, as a major short-term research priority. In fact, regional partnerships that seek to more effectively deliver data and information, and to guide and/or influence regional planning and urban development have been identified by the UCGIS as critical not only for data solution but for enabling creative solutions to broader environmental and socio-economic problems, for economic development, community service, and even the homeland security issues of responding to threats, disasters, and developing emergency operation plans and procedures [Elmes, 2000; Nedovic-Budic, 2002; Sietzen, 2003]. The situation cries out for innovation, innovation in the way that we catalog, distribute, analyze, and communicate regarding geospatial data.

The benefits of an integrative technology initiative to deliver geospatial data to today's decision makers are clear. We can reduce costs, improve decision making, and foster new business enterprises that assemble, package, analyze, and deliver these new information streams. However, successfully creating the infrastructure and providing the data for an interoperable geospatial data system exceeds the capacity of most organizations especially smaller businesses. We propose that a partnership of software and information architecture specialists, data providers, geospatial consultants, and end users can successfully build an interoperable geospatial data that will support private and government enterprises throughout the Pacific Northwest and serve as a model for such systems nationwide. We note that the NSF PFI program has not yet funded an Oregon partnership, nor one that focuses on geospatial data in the manner that we are proposing. We also have a specific goal of increasing the scientific and technological capabilities of the workforce in GIS and similar geospatial technologies within the state of Oregon, and to more fully meet these important needs through internships with our partners

Our effort will include two primary innovations:

- (1) Develop the capacity to deliver interoperable geospatial solutions throughout the region by training and providing technical assistance in cataloging of OpenGIS services, delivery of OpenGIS services, building web map interfaces, and using and creating geospatial analytical web services.
- (2) Build a Virtual Oregon Map (on top of the existing Virtual Oregon Natural Resources Data Clearinghouse) to provide an open catalog of regional web mapping services, a web mapping tool for viewing services in the catalog, and an introductory set of geospatial analytical web services.

The training and assistance program will provide individuals and organizations with the knowledge to find, deliver and utilize OpenGIS services in general, while the Virtual Oregon Map will provide an initial point within our specific region to find and use OpenGIS services and to prototype a larger developing role for geospatial analytical web services. This feedback loop between training/assistance and improvement of services as they used by partners at varying levels of complexity, will build a community of innovation in Oregon.

## (1) Providing Training and Technical Assistance

**Key partners necessary to ensure innovation:** Alsea Geospatial, City of Corvallis, ESRI, GMT, Willamette Valley Council of Governments, Titan

The training and technical assistance program will use a combination of workshops (see details in Management Plan) web-based resources, an implementation cookbook series (i.e., hands-on tutorials), and individual face to face interaction. Using both national and local expertise, these workshops will provide the participants with the knowledge to go back to their employer and function as an expert in utilizing and providing geospatial web services. We will form a conference organizing committee that reflects the makeup of the geospatial community throughout the region. OSU's multimedia classrooms offer the perfect setting for participants to actually do hands-on computer exercises illustrating the concepts. By holding the events on campus, we will help foster cooperative work between our university, the private sector, and local, state, and tribal governments. Several workshops are planned including:

- ! Workshop #1 (Year 1) to inform the campus and statewide community of data exchange and distribution efforts to see what everyone is doing and to reconfirm user needs revealed in Virtual Oregon survey of the OSU campus in 2000 and 2001 (<http://virtual-oregon.nacse.org/survey/>), as well as a statewide natural resources digital library survey conducted by J. Salwasser, Information Policy Advisor for OWEB ([-oregon.nacse.org/background/](http://oregon.nacse.org/background/)).
- ! Workshop #2 (Year 1) on cataloguing, metadata harvesting and decision support;
- ! Workshop #3 (Year 2) on interoperability (led in part by John Helly, San Diego SuperComputer Center);
- ! Workshop #4 (Year 2) on OpenGIS WMS, WFS, WCS focusing on focusing on state clearinghouses in order to exchange ideas with related efforts in Idaho, Montana, Washington, California;
- ! Workshop #5 (Year 3) on participating in national data efforts such as the National Map, the NBII, and the National States Geographic Information Council (NSGIC).

To provide a continuous non-place-bound educational resource, we will create an Internet portal for geospatial interoperability. This portal will focus on how-to advice and implementation examples. We will post at least one feature type article monthly as well as web logs from developers working on the Virtual Oregon Map project described later in this proposal and from the efforts of our partners. The site will include a newsgroup and we will recruit individuals to actively respond to posts especially in the early stages of the proposed work so those seeking help receive responses.

Using materials from workshop tutorials, web portal feature articles, and newsgroup postings, we will produce how-to cookbooks as downloadable publications. These publications will provide users with step by step instructions on how configure and use metadata catalogs, OpenGIS services, web-mapping clients, and geospatial analytical web services.

The final component of our training and technical assistance program, an internship program, will provide individual face-to-face interaction. We will offer two types of internships. First, we will place trained graduate and undergraduate students at enterprises implementing interoperable data services during the second and third years of this project, for periods of up to six months. These students will bring to the hosting

company the ability to support or lead efforts to implement interoperable data services. We will split the internship expenses with the hosting company so that both parties have a financial stake in ensuring a successful internship outcome.

For the second internship opportunity, we will host individuals from outside organizations in our development labs for up to three months (one quarter of the university calendar). While we will not cover the individuals' expenses during their time at the lab, we will provide them with a faculty and student mentor. We will require that interns in our labs have projects with defined objectives and sufficient resources to implement them. We will provide technical assistance and reference platforms so that they can leave the internship with a functioning prototype.

Through the combined impact of the workshops, web portal, cookbook publications, and internships, we will establish a cadre of geospatial interoperability specialists. Furthermore and equally important, these efforts will establish relationships between working professionals throughout the region and beyond. Relationships such as these are essential in developing interoperable systems as they require more than just software and standards.

There are substantial economic workforce issues as well, as the broader geospatial technology industries (which include GIS, web GIS servers and services, global positioning systems or GPS, relational database management systems or RDBMS, remote sensing, surveying, digital and multimedia cartography, and the like) will continue to grow and require qualified candidates. These candidates must NOT be just button pushers, but geospatially aware people who understand how to think critically about data and the accompanying issues of data quality, data mining and knowledge discovery, data uncertainty, data visualization, geospatial analysis, [UCGIS, 1996], **and how to capitalize on new knowledge produced from efforts such as our proposed PFI partnership.** GIS is now a \$8 billion industry, with 2003 software revenue topping \$1.75 billion, an increase of 8% over the previous year [Daratech, 2003]. ESRI, a major industry partner in this proposal, has software revenues accounting for nearly one-half of that total. ESRI along with literally hundreds of other companies in scores of different industries (e.g., forestry, agriculture, transportation, environmental management, defense and intelligence, telecommunications, banking and insurance, retail and commercial business, petroleum, water/wasterwater, law enforcement, etc.) are looking for individuals with excellent training and practical experience with GIS, and knowledge of interoperability issues critical to successful implementation.

## **(2) The Virtual Oregon Map**

The Virtual Oregon Map will consist of four components. These are

- 1) an OpenGIS service metadata map catalog
- 2) a OpenGIS service map viewer
- 3) a reference set of geospatial analytical web services
- 4) a web portal that serves as the home site for all project web components

### ***The Virtual Oregon Map Catalog***

**Key partners necessary to ensure innovation:** ESRI, State of Oregon Department of Administrative Services (DAS), USDA Forest Service

The map catalog will form the basis of the Virtual Oregon Map. The catalog will contain records of WMS, WFS, and WCS services that users can view and interact with in the map viewer.

We will populate the Virtual Oregon map catalog by searching metadata from the USGS Geospatial One-Stop metadata catalog, NSDI sites and other regional metadata catalogs such as the Virtual Oregon Natural Resources Data Clearinghouse. These sites contain records for many forms of geospatial data. The harvesting process for the Virtual Oregon metadata catalog will only harvest records that cite WMS, WFS, and WCS sites. Because a service specification is not part of the required FGDC metadata specification, we will use appropriate metrics to determine if metadata records reference WMS's, WFS's, or WCS's.

In addition to harvesting, the Virtual Oregon map catalog will allow users to register or nominate WMS's, WFS's and WCS's to the collection. We will also provide a system where users can register metadata catalogs for harvesting by the Virtual Oregon map catalog.

Similar to popular metadata cataloging systems such as ESRI's Metadata Explorer/SDE system, the Virtual Oregon map catalog will store complete metadata records so that users of the Virtual Oregon Map can access detailed metadata as needed. In addition, the Virtual Oregon Map will extract information from the metadata records to help users construct appropriate combinations of data. For example, map scale and accuracy are essential factors in any geographic information system analysis. The Virtual Oregon map catalog will tabulate records on scale, accuracy, data age and other factors that will enable users to make better, more informed decisions about which data sets are appropriate for their analysis needs.

### ***The Virtual Oregon Map Viewer***

**Key partners necessary to ensure innovation:** Alsea Geospatial, ESRI, OWEB, State of Oregon Department of Administrative Services (DAS)

A key component to achieving our overall goal of helping people and organizations make better decisions that utilize geospatial data, the Virtual Oregon Map viewer will provide web-based access to the data referenced within the Virtual Oregon Map Catalog. Users will be able to select which map layers (WMS's) to view, set the display order, and perform all normally expected web mapping operations such as zoom, pan, print, save map image, identify map features, view layer metadata, and query by feature attributes.

We will develop two map viewer interfaces, one for novice users and one for advanced users. For those new to working with mapping software, the novice interface will present a subset of the map viewer's features while the advanced user interface will access all of the GIS capability that we can provide.

### ***Geospatial Analytical Web Services***

**Key partners necessary to ensure innovation:** Alsea Geospatial, Newlands & Company, State of Oregon Department of Administrative Services (DAS)

Geospatial analytical web services will allow the incorporation of advanced features into clients such as the Virtual Oregon Map. Geospatial analytical web services are processing services that allow users of web data streams such as WFS and WCS's to

incorporate functionality that are typically only available in desktop GIS software. The geospatial analytical web services will use WFS and WCS's as inputs and produce WMS, WFS or WCS's as outputs. With WFS and WCS's providing vector and raster data respectively, the operations that geospatial analytical web services could perform are only limited by processor time. For example, the intersection and reclassifying of millions of polygons might take hours of processing time and would not be suited for real time web display.

To prototype and test the functionality of geospatial analytical web services, we will create a set of basic services to perform the following operations:

1. A reporting tool providing summary statistics of WCS and WFS data within a given region.
2. A hazard/suitability assessment tool utilizing WCS's.

**Reporting Tool.** The reporting tool will summarize attribute data (either polygons or grid cells) contained within a specified area. For each attribute value, the tool will return area and percent of the area specified. These data will allow the client that calls the reporting tool to create summary tables and graphs. For example, prepare a report of current land use within a proposed annexation area. The tool will provide the option of splitting polygons that span the boundary of the specified area so that the area calculations are correct for any arbitrary reporting region.

**Hazard/Suitability Assessment Tool.** The hazard/suitability assessment tool allows users to combine raster data sets to produce an aggregate 0 to 1 scaled raster data set for analysis and display. The tool will perform the following operations:

1. Transform raster data sets of discrete feature classes into a value or intensity map. For example, transform an agriculture land use map into a map of dollar value per acre by applying a lookup table that equates land use to dollar value.
2. Transform raster data sets to 0 to 1 scale. For example, convert a map of agricultural dollar value per acre to a 0 to 1 index where 1 represents the greatest value per acre.
3. Combine two or more 0 to 1 index maps to provide an aggregate weighted hazard/suitability index such that map  $Y = x_1I_1 + x_2I_2 + \dots + x_nI_n$  where  $\sum x_i = 1$  and  $I_i =$  index data set  $i$  (0 to 1 scale) .  
For example, produce a land value map by combining an agriculture land value index map with a habitat land value index map.

We will use the OpenGIS's Service Information Model (SIM) to describe our geospatial analytical web services. This model uses an XML vocabulary to describe the service interface so an automated process can utilize the service and additionally describes the data requirements of the service.

### ***Virtual Oregon Web Portal***

The Virtual Oregon Web Portal will serve as the entry point to all Virtual Oregon Map Components including the metadata map catalog, the Virtual Oregon Map viewer, user information for the geospatial analytical web services, the geospatial interoperability educational web site, and the hands-on cookbook series.

## Management Plan (3-page limit)

### Implementation and Administration

We propose to complete the project over a 3-year period with a project timeline as presented below in Innovation Outcomes section. Initial administrative functions of the lead institution (OSU) will include: (a) development of topics, presentation materials and learning outcomes for workshops, with parallel development or compilation of hands-on tutorials; (b) web portal design and creation, newsgroup or Wiki set up and moderation; (c) development of add-on to existing Virtual Oregon Natural Resources Clearinghouse to phase in to Virtual Oregon Map Catalog and accepting additional data and metadata submissions for input; (d) construction of a web client for the Virtual Oregon Map Viewer tracking data sets from initial data gathering through final submission; (e) design and build Geospatial Analytical Web Services; (f) working with data providers (partners) on data quality control and procedures for submitting data and metadata; and (g) disseminating information to campus and statewide communities on additions/changes to the entire project or changes in infrastructure/procedures.

Virtual Oregon team members will meet monthly throughout the 3-year period of the project to monitor and assess progress toward innovation goals, refine implementation plans, discuss roadblocks and their removals (often in consultation with our private sector and government partners), and plan for the workshops and community outreach activities. All Virtual Oregon team members, partners, and interested supporters will be subscribed to a Wiki or listserv to keep everyone apprised of progress on the project (especially as we set up the initial drafts of our web services catalog and viewer). This has been a challenge in our state (i.e., keeping abreast of what others are doing). A representative of each partner will sit on the **Virtual Oregon Center Advisory Board**, which will meet at every two months in Year 1 and at least twice a year in Years 2 and 3. Partners will be invited to all workshops. Internship or job opportunities will be passed on to our students and we will provide you some of our best students using funds from the grant for internships.

### Partners and Roles

The respective roles and responsibilities of each of the 12 partner organizations with Virtual Oregon are summarized in the table near the end of this Project Description and in the Supporting Documents. Our Partnership for Innovation is founded on four sectors: private sector (business); state, local, and tribal government; academic; and federal (government lab and national initiative).

**Our private sector and NGO** partners gain access to new knowledge and a workforce that can capitalize on it, as well as the ability to use the resources and capabilities of academic institutions. They contribute developing and state-of-the-art information technologies and services. Their participation reflects both an interest in the practical applications of technology and a long history of successful research and development programs. Our private sector and NGO partners include **ESRI**, the world's leading GIS company (34 straight years and running) with more than 1,000,000 customers worldwide. It maintains a business partner program with more than 1,500 developers, consultants, resellers, and data providers; a network of more than 75 international distributors with users in more than 220 countries, and invests nearly 20% of its revenues each year in research and development ([www.esri.com](http://www.esri.com)). **Alesea Geospatial** ([www.alseageo.com](http://www.alseageo.com)) is an independent GIS consulting firm in Corvallis, as well as a business partner with ESRI (authorized trainer and reseller of ESRI products), and a leader in public access GIS and interactive mapping. In 2002 it was named ESRI Business Partner of the Year. **Global Mapping Technology** ([www.gmtgps.com](http://www.gmtgps.com)) is another Corvallis company that excels in the distribution and training of GPS and integrated GPS/GIS equipment and software. They are a longstanding support of OSU and have been critical in

the success of our community outreach events and workshops. This will again be an important role for them in the NSF PFI endeavor. Along with ESRI and Alsea Geospatial, **Titan Systems Corporation** ([www.titan.com](http://www.titan.com)) will provide valuable consultation on workshops, while continuing as an important collaborator with our State government. Their Geospatial Services Division specializes in the integration of GIS with mainstream RDBMS and other information systems, as well as specifying requirements for various geospatial information, analysis and output, and authentication, platform identification and access control services for databases. **Newlands & Company** provides high-quality illustration, animation, photography, video and multimedia presentation services for architecture, transportation, and urban design. It is also developing capability and innovations in 3-D maps and 3-D GIS analytical models. They will contribute to the effective design of our geospatial analytical web services, and provide student internships.

**Local and state government** partners gain sustainable development activities and access to personnel and resources to help them reach their goals. They often seek innovative applications of technology to improve public services and government operations. Without a partnership with academia and the private sector, they often find it more difficult to take full advantage of opportunities for innovation. **The State of Oregon DAS** houses the Information Resources Management Division, and within that the Oregon Geospatial Enterprise Office. This entity is under the direction of the Oregon statewide GIS coordinator, and leads or assists in the coordination of GIS activities throughout the state, facilitates communication about GIS issues, and maintains the website that hosts statewide "framework" geospatial data for the State of Oregon (i.e., the most basic, commonly used geographic data such as elevation, geodetic control, street network, and rivers and streams, etc.) ([www.gis.state.or.us](http://www.gis.state.or.us)). **OWEB** ([www.oweb.state.or.us](http://www.oweb.state.or.us)) is a state agency led by a board of natural resource agency commissioners and citizens to promote and fund voluntary programs that support Oregon's efforts to restore salmon runs, improve water quality, and strengthen ecosystems that are critical to healthy watersheds and sustainable communities. Previous sections of the proposal have outlined the critical roles that both of these entities will play in the proposed project. **The City of Corvallis GIS** ([www.ci.corvallis.or.us](http://www.ci.corvallis.or.us)) was recently recognized by ESRI with a Special Achievement in GIS Award for innovative field data collection and mapping and the development of GISMO, a customized interface for viewing, querying, report-generation, and simple mapping. As with Global Mapping Technology they have been a longstanding supporter of OSU and will be critical to the success of our workshops and community outreach. We will also seek their input on the usability of our final map viewer. **The Willamette Valley Council of Governments** ([www.mwvcog.org](http://www.mwvcog.org)) represents 3 Oregon counties, 31 cities, 9 special districts, and the Confederated Tribes of the Grand Ronde. They also coordinate the Willamette Valley GIS User Group, the membership of which includes government workers but also GIS technicians, analysts, and researchers at community colleges, universities, and small companies throughout west-central Oregon. They will play an important role in testing and giving us feedback on our final products from the standpoint of the average user. They, along with **the Confederated Tribes of the Umatilla Reservation** will participate in our training and technical assistance program, particularly as visiting interns to the OSU campus.

**Federal** partners bring a wide range of expertise in a variety of fields and have very active research and education programs, but sometimes not the infrastructure that is needed to foster innovation. The **USDA Forest Service Pacific Northwest Research Lab** is resident on the OSU campus within the College of Forestry's Forestry Sciences Lab and conducts research in resource inventory and management, land use/land cover, aquatic/land interactions, and ecosystem processes. It will provide a critical researcher to the Virtual Oregon team at no cost (Valentine) and lead in the development of the ArcIMS Metadata Server and Explorer applications.

## **OSU Research Team and Results of Prior NSF Support**

The PFI program solicitation states that “a senior institutional administrator (Dean or higher) in the lead institution must serve as Principal Investigator or Co-Principal Investigator”. As such, our project PI team includes:

- ! **Gail Achterman**, Director of the new Institute for Natural Resources (INR). The INR was created by the State of Oregon legislature with the Oregon Sustainability Act of 2001, and seeks to improve the sustainability of natural resources within Oregon, and to secure their ongoing contributions to our environments, economies and communities. Achterman will serve as the main INR liaison for the proposed project, the activities of which will fall under the purview of the INR’s “Information Office” ([inr.oregonstat.edu](http://inr.oregonstat.edu)). As INR Director, Achterman oversees the development of grant proposals and the projects contracted by agencies to the institute.
- ! **Karyle Butcher, Donald and Delpha Campbell University Librarian and Deputy Vice Provost for Information Services**. Our University Librarian has direct responsibility for supervision and coordination of The Valley Library (our university library) on the OSU campus and the Guin Library in Newport at the Hatfield Marine Science Center, including cataloguing services and the development of digital library initiatives and resources. Butcher was Oregon's Librarian of the Year in 1998.
- ! **Curt Pederson, Vice Provost for Information Services**. Our Vice Provost provides coordination, vision, leadership, and advocacy for the effective application of information technologies to the instructional, research, and service missions of the university. He has line responsibility for university computing services (including central web services), classroom support via the Communications Media Center, student computing facilities, telecommunications, television engineering, distributive education infrastructure, and the Valley Library.

Achterman, Butcher, and Pederson will all serve as members of the Virtual Oregon Advisory Board, along with an experienced team of four senior personnel uniquely qualified to complete this project (whose roles, duties, and levels of effort are described in the **Budget Justification**). The Board will ensure that our vision and partnership activities stay on track, while also facilitating the incorporation of innovations in to the policies and practices of the university. The following OSU faculty members round out the PI team:

**Tim Fiez**, OSU Libraries Willamette Basin Project spatial data research coordinator, will serve as lead PI on the project, working with Wright on overall project management, and overseeing the architecture, programming, and hosting of the Virtual Oregon Web Services Catalog and Map Service. Fiez led the creation of the existing Virtual Oregon Natural Resources Clearinghouse, and will tie this in to the proposed effort, as well as the existing Willamette Basin Conservation Project of the university’s Institute for Natural Resources. He has a varied professional background perfectly suited to this project, having held past positions as a software engineer, a professor of soil science, and a farmer.

**Dawn Wright**, professor of Geosciences at OSU, will serve as a second lead PI on the project, working with Fiez on overall project management and overseeing workshop facilitation, hosting of partner interns visiting OSU, Virtual Oregon web portal design and implementation, Virtual Oregon Geospatial Analytical Web Services, public outreach efforts (including GIS Day), and supervision of students. She will also provide of budget and progress reports to NSF and annual progress/workshop visits to the NSF PFI program. Wright will also maintain communication with all the partners and co-organize/lead advisory board meetings with Fiez. She was a lead PI during the Virtual Oregon startup phase. Wright is involved in the development and maintenance of several data and analysis portals, and has been a leader for a variety of GIS mapping and process studies of the marine environment, culminating in the publication of the first book on the subject [Wright and Bartlett, 2000]. Her **Results of Prior NSF Support** are outlined in **Supporting Documents**.

## **Innovation Outcomes (3-page limit)**

We propose to support and sustain innovation through a partnership between academe, state/local/federal government and the private sector focused on geospatial operability. This partnership will design and develop (1) a single portal that brings together metadata catalogs, open standards, web mapping systems, and web service-based analysis tools, where one can find, use, and analyze the best data for the problem at hand; (2) the capacity to deliver interoperable geospatial solutions throughout our region by training and technical assistance. The proposed partnership addresses the three goals of the PFI, stimulation of knowledge transformation into innovation, broadening participation to meet workforce needs, and infrastructure development for long-term innovation while addressing the pressing need for better sharing and utilization of geospatial data as follows.

### **Stimulation of Knowledge Transformation into Innovations**

We will stimulate the transfer of knowledge into innovations through the development of the Virtual Oregon Map. The Virtual Oregon Map will serve as a reference system that in addition to stimulating knowledge transfer will help NSF meet workforce needs and develop infrastructure for long-term innovation (described below). The Virtual Oregon Map will serve as one example of the utility of interoperable geospatial systems, but it is not meant to be the exclusive example. The educational and outreach components of this project will prepare our partners and others to take the components of the Virtual Oregon Map, the OpenGIS service catalog, the map viewer, and the geospatial analytical web services, and build new, better, and more innovative services and enterprises. There are tremendous opportunities in helping people find geospatial data on the web (e.g. a geo Google), providing task specific web interfaces, and providing meaning to data through analysis tools.

**Monitoring and Assessment.** To monitor innovations stemming from the proposed work, we will provide a showcase section on the Virtual Oregon Map web portal where people can promote their work at no charge. Because we are developing interoperable networks, it is not possible to know of every possible use of the system components but the showcase section will provide a voluntary de facto reporting system that will enable us to assess the rate and extent of knowledge transfer.

### **Broadening Participation to Meet Workforce Needs**

Our project depends on broad participation of individuals representing academic, government, tribal, and small and large businesses. Both our educational program and the Virtual Oregon Map require collaborative effort to be successful. Just as the Virtual Oregon Map depends on a network of data providers and analysis services, our educational and outreach program will develop and depend upon a network of geospatial professionals.

**Monitoring and Assessment** We will tabulate and track participation in all components of our project. We will build from the participants listed in the List of Partnership Organizations and Personnel section. We will monitor participation to make sure we have representation from all types of geospatial businesses and organizations and that we have representatives from all areas of Oregon. We will also use the number of records in the Virtual Oregon Catalog as a measure of broadening participation. Our work should be reflected by an ever increasing number of WMS, WFS, and WCS's online throughout the region. Finally, we will monitor traffic on our geospatial interoperability web site and Virtual Oregon Map viewer to see if we are connecting to users.

## **Infrastructure Development for Long-Term Innovation**

We will develop two types of infrastructure necessary for long term innovation: people and a system implementation for sharing geospatial data, the Virtual Oregon Map. As discussed in the above Broadening Participation to Meet Workforce Needs section, our education and outreach plan will develop the geospatial professionals needed to drive an interoperable geospatial network. Then, the components of the Virtual Oregon Map will provide them with the building blocks for further innovation.

**Monitoring and Assessment** We will track participants in our workshops and on our geospatial interoperability web portal. These statistics will guide our recruitment, advertising, and outreach efforts and ensure that we are developing the necessary people infrastructure. We will establish a technical project manager for the Virtual Oregon Map and follow a development timeline to ensure that we successfully build and test the Virtual Oregon Map. As mentioned above, we will use web site traffic and the number of services in the Virtual Oregon map catalog to monitor success of the Virtual Oregon Map.

## **Related Outcomes**

Related outcomes that will foster innovation include:

### **Community Feedback**

Any resource intended for wide dissemination and use must incorporate a method to allow feedback from the community. We propose to provide simple online forms that allow users to make suggestions for improvements to the Virtual Oregon Map, inquire about search capabilities or data sets that are not presently available and report errors. A primary function of the Virtual Oregon data librarians and data managers (see project team description below and in the **Budget Justification**) will be to monitor these messages so that the PIs may designate the appropriate senior personnel on the project to address the points that are raised, and in a timely manner. Additionally, we will take advantage of various geospatial data and GIS meetings throughout the calendar year, such as gatherings of the Oregon Geographic Information Council, Framework Implementation Team, GIS Program Leaders, GIS in Action, Willamette Valley GIS User Group, etc. to describe and demonstrate the catalog and portal and solicit suggestions from the community.

### **Public Outreach**

A major outreach component of this project will be the participation of project personnel and partners in GIS Day. GIS Day is a global grassroots event where GIS users, educators, and vendors open their doors to schools, businesses, and the general public to showcase real-world applications of this important technology ([www.gisday.com](http://www.gisday.com)). OSU's GIS Day activities are sponsored by the Department of Geosciences and the College of Forestry, and include map and poster galleries, mapping demonstrations, and open houses. The City of Corvallis will again be asked to provide their mobile wireless mapping truck for an exhibit in the Memorial Union Quad, and industry partners Alsea Geospatial, ESRI, and Global Mapping Technologies will provide exhibits and presentations about their services and products in relation to the proposed work. In addition, several OSU graduate students will also be traveling to local area high schools to make special presentations. A new event planned for subsequent years is a special program for 100 local middle and high school students and their teachers, including a Geography Bowl competition, special videos, and a lunchtime question-and-answer session with campus GIS and remote sensing specialists. Part of this special program will include a "GPS hike" across the OSU campus so that students may learn about the GPS data that are often used in a GIS.

## For Long-Term Sustainability

Ultimately our desire is to use the web to access data in real-time using SOAP and more advanced XML technologies, along the lines of the current GOS for national transportation data, and research and develop data mining and knowledge discovery techniques for the Virtual Oregon Map. This will be in the next major proposal that we write to move beyond the NSF PFI effort. One goal will be to discover new patterns in very large, spatial databases (that are "data-rich" but "knowledge-poor"). In addition new methods will be developed for analyzing and presenting data in ways that make sense to non-scientists. Target audiences will include natural resource managers, industry, extension offices, students, and the general public. Research activities will necessitate a collaboration between geographers (led by Wright), library scientists (led by Fiez and Butcher), and computer scientists (led by Fiez and researchers at the Northwest Alliance for Computational Science and Engineering, or NACSE, at OSU, [www.nacse.org](http://www.nacse.org)). Computer science offers a variety of methods to formalize geographic knowledge, but many of them have not yet been broadly applied in geographic information science [Egenhofer and Herring, 1991]. We have already developed fundable, exciting research questions for this next phase that include:

- ! What is the best way to "mine" semi-structured map or vector data versus unstructured image raster data and can the two mining methods be combined in a single web-accessible system?
- ! How best to "mine" for data that is not explicitly stored in the database, for instance the position of salmon in a stream at any given point in time
- ! How can feature extraction be modified to facilitate knowledge discovery?
- ! How do emerging perceptions of digital (virtual) space map onto traditional conceptions of geographic space and how do we handle their interfaces analytically? [e.g., Janelle and Hodge, 1998]
- ! Development of data queries and strategies that go beyond just simple retrieval to content-based and knowledge-based retrieval.
- ! Statistical and classification tools to automate feature extraction and pattern identification, as well as the tools to visualize them in 2-D and 3-D.
- ! How can we use this to improve delivery of data through digital (virtual) space?

## Timeline for Innovation Outcomes

Task	Year 1				Year 2				Year 3			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Workshops			xx				xx				xx	
Educational Portal Development	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
Internship program					xx	xx	xx	xx	xx	xx	xx	xx
Virtual Oregon Map Portal	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
Map catalog development			xx	xx	xx	xx						
Map viewer development				xx	xx	xx	xx					
Geo. Analytical Web Services Dev.								xx	xx	xx	xx	

## List of Partnership Organizations and Personnel (2-page limit)

<b>ACADEMIC</b>		
<b>Partner</b>	<b>Senior Personnel</b>	<b>Commitment/Role</b>
<b>Oregon Natural Heritage Information Center</b> (part of Oregon State University)	James S. Kagan, Director Kuuipo Walsh, Res. Asst. 1322 SE Morrison Street Portland, OR 97214-2531 jimmy.kagan@oregonstate.edu 503-731-3070	<i>Senior personnel on this grant.</i> Contribute large, spatial and tabular resource data, esp. vegetation; innovations in map services for complex data sets; workshop support
<b>Oregon State University</b>	Wright, Fiez, Achterman, Butcher, Keon, Pederson, Williams, 4 others	<i>PIs &amp; senior personnel on this grant. See sections above for description of OSU team</i>
<b>GOVT LAB</b>		
<b>Partner</b>	<b>Senior Personnel</b>	<b>Commitment/Role</b>
<b>USDA Forest Service Pacific Northwest Research Station</b>	Theresa Valentine, Tom Spies Forestry Sciences Lab 3200 NW Jefferson Way Corvallis, OR 97331 theresa.valentine@oregonstate.edu 541-750-7250	Provide critical researcher to OSU team at no cost. Assist in developing web services catalog services and applications
<b>STATE &amp; LOCAL GOVT</b>		
<b>Partner</b>	<b>Senior Personnel</b>	<b>Commitment/Role</b>
<b>City of Corvallis GIS</b> (Benton County)	Alice Grucza, City GIS Coordinator Jon Nelson, City Manager 501 SW Madison Avenue Corvallis, OR 97339-1083 alice.grucza@ci.corvallis.or.us 541-766-6901	Provide internships, workshop presentations, guest lectures in OSU classes; innovation transfer via Dept. of Public Works; GIS Day outreach participant
<b>State of Oregon Department of Administrative Services</b> (Oregon Geospatial Enterprise Office)	Cy Smith, State GIS Coordinator Michael Freese, Chief Information Officer 955 Center St. NE, Rm. 470 Salem, OR 97301 cy.smith@state.or.us 503-378-3160	Coordinate catalog and portal with state natural resources clearinghouse; coordinate with <b>National Biological Info. Infrastructure (NBII)</b> Pacific Northwest Information Node
<b>State of Oregon Office of the Governor Natural Resources Policy</b>	James Brown Governor's Natural Resources Policy Director State Capitol Salem, OR 97301-4047 503-378-3111	Coordinator with Oregon Geospatial Enterprise Office; participate in workshops; beta-tester for catalog and map viewer
<b>State of Oregon Oregon Watershed Enhancement Board</b> (with 89 local Watershed Councils throughout Oregon)	Kenneth Bierly, Deputy Dir. 775 Summer St. NE, Suite 360 Salem, OR 97301-1290 ken.bierly@state.or.us 503-986-0178	Provide input on design and usability of portal, catalog, and map services; disseminate results of project to watershed councils, implement statewide info. sys. strategy
<b>Willamette Valley Council of Governments</b> (includes Marion, Polk, Yamhill Counties; 31 Cities; 9 Special Districts; Confederated Tribes of the	Lesley Hegewald 105 High St. SE Salem, OR 97301-3667 lhegewald@mail.open.org 503-588-6177	Provide input on design and usability of catalog and portal; provide information to university partners on internships, innovation transfer via <b>Willamette</b>

Grande Rhonde Community)		<b>Valley GIS User Group</b>
<b>Partner</b>	<b>TRIBAL GOVT Senior Personnel</b>	<b>Commitment/Role</b>
<b>Confederated Tribes of the Umatilla Indian Reservation</b>	Dan Haug, GIS Manager P.O. Box 638 Pendleton, OR 97801 danhaug@ctuir.com 541-966-2594	Contribute data, internship info; help build local capacity to use GIS through training on reservation, teacher groups, tribal community organizations, related non-profits
<b>Partner</b>	<b>PRIVATE SECTOR Senior Personnel</b>	<b>Commitment/Role</b>
<b>Alsea Geospatial</b>	John Gabriel, General Manager Karen Gabriel, President 450 SW Madison Ave. Corvallis, OR 97339-2380 john@alsegeo.com 541-754-5034	Provide internships, workshop presentations, guest lectures in OrSt classes; technology transfer; GIS Day participant
<b>Environmental Systems Research Institute (ESRI)</b>	Rob McDougald John Sharrard ESRI Northwest Suite 300 606 Columbia Street NW Olympia, WA 98501-1099 McDougald@esri.com JSharrard@esri.com 360-754-4727	Consulting on commercial products underlying project (ArcIMS Metadata Server, ArcSDE, etc.); internships; help to teach workshops; provide software via site license; 2-way innovation transfer; GIS Day participant
<b>Global Mapping Technology</b>	Richard Ash, President 1107 NW Oak Avenue Corvallis, OR 97330 gmtgps@peak.org 541-738-2934	Provide expertise, advice, teaching materials in GPS, incorporation of field GPS data in to map services, service; GIS Day participant
<b>Newlands &amp; Company, Inc.</b>	Donald Newlands, President 1926 NE 10 <sup>th</sup> Ave. Portland, OR 97212 www.nc3d.com 503-287-8000	Collaboration on innovations in 3-D data and visualizations as part of map, web services, and analytical services; storage and update of 3-D models; provide student internships
<b>Titan Systems Corporation</b>	Roger Crystal, Site Manager Geospatial Info. Systems Division 4099 SE International Way, Suite 206 Portland, OR 97222-8853 rcrystal@averstar.com 503-794-1344	Provide input on effectiveness of catalog and portal; provide workshop, seminar presentation; provide internships; lend homeland security perspective
<b>Partner</b>	<b>OTHER Senior Personnel</b>	<b>Commitment/Role</b>
<b>The National Map, U.S. Geological Survey</b>	Nancy Tubbs, Oregon Liaison, USGS Oregon District Office 10615 SE Cherry Blossom Portland, OR 97216 Nancy.tubbs@usgs.gov 541-251-3210 oregon.usgs.gov	Maintain, update, and make Virtual Oregon data available through National Map; participant and innovation in WMS services; GIS Day participant

## **Intellectual Property Rights (1 page limit)**

The proposed partnership will adopt the Oregon Board of Higher Education's *Policies Relating to Intellectual Property* reproduced in part below and found in full on the OSU Research Office web site at [oregonstate.edu/research/TechTran/form1.html](http://oregonstate.edu/research/TechTran/form1.html). This policy is also in keeping the NSF policy on intellectual property in section 730 of the NSF Grant Policy Manual (NSF 95-26).

### **Policy**

580-43-006 The educational and research activities of employees and partners of the Board of Higher Education and its institutions frequently result in the discovery of new knowledge in the form of invention, technological improvements, and the production of educational and professional materials. It shall be the general policy of the Board that such results be made available to the public in the most expeditious manner.

Stat. Auth.: ORS ch. 351 ; Hist.: HEB 8-1978. f. & ef. 12-5-78

### **Objectives of Policies**

580-43-007 It is the Board's intent to:

1) Provide systematic means of bringing inventions, technological improvements, and educational and professional materials into the public domain; 2) Encourage the development of new knowledge while protecting traditional academic freedom of employees and partners in the publication of materials, development of inventions, and discovery of technological improvements; 3) Establish principles and procedures for equitable sharing net royalty income with employees, partners, and with sponsoring agencies when required by an agreement. Stat. Auth.: ORS ch. 351; Hist.: HEB 8-1978. f. & ef. 12-5-78

### **Employee Responsibilities and Rights**

580-43-011

1. As a condition of employment, all Board and institution employees and partners shall agree to assign to the Board rights to:

(a) Any invention or improvement in technology conceived or developed using institutional facilities, personnel, information, or other resources; and (b) Educational and professional materials, whether or not registered for copyright, which result from the instructional, research, or public service activities of the institutions.

2. Employees shall be responsible for disclosing to designated institutional representatives all inventions, technological improvements, and educational and professional materials conceived, developed, and/or produced during the conduct of normal activities.

3. Employees shall be responsible for cooperating and assisting Board, institutional representatives, and partners responsible for patenting, licensing, registering for copyright, publishing, and generally assisting public access to new knowledge resulting from employee activities.

4. Employees and partners shall be eligible to share in net royalty income from each invention or separate improvement thereof, an amount not to exceed: (a) 40% of the first \$50,000, 35% of the next \$50,000, and 30% of all additional net royalty income received by the Board for inventions and technological improvements; and (b) 50% of net royalty income from educational and professional materials.

5. For the limited purposes of administering the policies under Division 43, persons acting in the following capacities shall be entitled to the benefits and subject to the responsibilities of said rules: Graduate teaching assistants, graduate teaching fellows, graduate research assistants, and student employees.

Stat. Auth.: ORS Ch. 351

Hist.: HEB 8-1978. f. & ef. 12-5-78. HEB 9-1980. f. & ef. 8-20-80. HEB 1-1982. f. & ef. 4-20-82

### **Reporting of Inventions**

580-43-015 [HEB 3-1978, f. & ef. 6-5-78, Repealed by HEB 8-1978, f. & ef. 12-5-78]

### **Office of Administration Responsibilities**

580-43-026 The Office of Administration shall:

(1) Assist institutions in the development of procedures implementing Board policies and managing new knowledge; (2) Monitor institutional application of Board policies; (3) Review and approve institutional recommendations regarding assignment of rights, applications for patents.

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<http://dusk.geo.orst.edu>

### Professional Preparation:

B.S., 1983, Wheaton College, Wheaton, Illinois  
*Geology (cum laude)*  
M.S., 1986, Texas A&M University, College Station, Texas  
*Oceanography*  
Ph.D., 1994, University of California, Santa Barbara, California  
*Individual Interdisciplinary Ph.D. in Geography and Marine Geology*  
Postdoctoral Institutions, 1995: NOAA Pacific Marine Environmental Lab (PMEL), Newport, OR and Oregon State University

### Positions Held:

Professor, Oregon State University, 2002-present  
Associate Professor, Oregon State University, 1999-2002  
Assistant Professor, Oregon State University, 1995-1999  
Senior Researcher, Oregon State University, 1995  
Graduate Student Researcher, Marine Science Institute and National Center for Geographic Information and Analysis, Santa Barbara 1990-1994  
Marine Laboratory Specialist, Logistics and Technical Support, Ocean Drilling, Texas A&M, 1986-1989  
Graduate Research Assistant, Science Operations, Ocean Drilling, Texas A&M, 1985-1986

### Research Cruise Experience:

2001-'02 - Co-PI on shallow- and deepwater surveys, small survey boat and *R/V Revelle*, American Samoa coral reefs  
1996 - Co-Chief Scientist, Boomerang Leg 2, *R/V Melville*, Tonga Trench and Forearc  
1996 - *Argo II* Watch Leader, Sojourn Leg 2, *R/V Melville*, Southern East Pacific Rise  
1995 - *Alvin* Observer, *R/V Atlantis II*, Co-Axial segment of Juan de Fuca Ridge and Co-Axial and Cleft segments of Juan de Fuca Ridge  
1992 - Sea Beam 2000/HMR-1 Watch Leader, Gloria Leg 2, *R/V Melville*, Southern East Pacific Rise; Shipboard Scientist, *R/V Atlantis II*, Northern East Pacific Rise, 9°N  
1991 - *Alvin* Observer, *R/V Atlantis II*, Northern East Pacific Rise, 9°N  
1986-'89 - 10 cruises aboard *D/V JOIDES Resolution*, Ocean Drilling Program marine technician

### Recent Professional Recognition:

Outstanding Professor, University Honors College, Oregon State University, 1999  
Women of the Year in Education, *Clarity Magazine*, a Guideposts publication for women, 1999  
Excellence in Mentoring, College of Oceanic and Atmospheric Sciences, OSU, 1998 and 2001  
Faculty Early Career Development Award, NSF CAREER, 1995-1998

### Five Relevant Publications:

1. Wright, D.J. and D.J. Bartlett (eds.), 2000. *Marine and Coastal Geographical Information Systems*, London, Taylor & Francis, 320 pp.
2. Wright, D.J., E. O'Dea, J.B. Cushing, J.E. Cuny, and D.R. Toomey, 2003. Why web GIS may not be enough: A case study with the Virtual Research Vessel, *Marine Geodesy*, 26(1-2), 73-86
3. Wright, D.J., 2002. *Undersea with GIS*, Redlands, CA, ESRI Press, 253 pp. + companion CD.
4. Mayer, L., Barbor, K., Boudreau, P., Chance, T., Fletcher, C., Greening, H., Li, R., Mason, C., Metcalf, K., Snow-Cutter, S., and Wright, D., in press, 2003. *National Needs for Coastal Mapping and Charting*, Washington D.C.: National Academies Press.
5. Wright, D.J., C.G. Fox, and A.M. Bobbitt. 1997. A scientific information model for deepsea mapping and sampling, *Marine Geodesy*, 20(4): 367-379.

### **Five Additional Publications:**

1. Wright, D.J., R. Wood, and B. Sylvander, 1998. ArcGMT: A suite of tools for conversion between Arc/INFO and Generic Mapping Tools (GMT), *Comp. Geosci.*, 24(8): 737-744.
2. Wright, D.J., R.M. Haymon, and D.J. Fornari, 1995. Crustal fissuring and its relationship to magmatic and hydrothermal processes on the East Pacific Rise crest (9° 12' - 54°N), *J. Geophys. Res.*, 100(B4): 6097-6210.
3. Wright, D.J., 1998. Formation and development of fissures at the East Pacific Rise: Implications for faulting and magmatism at mid-ocean ridges, in Buck, W.R., Delaney, P., Karson, J. A., and Lagabriele, Y. (Eds.), *Faulting and Magmatism at Mid-Ocean Ridges*, Geophysical Monograph 106, Washington, D.C: American Geophysical Union, 137-151.
4. Wright, D.J., and M.F. Goodchild. 1997. Data from the deep: Implications for the GIS community, *Int. J. Geographical Information Science*, 11(6): 523-528.
5. Wright, D.J., S.H. Bloomer, C.J. MacLeod, B. Taylor, and A.M. Goodliffe, 2000. Bathymetry of the Tonga Trench and forearc: A map series, *Marine Geophysical Researches*, 21(5): 489-512.

### **Synergistic Activities:**

1. Currently serving as board member, vice-chair of communications, member of the national education committee, and lead Oregon State delegate for the 60+member University Consortium for Geographic Information Science (UCGIS, [www.ucgis.org](http://www.ucgis.org)), as well on the National Research Council's National Needs for Coastal Mapping & Charting Committee.
2. Member of organizing committee and co-convenor (with colleagues from WHOI, Scripps, and Lamont) of the Marine Geology & Geophysics Database Management Workshop (<http://hummm.who.edu/DBMWorkshop/>), sponsored by the National Science Foundation and the Office of Naval Research.
3. Teamed with Cherri Pancake of Computer Science, Karyle Butcher and Shirley Scott of the Valley Library, Phil Sollins and Theresa Valentine of the College of Forestry, and Greg Gaston of Geosciences to establish Virtual Oregon, a new data coordination center for environmental, place-based data from Oregon, funded by the Northwest Academic Computing Consortium.
4. Development and coordination of the ArcGIS Marine Data Model Project for a user community of ~1500 ([dusk.geo.orst.edu/djl/arcgis](http://dusk.geo.orst.edu/djl/arcgis)), in collaboration with Duke University, NOAA Coastal Services Center, the Danish Hydraulic Institute, and the Environmental Systems Research Institute (ESRI), with a technical design and testing team of 32, and 150 reviewers from 29 countries worldwide.
5. Coordinator of a site license program with ESRI, involving over 20 departments within the OSU Colleges of Science, Forestry, Engineering, Agriculture, Oceanographic & Atmospheric Sciences, as well as the Hatfield Marine Science Center, each year saving the campus ~\$40,000 in maintenance fees and at least \$200,000 in new software purchases.

### **Recent Collaborators (last 5 years)**

Karyle Butcher, OSU Valley Library; Darius Bartlett, Geography, University College Cork, IRELAND; Sherman Bloomer, OSU Geosciences; Jan Cuny, University of Oregon Computer Science; Judy Cushing, Evergreen State College Computer Science; Greg Gaston, OSU Geosciences; Mike Goodchild, UCSB Geography; Rachel Haymon, UCSB Geological Sciences; Ken Macdonald, UCSB Geological Sciences; Gordon Matzke, OSU Geosciences; Russ McDuff, School of Oceanography, University of Washington; David Naar, U. of S. Florida Geological Oceanography; Cherri Pancake, OSU Computer Science; Jim Proctor, UCSB Geography; Phil Sollins OSU College of Forestry; Doug Toomey, University of Oregon Geological Sciences; Theresa Valentine, OSU College of Forestry; Tiffany Vance, NOAA-PMEL, Seattle; Scott White, U. South Carolina Geological Sciences, Aaron Wolf, OSU Geosciences.

### **Graduate Students**

11 Doctoral, 37 Master of Science, and 1 B.S. Honors undergraduate student advised and graduated. Currently major adviser for 2 Doctoral students, 8 M.S. students, 1 undergrad McNair scholar, and serving additionally on 8 doctoral committees and 12 M.S. committees.

### **Graduate and Postgraduate Advisors**

Dr. Christopher G. Fox, NOAA-PMEL (Postdoctoral supervisor)  
Dr. Raymond C. Smith, UCSB Geography (Doctoral Committee Chair)

**Gail L. Achterman**

Institute for Natural Resources, 210 Strand Agricultural Hall, Corvallis, OR 97331  
Telephone: (541)-737-9875 E-mail: [gail.achterman@oregonstate.edu](mailto:gail.achterman@oregonstate.edu)

Gail L. Achterman is the Director of the Institute for Natural Resources. Before joining the Institute, Gail served as Executive Director of the Deschutes Resources Conservancy, a non-profit organization dedicated to watershed restoration. She practiced law for 18 years with Stoel Rives LLP and served as Governor Neil Goldschmidt's Assistant for Natural Resources. She is a leading state and national natural resource and environmental expert with policy making experience at the state, local and federal level enabling her to work across and within multiple interests and disciplines. Gail also serves on the Oregon Transportation Commission and is a member of the board of Northwest Environment Watch.

**Education**

1971 ñ A.B. Economics with honors, Stanford University  
1975 ñ M.S. Natural Resources Policy and Management, University of Michigan  
1974 ñ J.D. cum laude, University of Michigan

**Professional Experience**

Director, Institute for Natural Resources, Oregon State University (2003 ñ present)  
Executive Director, Deschutes Resources Conservancy ñ Bend, Oregon. (2000-2003)  
Partner ñ Stoel Rives LLP ñ Portland, Oregon. (1991-2000)  
Assistant to the Governor for Natural Resources, Governor's Office, Salem, Oregon. (1987-1991)  
Associate and Partner ñ Stoel, Rives, Boley, Fraser & Wyse ñ Portland, Oregon (1978-1987)  
Attorney-Advisor/Spec. Asst to the Solicitor, US Dept of the Interior, Washington, DC (1975-1978)

**Professional Activities and Awards**

Forestry Appreciation Award, Oregon Chapter Society of American Foresters (1989)  
Richard Neuberger Award, Oregon Environmental Council (1986)  
Vice Chair, Public Lands Section, SONREEL, American Bar Association  
Vice Chair, Public Lands Section, Administrative Law Section, American Bar Association  
Member, Board of Trustees, Rocky Mountain Mineral Law Foundation  
Member, Oregon Chapter, International Women's Forum  
Member, Wild Horse and Burro Study Committee, BARR, Nat'l Academy of Science (1978-80)  
Editorial Advisory Board, Environmental Law Reporter (1978-198\_)  
Task Force on the Availability of Federally Owned Mineral Lands, Final Report (1977)

Member, Society for Range Management (1975-198\_)

### **Five Relevant Publications**

- Achterman, Gail L. and Campbell, Michael R., "The Continuing Evolution of the Clean Water Act and its Implications for Natural Resources Development," 43 Rocky Mt. Min. L. Inst. Ch.8 (1997)
- Achterman, Gail L., "An Evaluation of State Energy Facility Siting Acts," in Resources Development Environmental; Land Management and Permitting (1996 Rocky Mountain Mineral Law Foundation)
- Achterman, Gail L. and Mostow, Peter D., "Senate Bill 674: Increasing the Flow Rate of Oregon's Water Rights Permitting Process," 32 Willamette L.J. 187 (1996)
- Achterman, Gail L., "Implementing Plastics Recycling Mandates," 9 Natural Resources & Environment 13 (American Bar Association, Fall 1994)
- Achterman, Gail L. "Reflections on Owls, Salmon, and Suckers: Current Developments under the Endangered Species Act, 38 Rocky Mt. Min. L. Inst. (1992)

### **Recent Grants Awarded**

- Oregon Department of Forestry ñ Salmon Anchor Habitat \$120,552. 2003-2004
- Oregon Department of Forestry ñ Fire Policy Review \$66,665. 2003-2004
- Sea Grant ñ Oregon Coastal Community Water Supply Assessment \$10,000. 2004

**KARYLE S. BUTCHER**

Oregon State University  
4165 The Valley Library  
Corvallis, OR 97331  
(541) 737-7300 phone  
(541) 737-3453 fax  
Karyle.Butcher@orst.edu

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**PROFESSIONAL PREPARATION**

Oregon State University, Corvallis, Oregon  
MAIS in History, 1991

University of Southern California, Los Angeles, California  
Masters of Library Science, 1965

California State University, Fresno, California  
University of California, Berkeley, California  
Bachelor of Arts in History, 1960

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**APPOINTMENTS**

**Oregon State University**

**Donald and Delpha Campbell University Librarian and Deputy Vice Provost For Information Services – 1998 to present**

Continue responsibilities noted below and, in conjunction with the Vice Provost for Information Services, provide leadership to OSU campus in areas of computing, telecommunication, and media services. Increase fund raising and donor stewardship activities.

**Oregon State University**

**Interim University Librarian, Associate Professor, Information Services – 1996-98**

Responsible for providing vision and leadership to OSU Libraries' faculty and staff and managing OSU Libraries' budget. Additional responsibilities include leading the \$47 million library construction project, managing development staff on fundraising projects and partnership with OSU Information Services to ensure excellent services for OSU faculty and students.

**Oregon State University**

**Associate University Librarian for Research and Consulting Services, Information Services – 1995-96**

Responsible for planning and directing work of 28 faculty, 26 staff, and 24 students to provide library services and computer consulting services for the university community. Work as a member of the Information Services senior management team to develop and support a team-based organization.

**Oregon State University**

**Assistant University Librarian for Research and Reference Services, Assistant Professor – 1985-94**

Responsible for planning, organizing, and directing the work of a staff consisting of 22 faculty, 26 staff, and 20 students to provide library services for the university community. These areas include reference, research, special collections, collection development, government documents, maps, microfilms, interlibrary loan, online and CD-ROM searching, circulation, photocopy, documents delivery, stack maintenance, and the Hatfield Marine Science Center Guin Library.

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## **PUBLICATIONS AND PRESENTATIONS**

- Butcher, Karyle S. 1993. Political Networking. *College & Research Libraries*. 54(4): 291-293.
- Butcher, Karyle S. 1993. Total Quality Management: The Oregon State University Experience. *Integrating Total Quality Management in a Library Setting*. Editors: Susan Jurow and Susan Barnard. Haworth Press. Pp. 45-56.
- Butcher, Karyle S. 1999. Reflections on Academic Librarianship. *Journal of Academic Librarianship*. 25(5): 350-51.
- Butcher, Karyle S. 1997. Decision Making in a Team Environment. *Library Administration and Management*. 11(3): 222-230.
- Butcher, Karyle S., and Shirley R. Scott. 1990. Impact of CD-ROM in a University Library. *Journal of Educational Media and Library Science*. 27(3): 257-269.
- Butcher, Karyle S., and Michael Kinch. 1990. Who Calls the Shots. *Journal of Academic Librarianship*. 16(5): 280-284.
- Butcher, Karyle S., and Joy R. Hughes. 1996. The Environment Personified. In *The National Electronic Library*. Editor: Gary M. Pitkin. Westport, CT: Greenwood Press. Pp. 3-16.
- Butcher, Karyle S., Joy R. Hughes, and Melvin R. George. 1995. Every Librarian a Leader. *College and Research Libraries News*. 56(4): 636-638.
- OCLC/WLN Directors Conference. April 2000. Seattle, Washington. Invited Speaker, "Crisis: Danger or Opportunity for Libraries in the 21<sup>st</sup> Century."
- Internet Librarian. 1999. San Diego, California. Presenter, "Building State of the Art Libraries: It's the People That Really Matter."
- Online Northwest. 1999. Portland, Oregon. Discussant, "There's Always Downhill: The Management of Electronic Resources in Oregon Libraries."

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## **PROFESSIONAL LEADERSHIP EXPERIENCE**

- Center For Research Libraries – Planning Committee 2000-
- Greater Western Library Alliance – Board of Directors –2000-
- ORBIS Council – Executive Committee –2000-
- Portal: Library and the Academy* – Editorial Board - 1999-
- Scholarly Publishing and Academic Resources Coalition – Steering Committee 1999-
- Linus Pauling and the Twentieth Century – Advisory Committee 1999-
- Journal of Academic Librarianship*-Editorial Board –1996-99
- Library Administration and Management Association. LAMA/LOMS Executive Board. 1994- 98
- Center for the Humanities, Advisory Board. 2000-
- Central Oregon Planning Team. 2000-
- University Growth Team. 2000.
- Accreditation Teams: Montana State University. 1999; University of Montana. 2000. Western Governors University. 2002
- American Library Association 1981-**
- American Library Association – Pay Equity Committee 1998-
- American Library Association – Presidential Program Committee, 1998-
- Association of College & Research Libraries**
- Task Force of Scholarly Communication – 2000-
- Chapters' Council Secretary, 1992.
- College & Research Libraries* - Editorial Board - 1990-1996
- Chapters' Council member 1990-1992.
- Task Force on ACRL and Social Responsibilities, 1988-89, Chair.
- Association of College and Research Libraries/Oregon Chapter**
- President, 1991-1992
- Newsletter Editor, 1989-90.
- Oregon Library Association**
- Statewide Collection Development Steering Committee, 1992-95.
- OLA Resource Sharing Committee, 1992-94.
- Executive Board, 1990-96.
- Legislative and Development Committee, 1991- 96. Chair 1995-96

## **Tim Fiez**

Willamette Basin Project Spatial Data Research Coordinator  
Oregon State University Library  
tim.fiez@oregonstate.edu

### **Education**

Ph.D. Crop Science, 1995, Washington State University  
M.S. Computer Science, 1995, Washington State University  
M.S. Crop Science, 1990, Oregon State University  
B.S. Crop Management, 1985, University of Idaho

### **Synergistic Activities**

Dr. Fiez focuses his activities on the application of computer science principles to natural resource sciences. Past projects have included spatial data mining, site-specific crop rotation design, and web-based delivery of high technology education for agriculture and natural resource scientists. His goal is to apply appropriate and novel technology and algorithms to real world problems in agriculture and other natural resource areas. Currently, Dr. Fiez is part of a team of researchers and information specialists working to deliver spatial data and other associated information via the web to both professional and new geographic information system users.

### **Professional Appointments**

Willamette Basin Project Spatial Data Research Coordinator, 2003-present, Oregon State University Library  
Software Engineer, 2000-2002, CAMOSmart, Inc.  
Assistant Professor of Soil Science, 1995-1999, Dept. of Crop and Soil Science, Washington State University  
Programming Professional, 1994-1995, School of Electrical Eng. and Computer Sci., Washington State University  
Graduate Research Assistant, 1990-1994, Dept. of Crop and Soil Science, Washington State University  
Graduate Research Assistant, 1987-1990, Crop Science Dept., Oregon State University  
Share-crop Farmer/Farmhand, 1985-1987

### **Professional Recognition**

Amer. Soc. of Agronomy Extension Education Award for Excellence in Educational Materials, 2001  
Co-Founder, Western Precision Agriculture Conference, 1997  
Best student paper award; Western Society of Soil Science Meeting, 1991  
National Science Foundation Graduate Fellowship, 1988-92

### **Five Relevant Publications**

1. Pokrajac, D., T. Fiez, and Z. Obradovic. 2002. A data generator for evaluating spatial issues in precision agriculture. *Precision Agriculture* 3:259-281.
2. Vucetic, S., T. Fiez, and Z. Obradovic. 2001. Analyzing the influence of data aggregation and sampling density on spatial estimation. *Water Resources Research*.
3. Lazarevic, A., T. Fiez, and Z. Obradovic. 2000. A software system for spatial data analysis and modeling. *Proc. Data Mining Minitrack at the IEEE Hawaii Int'l Conf. on System Sciences*. IEEE Computer Society Press, January 2000.
4. Pokrajac, D., T. Fiez, D. Obradovic, S. Kwek, and Z. Obradovic. 1999. Distribution comparison for site-specific regression modeling in agriculture. *Proc. IEEE/INNS Int'l Joint Conf. on Neural Networks*. IEEE Press, ISBN 0-7803-5532-6, Washington D.C., July 1999, No. 346, Session 10.9.
5. Vucetic, S., T. Fiez, and Z. Obradovic. 1999. A data partitioning scheme for spatial regression. *Proc. IEEE/INNS Int'l Joint Conf. on Neural Networks*. IEEE Press, ISBN 0-7803-5532-6, Washington D.C., July 1999, No. 348, Session 8.1A.

## **Five Other Publications**

1. Pocknee, S., C. Kvien, G. Rains, T. Fiez, J. Durfey, P. Mask. 2002. Web-Based Educational Programs in Precision Agriculture. *Precision Agriculture* 3:327-340.
2. Fiez, T., 2002. Providing Precision Farming Education Through Conferences and Workshops. *Precision Agriculture* 3:353-358.
3. Lazarevic, A., T. Fiez, and Z. Obradovic, Z. 2000. Adaptive boosting for spatial functions with unstable driving attributes. Proc. Pacific-Asia Conference on Knowledge Discovery and Data Mining. Kyoto, Japan, April 2000.
4. Lazarevic, A., X. Xu, T. Fiez, and Z. Obradovic. 1999. Clustering-regression-ordering steps for knowledge discovery in spatial databases. Proc. IEEE/INNS Int'l Joint Conf. on Neural Networks. IEEE Press, ISBN 0-7803-5532-6, Washington D.C., July 1999, No. 345, Session 8.1B.
5. Pokrajac, D., A. Lazarevic, S. Vucetic, T. Fiez, and Z. Obradovic. 1999. Image processing in precision agriculture. Proc. IEEE Int'l Conf. on Telecommunications in Modern Satellite, Cable and Broadcasting Services. Nis, Yugoslavia, October 1999, IEEE Press, v.2, pp. 616-619.

## **Grants and Awards from the Past 5 Years**

1. Huggins, D., E. Gallandt, R. Veseth, T. Fiez, C. Stockle, J. Yenish. Rotation designs for direct seed cropping systems. STEEP III. \$144,840. 1999-2001.
2. Fiez, T.E., and Z. Obradovic. Integration of distributed heterogeneous experts for precision agriculture knowledge discovery. INEEL University Research Consortium. \$307,832. 1998-2000.
3. Fiez, T.E., J. Yenish, R.J. Veseth, S.O. Guy, D.C. Thill, and J. Hammel. Residue production and retention in small grain cereal and legume rotational systems with different tillage practices. STEEP III. \$54,390. 1997-1999.
4. Guy, S.O., D.C. Thill, R. Veseth, J. Hammel, and T.E. Fiez. Residue production and retention in small grain cereal and legume rotational systems with different tillage practices. STEEP III. \$74,000. 1996-1998.
5. Guy, S.O., D.C. Thill, R. Veseth, J. Hammel, T.E. Fiez, and J. Yenish. Residue production and retention in small grain cereal and legume rotational systems with different tillage practices. STEEP III. \$48,390. 1997-1999.
6. Fiez, T.E., and J.E. Durfey. Technology literacy development through World Wide Web and multimedia instruction. USDA/CSREES Higher Education Challenge Grants Program. \$80,000. 1997-1999.
7. Fiez, T.E., R.D. Roe, R.J. Veseth, D.J. Wysocki, and B.C. Miller. Enhancing no-till and conservation farming success through the use of case studies, conferences, and workshops to facilitate farmer to farmer learning in the Pacific Northwest. Western Region SARE Program. \$125,842. 1997-1999.

## **Collaborators from the Past 5 Years**

Jim Durfey, Eric Gallandt, Stephen Guy, John Hammel, Dave Huggins, Baird Miller, Zoran Obradovic, Dennis Roe, Claudio Stockle, Don Thill, Roger Veseth, Don Wysocki, and Joe Yenish

## **Graduate Students from the Past 5 Years**

Aleksandar Lazarevic, Javier Marcos, Dragoljub Pokrajac, and Slobodan Vucetic.

**Curtis R. Pederson**  
Vice Provost for Information Services  
Oregon State University  
curt.pederson@oregonstate.edu

**Professional Preparation:**

Seattle University, Seattle, Washington, Master of Public Administration, 1986  
University of Puget Sound, Tacoma, Washington, Bachelor of Arts Cum Laude, Public Administration, 1975

**Teaching:**

Shoreline Community College, Seattle, Washington, Instructor (Part-Time), Business and Office Administration, 1980-89.  
Edmonds Community College, Lynnwood, Washington, Instructor (Part-Time), Business and Office Administration, 1980-89.

**Experience:**

Oregon State University, Vice Provost for Information Services - 1997 to present  
Oregon State Department of Administrative Services, Chief Information Officer (CIO) - 1994 to 1997  
Curtis R. Pederson Consulting - 1992 to 1994  
Washington State Department of Labor and Industries, Assistant Director, Information Services Division - 1989 to 1992  
Snohomish County Public Utility District, Various Positions - 1966 to 1989

**Professional Activities:**

Northwest Academic Computing Consortium (NWACC)  
Board Member 1977 - present; Chair, Membership Committee 1999; Chair, Grant Committee 2000;  
Chair, Conference Committee 2001.  
Washington State Information Processing Associates (IPMA)  
Elected Chair, 1991.  
Project Management Institute  
Charter Member, Salem, Oregon Chapter, 1997.  
Society for Information Management  
Member 1983-1995.

**Professional Recognition:**

Ford Foundation and John F. Kennedy School of Government Innovation in State and Local Government Award, 1992.

**Presentations:**

Washington State Information Processing Associates, October 1992. "Managing Information Services In White Water Without A Life-jacket."  
  
Technology Convergence Show, September 18, 1994. "Connect Through the State of Oregon."  
  
Society for Information Management, October 18, 1995. "Evolving the Dinosaur."  
  
Oregon Telecommunications Forum Council (OTFC) Meeting, May 30, 1996. "State Government as the Anchor Tenant - The Net 2000 Story."  
  
Marylhurst, October 29, 1996. "Preventing Information Technology Disasters."  
  
Summer Institute for Public Health Practice, University of Washington, July 21, 1997. "IRM and IRM

Planning.”

US West Executive Seminar, July 23-25, 1997. Presentation: “Fast Packet Partnership: State of Oregon/US West.”

SIM Seminar, 1997. “When Life is A Roller Coaster - You Never Get Bored!”

CAUSE - CNI- NWACC Conference, June 17, 1998. Presentation: “Build Trust - Then Infrastructure.”

CAUSE/CNI/NWACC Conference, “Collaboration Inside and Out,” Presentation Build Trust--Then Infrastructure, June 17-19, 1998.

“OWEN - Building a Statewide Education Network in Oregon,” October 16, 1998.

SIM Seminar, November 13, 1998. “Networking Works.”

PACC/SLOAN Conference, December 6, 1998. Presentation: “Come to Oregon, Things Look Different Here.”

1999. ACUTA, The Association for Telecommunications Professionals in Higher Education Fall Seminar, October 1999. Presentation: “Ideas to Finance New Technologies.”

EDUCAUSE, May 5, 1999. “The Community Network.”

School of Education Doctoral Seminar, October 7, 1999. “How Oregon Was Wired, Building a Statewide Network.”

ITEC Information Technology Exposition and Conference, November 1, 1999. “Planning A Turnaround Strategy.”

**Publications:**

*National Association of State Information Resource Executives Exchange*, Volume 6, Number 3, Summer 1995. “CIO Corner”.

**Consulting:**

Thurston County Central Services Department Report, February 22, 1993. (See EXPERIENCE section for more information.)

**Service:**

EDNET Board Member for Governor Kitzhaber, 1995-97.

Governor Roberts Cabinet Member, 1994.

**JAMES S. KAGAN**  
1724 SE 57th Avenue  
Portland, OR 97215  
503-233-1048  
[JamesKagan@netscape.net](mailto:JamesKagan@netscape.net)

Oregon Natural Heritage Information Center  
1322 SE Morrison St.  
Portland, OR 97214  
503-731-3070 ext. 111  
[jimmy.kagan@oregonstate.edu](mailto:jimmy.kagan@oregonstate.edu)  
<http://oregonstate.edu/ORNHIC>

**EDUCATION:**

MS Degree in Botany and Plant Ecology University of Oregon, Eugene, OR	December 1980
BS Degree in Biology w/ teaching certificate Portland State University, Portland, OR	June 1976
BA Degree in Environmental Science and Botany The Evergreen State College, Olympia, WA	June 1973

**WORK EXPERIENCE:**

Current Position

2/86-Present - Director/Ecologist, Oregon Natural Heritage Information Center. Duties include: Managing Heritage Program staff and budgets, botanical and ecological inventory, and biodiversity planning, research and analysis.

4/81-1/86 - Staff Ecologist and Botanist, The Nature Conservancy. Duties included: Ecological and Botanical Consultation as the Ecologist and Botanist for the Oregon Natural Heritage Program, Fire Planning for Oregon Stewardship Program, Ecological and Botanical Monitoring for Stewardship. Coordination and inventory for TNC Preserve Selection and Design for Oregon.

1/78-6/79 – Math-Science Teacher/Janitor/Bus Driver, Centerville Grade School district, Centerville, WA.

**RECENT RELEVANT PUBLICATIONS:**

Kagan, J.S., R. Morgan, and K. Blakely. 2000. Umatilla and Willow Creek Basin Assessment for Shrub steppe, grasslands, and riparian wildlife habitats. Final Report for EPA RGA grant. ORNHP, Portland. 26 pp.

Kagan, J.S., J.C. Hak, Blair Csuti, C.W. Kiilsgaard, and E.P. Gaines. 1999. Oregon Gap Analysis Project Final Report: A geographic approach to planning for biodiversity. Oregon Natural Heritage Program, Portland, OR. 72 pp. + appendices.

Alpert, P. and J.S. Kagan. 1998. The utility of plant community types: a practical review of riparian vegetation classification in the Intermountain United States. *Natural Areas Journal* 18:124-137.

Oregon Department of Forestry. 2001. Oregon Forest Legacy Program – Assessment of Need. Oregon Natural Heritage Program, Portland, OR. 108 pp.

Rare, Threatened, and Endangered Plants and Animals of Oregon. 1987, 1989, 1991, 1993, 1995, and 1998, 2001 editions. Lead Author, Published by ORNHP, 1205 NW 25th Ave, Portland, OR.

Oregon Progress Board. 2000. Oregon State of The Environment Report 2000. Biodiversity chapter author.

#### **FIVE ADDITIONAL PUBLICATIONS AND REPORTS:**

Kagan, J.S. and S. Caicco. 1992. Manual of Oregon Actual Vegetation. U.S. Fish and Wildlife Service, Biological Resources Division, Portland, OR.

Kagan, J.S. 1994. Habitat management plan for *Lomatium cookii* in the Illinois Valley. Unpublished report, Oregon Natural Heritage Program, Portland.

Kagan, J.S. 1994. Rare and endangered plants and animal and significant habitats on Oregon Military Department lands and project areas. Unpublished report, Oregon Natural Heritage Program, Portland, OR.

Kagan, J.S. 1993. Monitoring plan for *Astragalus peckii*. Unpublished report for Pringle District, BLM. Oregon Natural Heritage Program, Portland.

Kagan, J.S. 1993. Species management guide and monitoring plan for *Calochortus umpquaensis* and *Calochortus coxii*. Unpublished report, Oregon Natural Heritage Program, Portland.

**Dylan B. Keon**  
**Northwest Alliance for Computational Science and Engineering (NACSE)**  
**Oregon State University**  
**218 CH2M Hill Alumni Center, Corvallis, OR 97331**  
**(541) 737-6608 keon@nacse.org**

**PROFESSIONAL PREPARATION**

Western Michigan University, Kalamazoo; Biology (1), Environmental Science (2); B.S. 1993.  
Oregon State University; Plant Ecology; M.S. 2001.

**APPOINTMENTS**

2000-present Faculty Research Assistant, Dept. of Computer Science, Oregon State University  
1997-2000 Graduate Research Assistant, Dept. of Botany and Plant Pathology, Oregon State University  
1993-1997 Biological Science Technician, USGS Biological Resources Division, Yosemite National Park

**PROJECT-RELATED PUBLICATIONS (3)**

Ferschweiler, K., S. Harrah, D. Keon, M. Calzarossa, D. Tessera, and C. Pancake. 2002. The tracefile testbed – a community repository for identifying and retrieving HPC performance data. Pages 177-184 in T. S. Abdelrahman, ed. **Proceedings of the International Conference on Parallel Processing**. August 18-21, Vancouver, B.C., Canada.

Keon, D., C. Pancake, and D. Wright. 2002. Virtual Oregon: seamless access to distributed environmental information. Page 387 in G. Marchionini and W. Hersh, eds. **Proceedings of the Second ACM/IEEE-CS Joint Conference on Digital Libraries**. July 14-18, Portland, OR, USA.

Valentine, T., and D. Keon. 2000. Developing interactive internet mapping capability for the H.J. Andrews Experimental Forest. In: **Communicating and advancing ecology: The Ecological Society of America 85<sup>th</sup> annual meeting**, August 6-10, 2000, Snowbird, UT. The Ecological Society of America 403, Washington, DC, USA.

**OTHER SIGNIFICANT PUBLICATIONS (3)**

Keon, D. B. 2002. Fertile *Usnea longissima* in the Oregon Coast Range. **The Lichenologist** 34:13-17.

McCune, B., and D. Keon. 2002. Equations for potential annual direct incident radiation and heat load. **Journal of Vegetation Science** 13:603-606.

Keon, D. B., and P. S. Muir. 2002. Growth of *Usnea longissima* across a variety of habitats in the Oregon Coast Range. **The Bryologist** 105:233-242.

**COLLABORATORS**

Deana Pennington and John Vande Castle, LTER Network Office; Theresa Valentine and Linda Geiser, US Forest Service; George Lienkaemper, USGS Biological Resources Division; Tony Fountain, San Diego Supercomputing Center; Maria Calzarossa and Daniele Tessera, Università di Pavia, Italy; David Peterson and Ella Elman, National Biological Information Infrastructure; Tad Reynales, Globexplorer.com.

## **SYNERGISTIC ACTIVITIES**

As a research specialist in GIS and database theory and applications, I develop dynamic web-based mapping applications that integrate data stored in an assortment of relational databases, perform GIS analysis tasks, develop and apply database models for a variety of disciplines, and provide advice on implementing enterprise GIS/database infrastructures. In addition, I perform system administration tasks on our GIS and database servers and software, and supervise graduate and undergraduate student workers.

My work at NACSE and graduate research at Oregon State University have led to professional ties and affiliations with personnel within the San Diego Supercomputing Center; National Partnership for Advanced Computational Infrastructure; US Department of Agriculture, Forest Service; US Geological Survey, Biological Resources Division; US Department of the Interior, Bureau of Land Management; Michigan State University; Università di Pavia, Italy; University of Washington; Oregon State University; and the Oregon Natural Heritage Program. These collaborations have led to several publications as well as innovative Web-based interfaces for (1) accessing data from a multitude of research databases and (2) visualizing and exploring those data in their spatial context.

As lead Biological Science Technician at the Yosemite Research Center (USGS Biological Resources Division), I supervised a crew of six technicians on several studies, including two collaborative studies: (1) a forest fuels loading study that contributed to a fire prediction model, and (2) a long-term global change study that monitored growth of whitebark pine trees at timberline in several locations. Additionally, I managed a database containing hundreds of thousands of records for the forest fuels study, created, managed, and analyzed data in two GIS programs (ARC/INFO and GRASS), and led the GPS mapping operations for the research center.

## **GRADUATE ADVISOR**

Dr. Patricia S. Muir, Professor, Department of Botany and Plant Pathology, Oregon State University, Corvallis, OR 97331.

# Kuuipo Ann Walsh

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Faculty Research Assistant  
Department of Geosciences  
Oregon State University  
Corvallis, OR 97331-5506

U.S. citizen  
Daytime phone: (541) 737-2397  
Evening phone: (541) 753-1209  
E-mail: kuuipo.walsh@oregonstate.edu

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## **Education:**

**M.S., Marine Resource Management**, Oregon State University, Corvallis, OR, 97331, 2002  
Graduate Minor: Earth Information Science and Technology  
Total Quarter Credits Earned: 101, GPA 3.75/4.0

**B.S., Computer Science**, California Polytechnic State University, 1 Grand Avenue, San Luis Obispo, California, 93407, 1993  
Total Quarter Credits Earned: 216, GPA 3.0/4.0

## **Current Research Interests:**

- Spatial Analysis of natural resources in the Pacific Northwest
- Developing and maintaining spatial and non-spatial databases
- Interactive web mapping /web GIS

## **Professional Experience/Synergistic Activities:**

**1/04 ñ present**      **Research Assistant ñ Oregon Natural Heritage Information Center**

**12/02 ñ 1/04**      **Faculty Research Assistant ñ Department of Geosciences, Oregon State University**

- Developed interactive mapping web site with ArcIMS to track chemical hazards

**02/01 ñ 12/02**      **Graduate Student Assistant ñ Virtual Oregon, Oregon State University**

- Created an Oregon Statewide DEM download web page:  
<http://buccaneer.geo.orst.edu/dem/>
- Obtained pollution data on Coos Bay for Proof-of-Concept
- Compiled results of a survey of existing geographic data on the Oregon State University campus
- Maintained web site and coded HTML

**07/02 ñ 09/02**      **ESRI-Northwest 2002 Student Summer Intern ñ ESRI Olympia Regional Office**

- Implemented ArcIMS 4.0 on RedHat Linux 7.2
- Developed a comprehensive user guide describing the steps taken to install ArcIMS and other required system software on a Red Hat Linux 7.2 platform, using Apache Web Server.
- Developed tutorial videos for two developer samples: Map Book and Batch publishing with Publisher
- Created a web site featuring an Image Service
- Created a Java Custom Viewer with a Feature Streamed layer
- Developed databases in Oracle for Linux using ArcSDE 8.2
- Performed a usability assessment of the Geography Network
- Created and implemented backup procedures
- Provided a technical presentation to ESRI office staff summarizing skills and lessons learned during internship

**01/01 ñ 06/01**

**Graduate Research Assistant ñ The Transboundary Freshwater Dispute Database, Oregon State University**

- GIS Analyst / Database Programmer / Webmaster
- Created GIS layer of climatic zones
- Created Access database
- Wrote Visual Basic programs

**01/00 ñ 12/00**

**Graduate Research Assistant ñ Metadata Humane Society Project, Oregon State University**

- Performed usability evaluations of the National Geospatial Data Clearinghouse (NGDC) user interfaces

**Relevant Publication:**

Walsh, K.A., Pancake, C.M., Wright, D.J., Haerer, S., Hanus, F.J., 2002, "Humane" Interfaces to Improve the Usability of Data Clearinghouses, in Egenhofer, M.J. and Mark, D.M., editors, *GIScience 2002, Lecture Notes in Computer Science 2478*, Springer-Verlag, New York, 333-345.

**Professional Membership:**

Society for Conservation GIS

**Honors and Awards:**

- Student Assistantship Award, ESRI GIS User Conference, San Diego, 2001
- Outstanding Contribution Toward the Successful Achievement of the Space Based Early Warning Systems, 1994

**Catherine Williams**  
Director, Computing Services  
Oregon State University  
catherine.williams@oregonstate.edu

**Professional Preparation:**

A.S. Data Processing, Linn-Benton Community College, Albany, OR 1983  
55 Hours, Oregon State University, Corvallis, OR

**Experience:**

<b>Director, Computing Services</b>	2002-present
<b>Manager of Operations and Systems</b> , Oregon State University, Corvallis, OR	1999-2002
<b>Systems Analyst 2</b> , Oregon State University, Corvallis, OR	1994-1999
<b>Systems Analyst 1</b> , Oregon Department of Transportation, Salem, OR	1989-1994
<b>Member of the TEAMS Finance Project</b>	1986-1989
<b>Programmer</b> , Data Associates, Inc., Corvallis, OR	1983-1986

**Synergistic Activities:**

Oversees and directs the university's Central Computing, which provides every student with a central computer account enabling access to the Internet and electronic mail, as well as the ability to run sophisticated programs on the central Unix computer system. These services are also available to faculty. Central Computing also manages administrative computing services, including kiosks and Web access that provide online access to grades, transcripts, schedules, etc., the telephone registration system, Banner information systems, information kiosks, scanning, ONID (OSU Network Identification), and Data Warehouse. Williams supervises the four subdivisions of Central Computing (Administrative Computing, Operations, System Support, and Warehouse, Integration and Training). She reports directly to the Vice Provost of Information Services.

# SUMMARY PROPOSAL BUDGET YEAR 1

ORGANIZATION <b>Oregon State University</b>				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR <b>Dawn J Wright</b>				AWARD NO.	Proposed	Granted	
				A. SENIOR PERSONNEL: PI/PI, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)			
				CAL	ACAD	SUMR	
1.	<b>Dawn J Wright - PI</b>			0.00	0.00	1.00	\$ 7,647
2.	<b>Gail L Achterman - co-PI</b>			0.00	0.00	0.00	0
3.	<b>Karyle S Butcher - co-PI</b>			0.00	0.00	0.00	0
4.	<b>Tim E Fiez - PI</b>			4.00	0.00	0.00	15,000
5.	<b>Dylan B Keon - Programmer</b>			5.34	0.00	0.00	24,039
6.	( 2 ) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)			3.00	0.00	0.00	4,125
7.	( 7 ) TOTAL SENIOR PERSONNEL (1 - 6)			12.34	0.00	1.00	50,811
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1.	( 0 ) POST DOCTORAL ASSOCIATES			0.00	0.00	0.00	0
2.	( 2 ) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)			2.00	0.00	0.00	5,336
3.	( 2 ) GRADUATE STUDENTS						38,102
4.	( 3 ) UNDERGRADUATE STUDENTS						13,002
5.	( 0 ) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)						0
6.	( 0 ) OTHER						0
TOTAL SALARIES AND WAGES (A + B)							107,251
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)							25,659
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)							132,910
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)							
TOTAL EQUIPMENT							0
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)							2,000
2. FOREIGN							0
F. PARTICIPANT SUPPORT COSTS							
1.	STIPENDS \$ _____			0			
2.	TRAVEL _____			0			
3.	SUBSISTENCE _____			0			
4.	OTHER _____			0			
TOTAL NUMBER OF PARTICIPANTS ( 0 ) TOTAL PARTICIPANT COSTS							0
G. OTHER DIRECT COSTS							
1.	MATERIALS AND SUPPLIES						9,000
2.	PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION						0
3.	CONSULTANT SERVICES						0
4.	COMPUTER SERVICES						0
5.	SUBAWARDS						0
6.	OTHER						22,580
TOTAL OTHER DIRECT COSTS							31,580
H. TOTAL DIRECT COSTS (A THROUGH G)							166,490
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) <b>04/05 Yr. 1 (Rate: 41.5000, Base: 148910)</b>							
TOTAL INDIRECT COSTS (F&A)							61,798
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)							228,288
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPG II.C.6.j.)							0
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)							\$ 228,288 \$
M. COST SHARING PROPOSED LEVEL \$ <b>24,150</b>				AGREED LEVEL IF DIFFERENT \$			
PI/PI NAME <b>Dawn J Wright</b>				FOR NSF USE ONLY			
ORG. REP. NAME* <b>Peggy lowry</b>				INDIRECT COST RATE VERIFICATION			
		Date Checked		Date Of Rate Sheet		Initials - ORG	

## SUMMARY PROPOSAL BUDGET COMMENTS - Year 1

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### Other Senior Personnel

Name - Title	Cal	Acad	Sumr	Funds Requested
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Pederson, Curt - co-PI	0.00	0.00	0.00	0
Walsh, Kuuipo - Workshop Coordinator	3.00	0.00	0.00	0.00 4125

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# SUMMARY PROPOSAL BUDGET YEAR 2

ORGANIZATION <b>Oregon State University</b>				FOR NSF USE ONLY		
				PROPOSAL NO.	DURATION (months)	
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR <b>Dawn J Wright</b>				AWARD NO.	Proposed	Granted
					NSF Funded Person-months	
A. SENIOR PERSONNEL: PI/PI, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				CAL	ACAD	SUMR
1. <b>Dawn J Wright - PI</b>				0.00	0.00	1.00
2. <b>Gail L Achterman - co-PI</b>				0.00	0.00	0.00
3. <b>Karyle S Butcher - co-PI</b>				0.00	0.00	0.00
4. <b>Tim E Fiez - PI</b>				4.00	0.00	0.00
5. <b>Dylan B Keon - Programmer</b>				5.34	0.00	0.00
6. ( 2 ) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)				3.00	0.00	0.00
7. ( 7 ) TOTAL SENIOR PERSONNEL (1 - 6)				12.34	0.00	1.00
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. ( 0 ) POST DOCTORAL ASSOCIATES				0.00	0.00	0.00
2. ( 2 ) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)				2.00	0.00	0.00
3. ( 2 ) GRADUATE STUDENTS						
4. ( 3 ) UNDERGRADUATE STUDENTS						
5. ( 0 ) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)						
6. ( 0 ) OTHER						
TOTAL SALARIES AND WAGES (A + B)						112,506
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)						27,283
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)						139,789
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)						
TOTAL EQUIPMENT						0
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)						2,000
2. FOREIGN						0
F. PARTICIPANT SUPPORT COSTS						
1. STIPENDS \$ _____				0		
2. TRAVEL _____				0		
3. SUBSISTENCE _____				0		
4. OTHER _____				0		
TOTAL NUMBER OF PARTICIPANTS ( 0 ) TOTAL PARTICIPANT COSTS						0
G. OTHER DIRECT COSTS						
1. MATERIALS AND SUPPLIES						5,500
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION						0
3. CONSULTANT SERVICES						0
4. COMPUTER SERVICES						0
5. SUBAWARDS						0
6. OTHER						23,984
TOTAL OTHER DIRECT COSTS						29,484
H. TOTAL DIRECT COSTS (A THROUGH G)						171,273
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) <b>04/05 Yr. 2 (Rate: 41.5000, Base: 152289)</b>						
TOTAL INDIRECT COSTS (F&A)						63,200
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)						234,473
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPG II.C.6.j.)						0
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)						\$ 234,473 \$
M. COST SHARING PROPOSED LEVEL \$ <b>24,150</b> AGREED LEVEL IF DIFFERENT \$						
PI/PD NAME <b>Dawn J Wright</b>				FOR NSF USE ONLY		
ORG. REP. NAME* <b>Peggy lowry</b>				INDIRECT COST RATE VERIFICATION		
		Date Checked	Date Of Rate Sheet	Initials - ORG		

## SUMMARY PROPOSAL BUDGET COMMENTS - Year 2

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### Other Senior Personnel

Name - Title	Cal	Acad	Sumr	Funds Requested
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Pederson, Curt - co-PI	0.00	0.00	0.00	0
Walsh, Kuuipo - Workshop Coordinator	3.00	0.00	0.00	0.00 4290

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# SUMMARY PROPOSAL BUDGET YEAR 3

ORGANIZATION <b>Oregon State University</b>				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR <b>Dawn J Wright</b>				AWARD NO.	Proposed	Granted	
				A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)			
				CAL	ACAD	SUMR	
1.	<b>Dawn J Wright - PI</b>			0.00	0.00	1.00	\$ 8,271
2.	<b>Gail L Achterman - co-PI</b>			0.00	0.00	0.00	0
3.	<b>Karyle S Butcher - co-PI</b>			0.00	0.00	0.00	0
4.	<b>Tim E Fiez - PI</b>			2.00	0.00	0.00	8,112
5.	<b>Dylan B Keon - Programmer</b>			5.34	0.00	0.00	13,005
6.	( 2 ) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)			3.00	0.00	0.00	4,462
7.	( 7 ) TOTAL SENIOR PERSONNEL (1 - 6)			10.34	0.00	1.00	33,850
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1.	( 0 ) POST DOCTORAL ASSOCIATES			0.00	0.00	0.00	0
2.	( 2 ) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)			2.00	0.00	0.00	5,772
3.	( 2 ) GRADUATE STUDENTS						9,743
4.	( 3 ) UNDERGRADUATE STUDENTS						9,376
5.	( 0 ) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)						0
6.	( 0 ) OTHER						0
TOTAL SALARIES AND WAGES (A + B)							58,741
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)							18,919
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)							77,660
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)							
TOTAL EQUIPMENT							0
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)							3,500
2. FOREIGN							0
F. PARTICIPANT SUPPORT COSTS							
1.	STIPENDS \$ _____			0			
2.	TRAVEL _____			0			
3.	SUBSISTENCE _____			0			
4.	OTHER _____			0			
TOTAL NUMBER OF PARTICIPANTS ( 0 ) TOTAL PARTICIPANT COSTS							0
G. OTHER DIRECT COSTS							
1.	MATERIALS AND SUPPLIES						4,000
2.	PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION						2,000
3.	CONSULTANT SERVICES						0
4.	COMPUTER SERVICES						0
5.	SUBAWARDS						0
6.	OTHER						1,500
TOTAL OTHER DIRECT COSTS							7,500
H. TOTAL DIRECT COSTS (A THROUGH G)							88,660
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) <b>04/05 Yr. 3 (Rate: 41.5000, Base: 88659)</b>							
TOTAL INDIRECT COSTS (F&A)							36,793
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)							125,453
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPG II.C.6.j.)							0
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)							\$ 125,453
M. COST SHARING PROPOSED LEVEL \$ <b>24,150</b>				AGREED LEVEL IF DIFFERENT \$			
PI/PD NAME <b>Dawn J Wright</b>				FOR NSF USE ONLY			
ORG. REP. NAME* <b>Peggy lowry</b>				INDIRECT COST RATE VERIFICATION			
		Date Checked		Date Of Rate Sheet		Initials - ORG	

## SUMMARY PROPOSAL BUDGET COMMENTS - Year 3

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### Other Senior Personnel

Name - Title	Cal	Acad	Sumr	Funds Requested
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Pederson, Curt - co-PI	0.00	0.00	0.00	0
Walsh, Kuuipo - Workshop Coordinator	3.00	0.00	0.00	0.00 4462

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# SUMMARY PROPOSAL BUDGET Cumulative

ORGANIZATION <b>Oregon State University</b>				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR <b>Dawn J Wright</b>				AWARD NO.	Proposed	Granted	
				A. SENIOR PERSONNEL: PI/PI, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)			
				CAL	ACAD	SUMR	
1.	<b>Dawn J Wright - PI</b>			0.00	0.00	3.00	\$ 23,871
2.	<b>Gail L Achterman - co-PI</b>			0.00	0.00	0.00	0
3.	<b>Karyle S Butcher - co-PI</b>			0.00	0.00	0.00	0
4.	<b>Tim E Fiez - PI</b>			10.00	0.00	0.00	38,712
5.	<b>Dylan B Keon - Programmer</b>			16.02	0.00	0.00	62,054
6.	( 2 ) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)			9.00	0.00	0.00	12,877
7.	( 7 ) TOTAL SENIOR PERSONNEL (1 - 6)			35.02	0.00	3.00	137,514
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1.	( 0 ) POST DOCTORAL ASSOCIATES			0.00	0.00	0.00	0
2.	( 6 ) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)			6.00	0.00	0.00	16,658
3.	( 6 ) GRADUATE STUDENTS						88,427
4.	( 9 ) UNDERGRADUATE STUDENTS						35,899
5.	( 0 ) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)						0
6.	( 0 ) OTHER						0
TOTAL SALARIES AND WAGES (A + B)							278,498
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)							71,861
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)							350,359
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)							
TOTAL EQUIPMENT							0
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)							7,500
2. FOREIGN							0
F. PARTICIPANT SUPPORT COSTS							
1.	STIPENDS \$ _____			0			
2.	TRAVEL _____			0			
3.	SUBSISTENCE _____			0			
4.	OTHER _____			0			
TOTAL NUMBER OF PARTICIPANTS ( 0 ) TOTAL PARTICIPANT COSTS							0
G. OTHER DIRECT COSTS							
1.	MATERIALS AND SUPPLIES						18,500
2.	PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION						2,000
3.	CONSULTANT SERVICES						0
4.	COMPUTER SERVICES						0
5.	SUBAWARDS						0
6.	OTHER						48,064
TOTAL OTHER DIRECT COSTS							68,564
H. TOTAL DIRECT COSTS (A THROUGH G)							426,423
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)							
TOTAL INDIRECT COSTS (F&A)							161,791
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)							588,214
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPG II.C.6.j.)							0
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)							\$ 588,214 \$
M. COST SHARING PROPOSED LEVEL \$ <b>72,450</b>				AGREED LEVEL IF DIFFERENT \$			
PI/PI NAME <b>Dawn J Wright</b>				FOR NSF USE ONLY			
ORG. REP. NAME* <b>Peggy lowry</b>				INDIRECT COST RATE VERIFICATION			
		Date Checked		Date Of Rate Sheet		Initials - ORG	

C \*ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

## BUDGET JUSTIFICATION

### **Salaries**

**PIs:** We request one month of 1.0 FTE summer salary per year for lead PI Wright for overall project management, research, workshop facilitation, Virtual Oregon web portal design and implementation, Virtual Oregon Geospatial Analytical Web Services, public outreach efforts (including GIS Day), and supervision of students. Lead PI Fiez will assist in overall project management, and oversee the architecture, programming, and hosting of the Virtual Oregon Web Services Catalog and Map Service. Fiez led the creation of the existing Virtual Oregon Natural Resources Clearinghouse, and will tie this in to the proposed effort as well as the existing Willamette Basin Conservation Project of the university's Institute for Natural Resources (INR). His effort will require 4 months of salary in Years 2 and 3, and 2 months of salary in Year 3 (Fiez is on a fixed term, 0.75 FTE soft money appointment at the university). Senior administrative officials Achterman, Butcher, and Pederson, will participate at no cost to the project, serving as senior members of the Virtual Oregon Advisory Board, which will meet every 2 months to ensure that our vision and partnership activities stay on track, while also facilitating the incorporation of innovations in to the policies and practices of the Oregon State University (OSU).

### **Other Senior Personnel:**

**Dylan Keon:** Keon, GIS analyst and programmer at the Northwest Alliance for Computational Science and Engineering (NACSE) will require ~5 months of 1.0 FTE salary in Years 1 and 2, and ~2 months in Year 3, as the main programmer for the Virtual Oregon Map and Analytical Web Services. He will also install, configure, and maintain additional web mapping and web feature services software as needed; work with the university library (Fiez and student) to coordinate and integrate cataloging efforts; and assist in the design and implementation of the Virtual Oregon web portal (with Wright and student).

**Kuipo Walsh:** We request 3 months of 0.5 FTE salary per year for Walsh, faculty research assistant with the Oregon Natural Heritage Information Center, to serve as workshop coordinator to manage the logistical and technical duties including advertising, registration, facility rental, administrative support for instructors, etc.

**James Kagan,** Director of Oregon Natural Heritage Information Center and coordinator of the Information Program of the INR will participate at no cost. The Information Program efficiently integrates and provides comprehensive information about Oregon's natural resources and environment to support decision-making at local, state, and regional levels. The need for the program was highlighted in the State of the Environment Report, and was a major reason for the establishment of the INR. As an important representative of this effort Kagan will serve as a key member of the Virtual Oregon Advisory Board.

**Catherine Williams,** Director of OSU Central Computing, will also participate at no cost to the project as a senior administrative official. As the supervisor of campus data warehousing, as well as administrative computing, operations, system support, integration and training, she will serve as a member of the Virtual Oregon Advisory Board.

### **Other Personnel:**

One month of 1.0 FTE salary is requested each year for Matthew Gonzales to cover system administration services at the university library, which will house a considerable portion of the web mapping services for the project. One month of 0.25 FTE salary is requested each year for Ken Ferschweiler to cover system administration services at the NACSE, to support the work of Keon. Gonzales and Ferschweiler will also interface with OSU Central Computing and Web Services (via Catherine Williams) to ensure the viability of all systems. The College of Science Information Network at OSU already covers system administration for Wright and students. Funds are requested for 2 academic graduate research assistantships (one in geography and one in computer

science) to assist Fiez, Wright, and Keon with data acquisition (ensuring also that data are properly georeferenced, documented and meet the Federal Geographic Data Committee metadata standards) and database development, cataloguing information, and web page creation. They will also assist Wright, Fiez and Walsh in the planning and conducting of workshops, and on projects for technology transfer of Virtual Oregon innovations to our partners, to Oregon Watershed Councils, and to middle and high school students and teachers, enabling them to participate in technology transfer themselves. Funds for summer internships for the 2 graduate research assistants, plus 2 additional graduate students in Year 2, as well as undergraduate students (3 in Years 1 and 2, and 2 in Year 3) are requested so that they may also work with industry and government partners on innovative geospatial data cataloguing, access, and education projects.

### **Benefits**

Fringe benefits for all personnel have been calculated using the latest OSU guidelines.

### **Travel**

Travel funds are requested for Years 1-3 for project personnel to attend state and regional meetings (e.g., GIS in Action, Oregon Geographic Information Council, State Framework Implementation Team Meetings, etc.) to present work in progress and keep apprised of statewide initiatives. Funds are also included to allow lead PIs Wright or Fiez to make one trip per year to Washington, DC to report on progress or to participate in PFI workshops, as well as to facilitate the travel of partners to the OSU campus to attend advisory board meetings and workshops (all that travel will be in-state). Year 3 funds also include airfare, per diem, rental car, and hotel for a PI to present results of the project at the ESRI User Conference in San Diego, the world's largest and most pre-eminent GIS and geospatial technology meeting (~12,000 attendees). The conference registration of \$495 is complimentary due to Oregon State's annual site license with ESRI.

### **Other Direct Costs**

#### ***Materials and Supplies / Workshop Expenses***

Included are costs for (1) project supplies, telephone and fax toll charges, mailing costs for project-related materials (including bulk mailings), and photocopying; (2) facilities and equipment rental, catering of snacks and coffee, hardcopy and digital materials for the workshops; and (3) various network support and maintenance supplies, reference materials (books, copy fees), hardware maintenance contracts, software and operating system upgrades and annual licenses, backup tapes, printer supplies (ink, media), and UPS (uninterrupted power supply) replacements for computers.

#### ***Publication Costs / Tuition***

Page charges and funds for publishing one manuscript in Year 3 are requested, along with funds to cover the cost of reprints. Fall, Winter, and Spring tuition costs are included in Years 1 and 2 for the graduate student assistantships.

#### ***Subaward***

Separate subaward budgets for participating partners are not included as partners will participate at no-cost or costs will already be covered within the categories of "Travel" and "Materials and Supplies/Workshop Expenses" that are also being supplemented by OSU in-kind cost share.

### **Cost Sharing**

In addition to the OSU in-kind cost share in salaries and benefits itemized above, the project will receive a \$60,000 match from the university's Sponsored Research Office. A document to this effect is included in the supplementary documents section. The cost share is also itemized in the supplemental documents budget summary.

**NSF-PFI Proposal submitted by Dawn Wright and Tim Fiez, 05/17/04**

The Virtual Oregon Map: A Partnership to Enhance Geospatial Awareness and Interoperability ...

Proposed Project Dates: 9/01/2004 - 8/31/2007

	Year 1 Fiscal 04/05	Year 2 Fiscal 05/06	Year 3 Fiscal 06/07	Cumulative	OSU SRO Cost Share
<b>A. SENIOR PERSONNEL</b>					
1. D. Wright, P.I. , 1 mo. ea yr, @ 1.0 FTE/Sum	7,647	7,953	8,271	23,871	0
2. T. Fiez, PI, 4/4/2 mos. @ .75 FTE	15,000	15,600	8,112	38,712	0
3. G. Achterman, co-PI, Dir. INR	0	0	0	0	0
4. K. Butcher, co-PI, University Librarian, Asst. Vice Provost	0	0	0	0	0
5. C. Pederson, co-PI, Vice Provost, Info. Serv	0	0	0	0	0
6. D. Keon, NACSE Programmer, 5.34/5.34/2.17 mos ea yr @ 1.0 FTE	24,039	25,010	13,005	62,054	0
7. K. Walsh, Workshop Coordinator, 3 mo ea yr @ 0.5 FTE	4,125	4,290	4,462	12,877	0
8. J. Kagan, Info. Policy Office, INR	0	0	0	0	0
9. C. Williams, Director, OSU Central Computing	0	0	0	0	0
Total Senior Personnel	50,811	52,853	33,850	137,514	0
<b>B. OTHER PERSONNEL</b>					
2a. Library Tech Sys Adm (M. Gonzales), 1 mo. @ 1.0 FTE	3,364	3,499	3,639	10,501	0
2b. NACSE Sys Admin (K. Ferschweiler), 1 mo each yr @ .34 FTE	1,972	2,051	2,133	6,156	0
3a. 2 GRAs - 9 mo. Appt. @ .49 FTE FWSp	29,094	31,212	0	60,306	0
3b. 2 Grad Student Summer Interns - hourly	9,008	9,370	9,743	28,121	0
4. 3/3/2 Undergrad Summer Interns - hourly	13,002	13,521	9,376	35,899	0
<b>Total Other Personnel</b>	<b>56,440</b>	<b>59,653</b>	<b>24,891</b>	<b>140,983</b>	<b>0</b>
Total Salary & Wages	107,251	112,506	58,740	278,497	0
<b>C. FRINGE BENEFITS</b>					
A1 .38, .39, .40	2,906	3,102	3,308	9,316	0
A2/A6/B2b .43, .44, .45	17,635	18,771	10,463	46,869	0
A7 .52, .53, .54	2,145	2,274	2,409	6,828	0
B2a .47, .48, .49	1,581	1,679	1,783	5,043	0
B3a .01 ea year	291	312	0	603	0
B3b/B4 .05 ea year	1,101	1,145	956	3,202	0
<b>Total Fringe Benefits</b>	<b>25,659</b>	<b>27,283</b>	<b>18,919</b>	<b>71,861</b>	<b>0</b>
Total Salary & Benefits	132,910	139,789	77,659	350,358	0
<b>D. EQUIPMENT</b>					
	0	0	0	0	30,000
<b>E. TRAVEL</b>					
1. Domestic: Yr 1-2, state, regional meetings	2,000	2,000	3,500	7,500	7,500
Yr 3, Lead Pls to DC and present results at ESRI					
Total Travel	2,000	2,000	3,500	7,500	7,500
<b>F. PARTICIPANT SUPPORT</b>					
	0	0	0	0	0
<b>G. OTHER DIRECT COSTS</b>					
1a. Materials and Supplies	9,000	5,500	4,000	18,500	10,500
1b. Workshop Expenses	5,000	5,000	1,500	11,500	10,000
<b>Total G1.</b>	<b>14,000</b>	<b>10,500</b>	<b>5,500</b>	<b>30,000</b>	<b>20,500</b>
5. Publication Costs	0	0	2,000	2,000	2,000
6. Other - Tuition FWSp	17,580	18,984	0	36,564	0
Total Other Direct Costs	31,580	29,484	7,500	68,564	22,500
<b>H. TOTAL DIRECT COSTS</b>					
	166,490	171,273	88,659	426,422	60,000
<b>I. INDIRECT COSTS RATES</b>					
Total Direct Costs less Tuition & Participant Support	61,798	63,200	36,794	161,792	12,450
04/05 Yr. 1 41.5%	\$148,910				
05/06 Yr. 2 41.5%	\$152,289				
06/07 Yr. 3 41.5%	\$88,659				
<b>J. TOTAL DIRECT+INDIRECT</b>					
	228,288	234,473	125,453	588,214	72,450
<b>L. AMOUNT OF THIS REQUEST</b>					
	228,288	234,473	125,453	<b>588,214</b>	
<b>M. TOTAL COST SHARE</b>					
				<b>72,450</b>	

## Current and Pending Support

(See GPG Section II.D.8 for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.	
Investigator: <b>Dawn Wright</b>	Other agencies (including NSF) to which this proposal has been/will be submitted.
Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title: <b>Infrastructure for Data Sharing, Spatial Analysis, and Resource Decision-Making: The Oregon Coastal Atlas (w/ T. Haddad, J. Marra, P. Komar)</b>  Source of Support: <b>NSF-ITR/IM, Digital Government</b> Total Award Amount: \$ <b>507,965</b> Total Award Period Covered: <b>10/01/01 - 08/31/04</b> Location of Project: <b>Oregon State University</b> Person-Months Per Year Committed to the Project.    Cal: <b>0.00</b> Acad: <b>0.00</b> Sumr: <b>1.30</b>	
Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title: <b>Benthic Habitat Characterization for Coastal Management and Marine Protected Areas: American Samoa</b>  Source of Support: <b>NOAA Coastal Services Center</b> Total Award Amount: \$ <b>25,000</b> Total Award Period Covered: <b>03/03/03 - 05/31/04</b> Location of Project: <b>Oregon State University</b> Person-Months Per Year Committed to the Project.    Cal: <b>0.00</b> Acad: <b>0.00</b> Sumr: <b>0.50</b>	
Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title: <b>Spatial Technology Development and Educational Modules for the Fagatele Bay National Marine Sanctuary</b>  Source of Support: <b>NOAA Coastal Services Center</b> Total Award Amount: \$ <b>85,000</b> Total Award Period Covered: <b>06/15/03 - 09/30/05</b> Location of Project: <b>Oregon State University and Pago Pago, American Samoa</b> Person-Months Per Year Committed to the Project.    Cal: <b>0.00</b> Acad: <b>0.00</b> Sumr: <b>2.00</b>	
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input checked="" type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title: <b>Collaborative Research: A Distributed Data Management System to Support Arctic Geology and Geophysics Programs (w/M. Edwards, Univ. of Hawaii)</b>  Source of Support: <b>NSF OPP - Arctic Research Support &amp; Logistics</b> Total Award Amount: \$ <b>320,745</b> Total Award Period Covered: <b>01/05/05 - 07/31/08</b> Location of Project: <b>University of Hawaii and Oregon State University</b> Person-Months Per Year Committed to the Project.    Cal: <b>0.00</b> Acad: <b>0.00</b> Sumr: <b>1.00</b>	
Support: <input type="checkbox"/> Current <input checked="" type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title: <b>Living on the Edge with the Oregon Coastal Atlas</b>  Source of Support: <b>NSF Communication to Public Audiences</b> Total Award Amount: \$ <b>74,880</b> Total Award Period Covered: <b>07/05/04 - 09/30/06</b> Location of Project: <b>Oregon State University</b> Person-Months Per Year Committed to the Project.    Cal: <b>0.00</b> Acad: <b>0.00</b> Summ: <b>0.00</b>	
*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.	





## Current and Pending Support

(See GPG Section II.D.8 for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.

Investigator: <b>Karyle Butcher</b>	Other agencies (including NSF) to which this proposal has been/will be submitted.
Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title: <b>None</b>	
Source of Support: <b>12-month academic support as University Librarian</b> Total Award Amount: \$ <b>0</b> Total Award Period Covered: <b>01/01/04 - 12/31/07</b> Location of Project: <b>Oregon State University</b> Person-Months Per Year Committed to the Project.    Cal: <b>0.00</b> Acad: <b>12.00</b> Sumr: <b>0.00</b>	
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title:	
Source of Support: Total Award Amount: \$                    Total Award Period Covered: Location of Project: Person-Months Per Year Committed to the Project.    Cal:            Acad:            Sumr:	
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title:	
Source of Support: Total Award Amount: \$                    Total Award Period Covered: Location of Project: Person-Months Per Year Committed to the Project.    Cal:            Acad:            Sumr:	
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title:	
Source of Support: Total Award Amount: \$                    Total Award Period Covered: Location of Project: Person-Months Per Year Committed to the Project.    Cal:            Acad:            Sumr:	
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title:	
Source of Support: Total Award Amount: \$                    Total Award Period Covered: Location of Project: Person-Months Per Year Committed to the Project.    Cal:            Acad:            Summ:	

\*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.

## Current and Pending Support

(See GPG Section II.D.8 for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.

Investigator: <b>Tim Fiez</b>	Other agencies (including NSF) to which this proposal has been/will be submitted.
Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title: <b>North Coast Pilot Project</b>	
Source of Support: <b>Oregon Watershed Enhancement Board, State of Oregon</b> Total Award Amount: \$ <b>16,425</b> Total Award Period Covered: <b>10/01/03 - 10/01/04</b> Location of Project: <b>Corvallis, OR</b> Person-Months Per Year Committed to the Project.    Cal: <b>3.00</b> Acad: <b>0.00</b> Sumr: <b>0.00</b>	
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title:	
Source of Support: Total Award Amount: \$                      Total Award Period Covered: Location of Project: Person-Months Per Year Committed to the Project.    Cal:              Acad:              Sumr:	
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title:	
Source of Support: Total Award Amount: \$                      Total Award Period Covered: Location of Project: Person-Months Per Year Committed to the Project.    Cal:              Acad:              Sumr:	
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title:	
Source of Support: Total Award Amount: \$                      Total Award Period Covered: Location of Project: Person-Months Per Year Committed to the Project.    Cal:              Acad:              Sumr:	
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title:	
Source of Support: Total Award Amount: \$                      Total Award Period Covered: Location of Project: Person-Months Per Year Committed to the Project.    Cal:              Acad:              Summ:	

\*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.

## Current and Pending Support

(See GPG Section II.D.8 for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.

Investigator: <b>Curt Pederson</b>	Other agencies (including NSF) to which this proposal has been/will be submitted.
Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title: <b>None</b>	
Source of Support: <b>12-month academic support as Vice Provost for Info. Services</b> Total Award Amount: \$ <b>0</b> Total Award Period Covered: <b>01/01/04 - 12/31/07</b> Location of Project: <b>Oregon State University</b> Person-Months Per Year Committed to the Project.    Cal: <b>0.00</b> Acad: <b>12.00</b> Sumr: <b>0.00</b>	
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title:	
Source of Support: Total Award Amount: \$                    Total Award Period Covered: Location of Project: Person-Months Per Year Committed to the Project.    Cal:            Acad:            Sumr:	
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title:	
Source of Support: Total Award Amount: \$                    Total Award Period Covered: Location of Project: Person-Months Per Year Committed to the Project.    Cal:            Acad:            Sumr:	
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title:	
Source of Support: Total Award Amount: \$                    Total Award Period Covered: Location of Project: Person-Months Per Year Committed to the Project.    Cal:            Acad:            Sumr:	
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title:	
Source of Support: Total Award Amount: \$                    Total Award Period Covered: Location of Project: Person-Months Per Year Committed to the Project.    Cal:            Acad:            Sumr:	

\*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.

### Current and Pending Support ñ J.S. Kagan

Title: Wetland Plant Associations of Northwestern Oregon  
Source of Support: US Forest Service  
Project Location: ORNHIC Office, Portland, OR  
Total Award Amount: \$17,000.00  
Start Date: 06/09/03 End Date: 09/03/04  
Support Type: Current  
Person Months:  
Calendar: 0.1 Academic Summer

Title: Sagebrush Mapping  
Source of Support: US Geological Survey  
Project Location: ORNHIC Office, Portland, OR  
Total Award Amount: \$176,599.00  
Start Date: 05/08/03 End Date: 09/30/05  
Support Type: Current  
Person Months:  
Calendar 4.25 Academic Summer

Title: Ecoregional Planning Work - Cascades  
Source of Support: The Nature Conservancy  
Project Location: ORNHIC Office, Portland, OR  
Total Award Amount: \$7,500.00  
Start Date: 07/01/02 End Date: 06/30/04  
Support Type: Current  
Person Months:  
Calendar 0.5 Academic Summer

Title: Sensitive Wildlife Species Data Management  
Source of Support: OR Department of Fish and Wildlife  
Project Location: ORNHIC Office, Portland, OR  
Total Award Amount: \$59,438.00  
Start Date: 03/14/03 End Date: 03/09/05  
Support Type: Current  
Person Months:  
Calendar: 0.1 Academic Summer

Title: Oregon Comprehensive Wildlife Conservation Plan Ecoregional Assessment  
Source of Support: OR Department of Fish and Wildlife  
Project Location: ORNHIC Office, Portland, OR  
Total Award Amount: \$318,000.00  
Start Date: 09/19/03 End Date: 09/20/05  
Support Type: Current  
Person Months:  
Calendar 3.0 Academic Summer

Title: On-line Threatened and Endangered Species Guide  
Source of Support: OR Watershed Enhancement Board  
Project Location: ORNHIC Office, Portland, OR  
Total Award Amount: \$20,053.00  
Start Date: 02/10/03 End Date: 11/03/04  
Support Type: Current  
Person Months:  
Calendar: 1.0 Academic Summer

Title: DSL Pilot SPGP Permit Review  
Source of Support: Department of State Lands  
Project Location: ORNHIC Office, Portland, OR  
Total Award Amount: \$16,106.00  
Start Date: 03/01/04 End Date: 05/30/04  
Support Type: Current  
Person Months:  
Calendar: 0.25 Academic Summer

Title: Crooked Creek, Succor Creek, and Saddle Mountain Natural Resources Assessment  
Source of Support: OR Parks and Recreation Department  
Project Location: ORNHIC Office, Portland, OR  
Total Award Amount: \$13,956.00  
Start Date: 04/10/04 End Date: 12/30/04  
Support Type: Pending  
Person Months:  
Calendar: 1.15 Academic Summer

Title: Columbia Plateau Ecoregional Planning Data Development  
Source of Support: The Nature Conservancy (DOD grant)  
Project Location: ORNHIC Office, Portland, OR  
Total Award Amount: \$47,357.00  
Start Date: 05/30/04 End Date: 6/30/05  
Support Type: Pending  
Person Months:  
Calendar: 1 Academic Summer

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Title: Western Snowy Plover Management and Nest Protection 2003  
Source of Support: US Forest Service  
Project Location: Oregon Coast, ORNHIC Office, Portland, OR  
Total Award Amount: \$48,000.00  
Start Date: 04/21/03 End Date: 3/31/05  
Support Type: Current  
Person Months:  
Calendar: 0 Academic Summer

Title: Mapping Historic Vegetation in the Columbia River Gorge National Scenic Area and Mt. Hood  
National Forest  
Source of Support: US Forest Service  
Project Location: ORNHIC Office, Portland, OR  
Total Award Amount: \$16,900.00  
Start Date: 06/09/03 End Date: 05/31/04  
Support Type: Current  
Person Months:  
Calendar: 0 Academic Summer

Title: Development of BCR 5 Waterbird Conservation Plan  
Source of Support: US Fish and Wildlife Service  
Project Location: ORNHIC Office, Portland, OR  
Total Award Amount: \$10,000.00  
Start Date: 08/20/02 End Date: 09/30/05  
Support Type: Current  
Person Months:  
Calendar: 0 Academic Summer

Title: The Efficacy of Nest Enclosures for Western Snowy Plover Predation on the Oregon Coast  
Source of Support: US Fish and Wildlife Service  
Project Location: Oregon Coast, ORNHIC Office, Portland, OR  
Total Award Amount: \$7,000.00  
Start Date: 08/28/03 End Date: 06/30/04  
Support Type: Current  
Person Months:  
Calendar: 0 Academic Summer

Title: Fenders Habitat Restoration at Basket Butte  
Source of Support: The Nature Conservancy, DSL, US Fish and Wildlife Service  
Project Location: Basket Slough National Wildlife Refuge  
Total Award Amount: \$10,995.00  
Start Date: 02/03/03 End Date: 06/30/04  
Support Type: Current  
Person Months:  
Calendar: 0 Academic Summer

Title: Western Snowy Plover Management and Nest Protection 2003  
Source of Support: OR Department of Fish and Wildlife  
Project Location: Oregon Coast, ORNHIC Office, Portland, OR  
Total Award Amount: \$27,000.00  
Start Date: 03/14/03 End Date: 12/31/05)  
Support Type: Current  
Person Months:  
Calendar: 0 Academic Summer

Title: Western Snowy plover Habitat Conservation Plan  
Source of Support: OR Parks and Recreation Department  
Project Location: ORNHIC Office, Portland, OR  
Total Award Amount: \$37,176.00  
Start Date: 07/01/02 End Date: 06/30/04  
Support Type: Current  
Person Months:  
Calendar:0 Academic Summer

Title: Western Snowy Plover Management and Protection 2004  
Source of Support: US Bureau of Land Management  
Project Location: Oregon Coast, ORNHIC Office, Portland, OR  
Total Award Amount: \$40,000.00  
Start Date: 08/09/03 End Date: 06/30/07  
Support Type: Current  
Person Months:  
Calendar: 0 Academic Summer

Title: Scappoose Bay Conservation and Restoration  
Source of Support: Wetlands Conservancy  
Project Location: ORNHIC Office, Portland, OR  
Total Award Amount: \$15,800.00  
Start Date: 02/10/04 End Date: 06/30/04  
Support Type: Current  
Person Months:  
Calendar: 0 Academic Summer

Title: Sycan Marsh Vegetation Monitoring  
Source of Support: The Nature Conservancy  
Project Location: ORNHIC Office, Portland, OR; Sycan Marsh  
Total Award Amount: \$7,357.00  
Start Date: 03/01/04 End Date: 12/31/04  
Support Type: Current  
Person Months:  
Calendar: 0 Academic Summer

Title: Western Snowy Plover management and Nest Protection 2004  
Source of Support: US Forest Service  
Project Location: Oregon Coast, ORNHIC Office, Portland, OR  
Total Award Amount: \$45,000.00  
Start Date: 03/15/04 End Date: 12/31/04  
Support Type: Current  
Person Months:  
Calendar: 0 Academic Summer

Title: Expanding Oregon's Wetland Database  
Source of Support: EPA  
Project Location: ORNHIC Office, Portland, OR  
Total Award Amount: \$71,798.00  
Start Date: 06/01/04 End Date: 06/30/05  
Support Type: Pending  
Person Months:  
Calendar: 0 Academic Summer

## Current and Pending Support

See GPG Section II.D.8 for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.

Investigator: Dylan B. Keon

Other agencies (including NSF) to which this proposal has been/will be submitted.

Support:  Current  Pending  Submission Planned in Near Future  \*Transfer of Support

Project/Proposal Title:

National Partnership for Advanced Computational Infrastructure

Source of Support: National Science Foundation

Total Award Amount: \$982,239 for Years 1-6 Total Award Period Covered: July 97 - June 07

Location of Project: Corvallis, Oregon

Person-Months Per Year Committed to the Project.

Cal: 5.0

Acad:

Sumr:

## Current and Pending Support

(See GPG Section II.D.8 for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.	
Investigator: <b>Catherine Williams</b>	Other agencies (including NSF) to which this proposal has been/will be submitted.
Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title: <b>None</b>	
Source of Support: <b>12-month academic support as Director of Central Computing</b> Total Award Amount: \$ <b>0</b> Total Award Period Covered: <b>01/01/04 - 12/31/07</b> Location of Project: <b>Oregon State University</b> Person-Months Per Year Committed to the Project.    Cal: <b>0.00</b> Acad: <b>12.00</b> Sumr: <b>0.00</b>	
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title:	
Source of Support: Total Award Amount: \$                    Total Award Period Covered: Location of Project: Person-Months Per Year Committed to the Project.    Cal:            Acad:            Sumr:	
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title:	
Source of Support: Total Award Amount: \$                    Total Award Period Covered: Location of Project: Person-Months Per Year Committed to the Project.    Cal:            Acad:            Sumr:	
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title:	
Source of Support: Total Award Amount: \$                    Total Award Period Covered: Location of Project: Person-Months Per Year Committed to the Project.    Cal:            Acad:            Sumr:	
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title:	
Source of Support: Total Award Amount: \$                    Total Award Period Covered: Location of Project: Person-Months Per Year Committed to the Project.    Cal:            Acad:            Summ:	

\*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.

## ***Facilities, Equipment, and Other Resources***

### **Laboratory**

OrSt GEOSCIENCES: Davey Jones Locker and Digital Earth are the primary research and teaching laboratories for GIS, remote sensing, cartography, numerical analysis, scientific visualization, and data management. Digital Earth is a 30-seat classroom jointly shared by the OrSt Department of Geosciences and the College of Science

### **Computer**

OrSt GEOSCIENCES: The Davey Jones Locker and Terra Cognita laboratories house programming, GIS, and visualization workstations with ArcGIS, ArcView, ERDAS, Mathematica, SPlus, OSL, Java, C/C++, Visual Basic, OpenGL, and various web servers. Hardware includes Unix, Windows, and Macintosh machines, large-format plotters, color scanners, color and b/w printers, and a large-format digitizing tablet.

OrST VALLEY LIBRARY: The campus library houses a web and data server: Sun Enterprise 3000, 168 Mhz, 512 Mb RAM, 45 Gb disk space; current usage is less than 25%.

### **Office**

OrSt GEOSCIENCES: Office space for all investigators, collaborators and students. Additional space for a dedicated RIDGE Data Management Office with telephone, computer access, and additional office support and supplies at no cost from the Department of Geosciences and the College of Oceanic and Atmospheric Sciences.

### **Other**

OrSt GEOSCIENCES: In addition to the Digital Earth teaching classroom in Geosciences, two world-class facilities for meetings and technical workshops exist on the OrSt campus: the LaSells Stewart Center and the CH2M-Hill Alumni Center. They are available for rental by OrSt faculty at greatly reduced rates.

### **Major Equipment**

OrSt GEOSCIENCES:

- 4 SGI Irix Indigo Development/Visualization workstations w/46 Gb total disk capacity
- 4 Sun workstations (inc. 2 Blade 100s) for file-sharing, network disk, and printing services
- 6 Windows NT/2000 development/visualization workstations
- 3 web servers (1 dual-processing Windows 2000, 1 Sun Blade 100, 1 IBM RS/6000)
- 2 DLT-2000 large capacity (15 Gb) tape drives
- 2 Exabyte large capacity (14 Gb) tape drives
- 1 HP DesignJet 5000 large-format color plotter
- 1 IBM 530T workstation optimized for matrix calculations

### **Other Resources**

Secretarial support available from the Department of Geosciences

Web and database consulting available from the Northwest Alliance for Computational Science and Engineering (particularly for Storage Resource Broker, Oracle, Informix, SQL, and ArcIMS)

---

## **The Northwest Alliance for Computational Science and Engineering (NACSE)**

**NACSE** is housed in a facility specifically designed to encourage cross-disciplinary cooperation. The physical facility includes, in addition to staff offices and conference space, a large laboratory space supporting usability testing activities, and a machine room with UPS backup providing several hours of supplementary power for the computing and networking servers. All local and remote electronic user access to initiate information requests will be provided via computers and network infrastructure at NACSE.

**Network Environment.** Oregon State University (OrSt) has been active in the development of high performance networks at the campus, regional, and national levels for many years. OrSt was the lead institution in developing the Network for Education and Research in Oregon (NERO), which evolved into a cooperative high-performance network connecting all public institutions of higher education, all K-12 institutions, and all state agencies and departments in Oregon. The University was also one of the first to be awarded an NSF High Performance Connections Award and to be connected to the vBNS; Pancake was PI on this project. OrSt is a founding member of Internet2, and Pancake serves on one of the organizing committees of the University Consortium for Advanced Internet Development, the organization responsible for Internet2's Abilene Network. As part of the cost-sharing on Pancake's more recent NSF grants ("Upgrading Oregon State's Multidirectional Wave Basin for Remote Tsunami Research"), the University has committed to maintaining very high-speed network connections through the year 2014. NACSE has been connected to the campus backbone via Gigabit Ethernet for over 2 years – the first research center on campus to enjoy this level of connectivity. NACSE was also the site of OrSt's first wireless network.

**File, Database, and Web Servers.** NACSE working files, database, and web services are maintained on NACSE's server farm of multi-processor SunFire and Dell PowerEdge servers. All servers are connected directly to the campus backbone and NERO. The aggregate disk storage in RAID arrays is currently about 500 GB. These existing facilities will be used during the initial startup period of the project, but the portal facilities will eventually be supported by separate, dedicated hardware infrastructure. NACSE maintains additional machines as test servers, allowing the development and testing of new software components without affecting the performance or stability of production-level services.

**Archival Backup.** All files on all NACSE servers are backed up incrementally on a nightly basis, with full backups monthly. Backup tapes are maintained in a separate facility located across campus, in order to provide reliability in the event of a fire or other physical threat to the NACSE machine room. The use of Legato software and tape jukeboxes allows backups to be made automatically, and recovery of lost or corrupted files to be performed very quickly, via remote access and without operator intervention.

**Database Management.** NACSE maintains databases from numerous scientific and engineering research data sets (see <http://www.nacse.org/databases> for examples). The primary relational database management systems employed are Oracle and Sybase. Since a major portion of NACSE research activities is in support of access to heterogeneous and distributed databases, however, we also support a wide variety of shareware and commercial database products running in UNIX, Windows, and Macintosh

systems (e.g., MySQL, Paradox, Access).

**Software Usability Testing and Evaluation.** NACSE's Usability Testing Laboratory is available as a testbed for systematically evaluating the usability and robustness of software tools and interfaces across a range of common platforms to insure that usability problems are solved before software is deployed. The testing facility, installed in 1995 and updated frequently since then, has been used by software developers from industry as well as academic organizations to evaluate whether tools and software behave consistently when invoked from a range of desktop platforms. For example, even a CDE-compliant interface developed on one platform (e.g., HPs) may exhibit bizarre font and color appearance when displayed on another type of workstation (e.g., SGIs); similar problems occur with web interfaces, due to browser inconsistencies. Currently, the laboratory supports UNIX workstation systems from IBM, Sun, HP, and SGI (multiple machines from each manufacturer, with differing hardware capabilities), Windows NT/2000/ME/XP machines from several manufacturers, Macintosh systems, and Linux systems. Earlier versions of operating systems, web browsers, and other key software are maintained for use in testing backward compatibility.

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## **OrSt College of Forestry**

The primary Forestry network consists of 2 master switches plus about 110 secondary switches and hubs. The network services approximately 1200 devices (computers, printers, servers, etc.) connected with over 60 miles of fiber. The network provides 100baseTX service to virtually everyone and uses gigabit Ethernet for most interconnections and servers. Gigabit Ethernet is available to the desktop. There is also a small wireless network designed to cover the primary public meeting spaces. The primary network is connected to the OrSt, PNW, and FRESO networks which provide access to our 4 satellite networks: OrSt College Forests, Oak Creek building (formerly FRL), HJ Andrews Experimental Forest, and ODFW. Network activities are coordinated with OrSt Information Services to avoid redundancy and to assure interoperability.

As of April 2002, FCR maintains the following servers and disk space (gigabyte (GB) is 1000 megabytes (MB), terabyte (TB) is 1000 GB):

### **Equipment:**

- 2 Web servers (1 of which is also the FTP server)
- 6 PC and Unix mail servers supporting core e-mail, task, contact, and calendaring services plus mailing lists and Web e-mail access
- 5 Application servers with over 600GB of space.
- 13 PC and Unix file servers with over 5.5TB of disk space for public, workgroup, and user files
- 4 SQL servers providing over 500GB of space for college and workgroup databases
- 10 Administrative servers providing DNS (domain name services for the Internet), directory services (authentication), print services, and imaging
- 4 Tape backup servers with jukeboxes providing about 10TB of backup space
- 5 Public access Unix workstations including a Cray J90
- 2 HP 5000 60" wide color plotters

HP 36" wide color plotter  
Multiple printers (color and black and white)

**Classrooms/laboratories:**

2 classrooms complete with 22 student computers (high end), instructor workstations and data projectors. An additional GIS lab is available for labs and workshops and contains 19 student computers with a teacher workstation. Computer equipment is available for instructors in six other classrooms, including projectors and sound systems.

The system uses the following operating system: Windows 2000 SP3

The following applications are available to all registered users:

- Adobe Acrobat Reader 5.05
- Animation Shop 1.0
- ArcGIS 8.3 (Workstation and Desktop)
- ArcIMS 4.0
- ArcView 3.2
- Banner
- Endnote 4.0
- Flashpath
- Ghostview 2.7
- GQL Data Warehouse
- ERDAS Imagine 8.5
- Internet Explorer 6
- Irfanview
- LimDep 7
- Lindo
- Maple8
- MS Office 2000
- MSDN Library 6.0a
- Netscape 4.79
- Norton Antivirus Corporate Edition 7.6
- Paintshop Pro 5.0
- PC Ord 4
- Procite 5.0
- Quicktime Player 6
- Real Player 8.0
- SAS 8.2
- SigmaPlot 6.0
- SPlus 6.1
- SSH - Secure Telnet
- Statgraphics 4.0
- UUDecode
- Visual Studio 6.0a
- Winzip 7.0
- Win QVT
- WS FTP32 3.0

## **Note on Letters of Support**

We have been gathering letters of support for this proposal over the course of several weeks prior to submission. In earlier solitications for support the title of our project at the time was "Virtual Oregon: A Center of Innovation for Data Cataloging, Access, and Geospatial Awareness" and those earlier letters of support reflect that. However, in the last week the title of the project has been changed to "The Virtual Oregon Map: A Partnership to Enhance Geospatial Awareness and Interoperability for Improved Business Processes and Decision-Making" and some letters of support received just prior to submission mention that title. We just want to make clear that all letters of support do in fact refer to the proposed project "The Virtual Oregon Map..." . For many of our partner organizations it takes several days to weeks for an official letter to be approved up the "chain of command" before release, so we did not have time to request new letters with the updated proposal title.

Thank you for your consideration of this proposal.



Alsea Geospatial, Inc.

[www.alseageo.com](http://www.alseageo.com)

GIS, Database, & Web Mapping Solutions

P.O. Box 2380  
450 SW Madison Ave  
Corvallis, OR 97339-2380  
Phone: 541.754.5034  
Fax: 541.754.5838

March 5, 2004

Dawn J. Wright  
Department of Geosciences  
104 Wilkinson Hall  
Oregon State University  
Corvallis, OR 97331-5506

**RE: Support for NSF Partnership for Innovation Proposal**

Dear Dawn,

We are pleased to offer our support for your National Science Foundation Partnership for Innovation proposal entitled "Virtual Oregon: A Center of Innovation for Data Cataloging, Access, and Geospatial Awareness". Natural resource data exploration, archiving and distribution are extremely important to GIS firms such as ours, in addition to the numerous government agencies, research and educational institutions, non-profit groups, and private companies and individuals throughout our state. We would like to be involved with you in enabling and encouraging the productive interchange of high quality data, scientific knowledge, and informed environmental policy. We also share your goal of helping us all to avoid mass duplication of effort and prevention of the development of fragmented digital systems. We look forward to entering into a partnership commitment should the proposal be funded.

Alsea Geospatial has enjoyed our previous cooperation with your department, including participation in GIS Day events, classroom presentations, and hiring GIS students for intern positions. We look forward to continuing to work with you.

Sincerely,

*Karen A. Gabriel*

Karen A. Gabriel  
President



**City Manager's Office**

501 SW Madison Avenue

P.O. Box 1083

Corvallis, OR 97339-1083

(541) 766-6901

FAX: (541) 766-6780

e-mail: [city.manager@ci.corvallis.or.us](mailto:city.manager@ci.corvallis.or.us)

April 5, 2004

Dawn J. Wright  
Department of Geosciences  
104 Wilkinson Hall  
Oregon State University  
Corvallis, OR 97331-5506

Dear Dawn,

We are pleased to support Oregon State University's NSF Partnership for Innovation (PFI) Proposal entitled "Virtual Oregon: A Center of Innovation for Data Cataloging, Access, and Geospatial Awareness" and to be entered into a partnership commitment should the proposal be funded.

Natural resource data archiving, distribution, and exploration are important to the City of Corvallis and our state. We would like to be involved with you in enabling and encouraging the productive interchange of high quality data, scientific knowledge, and informed environmental policy. We also share your goal of helping us all to avoid duplication of effort and prevention of the development of fragmented digital systems.

We look forward to working with you.

Sincerely,

Jon Nelson  
City Manager



April 26, 2004

Ms. Dawn J. Wright  
Department of Geosciences  
104 Wilkinson Hall  
Oregon State University  
Corvallis, OR 97331

Dear Ms. Wright,

ESRI is pleased to offer support for your NSF PFI proposal entitled "Virtual Oregon: A Center of Innovation for Data Cataloging, Access, and Geospatial Awareness." Your proposal addresses the use of geographic information systems (GIS) in the development of the Virtual Oregon Map project with the specific goal of helping improve the geospatial data infrastructure within the state of Oregon.

For more than 33 years, ESRI has been providing the most innovative GIS solutions available. Driven by the latest technologies, we are committed to developing mapping software with the latest industry-standard development and data management tools. Our scalable family of software programs, now known as ArcGIS, is a proven resource for academia, government, private and non-governmental organizations to collectively contribute and enhance geospatial infrastructure and apply geospatial knowledge and analysis.

ESRI is excited to be involved with the development of Virtual Oregon Map through the use of GIS technology and the integration and dissemination of high quality spatial information. We also share your goal to address the potential challenges of a large collaborative project including the avoidance of mass duplication of efforts, and prevention of the development of fragmented digital systems. We believe that the integration, cataloging and accessing of Pacific Northwest environmental data clearly addresses the NSF PFI grant goal of stimulating the transformation of knowledge, broadening participation and improving the national well-being.

We are pleased to be a partner in this effort and look forward to working with the team.

Sincerely,

Martin Balikov  
ESRI Olympia Regional Manager



United States  
Department of  
Agriculture

Forest  
Service

Pacific Northwest  
Research  
Station

Forestry Sciences Laboratory  
3200 SW Jefferson Way  
Corvallis, OR 97331  
Phone (541) 750-7250  
Fax (541) 758-7760

---

File Code: 1500

Date: April 8, 2004 April 8, 2004

Dawn J Wright  
Professor  
Department of Geosciences  
104 Wilkinson Hall  
Oregon State University  
Corvallis, OR 97331-5506

Dear Dawn,


We are pleased to offer support for your NSF PFI proposal entitled "Virtual Oregon: A Center of Innovation for Data Cataloging, Access, and Geospatial Awareness" and to be entered into a partnership should the proposal be funded. Natural resource data distribution, archiving and exploration are extremely important to our organization and our state, and we would like to be involved with you in enabling and encouraging the productive interchange of high quality data, scientific knowledge, and informed environmental policy. We also share your goal of helping us all to avoid mass duplication of effort and prevention of the development of fragmented digital systems.


We look forward to working with you.

Sincerely,

/s/ Thomas A. Spies  
THOMAS A. SPIES  
Team Leader  
Ecosystem Processes Program



 An Analysis of the Timber Situation in the United States: 1952-2050 (March 7, 2003)

 2002 Science Accomplishments Report (February 3, 2003)



Pacific Northwest Research Station  
USDA Forest Service



333 SW First Avenue, Portland, OR 97208 Phone: (503) 808-2592

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**W**elcome to the Pacific Northwest Research Station!!

**H**eadquartered in Portland, Oregon, the Pacific Northwest Research Station is one of eight USDA Forest Service Research facilities. This Station's research is organized into seven programs conducted at ten locations: nine laboratories in Alaska, Washington, and Oregon, and a Wood Utilization Center in Sitka, Alaska. Forestry research sites were established to evaluate and disseminate information and technology to improve management and use of natural resources. The Pacific Northwest Research Station celebrated its 75th anniversary in August 2000.

*.....Our mission is to generate and communicate scientific knowledge that helps people understand and make informed choices about people, natural resources, and the environment.....*

*Thomas M. Quigley, Station Director*

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*Unofficial*

USDA Forest Service

Pacific Northwest Research Station

# Corvallis Lab

3200 SW Jefferson Way  
Corvallis, Oregon 97331  
(541)750-7250  
FAX (541)750-7329

The Pacific Northwest Research Station has seven research programs. Teams within those programs are spread across the region. Listed here are the teams located in the Corvallis lab. [Phone numbers](#) can be found on the Pacific Northwest Research Station home page.

Aquatic and Land Interactions Program

- Aquatic Systems (Jim Sedell, Team Leader)

Ecosystem Processes Program

- [Sustainable Ecosystem Productivity](#) (Bernard Borman, Team Leader)
- Genetic Diversity -- Global Biological Diversity (Ross Kiester, Team Leader)
- [Forest Mycology](#) (Randy Molina, Team Leader)
- Forest Landscapes and Ecosystems (Fred Swanson, Team Leader)

Managing Natural Disturbance to Sustain Forest Health Program

- Behavior Chemicals and Ecology of Forest Insects and Diseases (Gary Daterman, Team Leader)
- [Fire and Environmental Research Applications \(FERA\)](#) (David "Sam" Sandberg, Team Leader)
- Mapped Atmosphere-Plant-Soil System (Ron Neilson, Team Leader)

Pacific Resource Inventory, Monitoring, and Evaluation (PRIME) Program

- Forest Health Monitoring (Leon Liegel, Team Leader)

People and Natural Resources Program

- [Knowledge-Based Systems](#) (Keith Reynolds, Team Leader)
- Effective Involvement in Resource Decisions (George Stankey, Team Leader)

Resource Management and Productivity Program

- Forest Genetics (Don Copes, Team Leader)
- Biology and Culture of Forest Plans (Nan Vance, Team Leader)

Social and Economic Values Program

- International Forestry (David Brooks, Team Leader)
- [Land Use Land Cover Dynamics team](#): Ralph Alig, team leader, located in Corvallis, Oregon

DISCLAIMERS

The Forest Service of the the U.S. Department of Agriculture is dedicated to the principle of multiple use management of the Nation's forest resources for sustained yields of wood, water, forage, wildlife, and recreation. Through forestry research, cooperation with the States and private forest owners, and management of the National Forests and National Grasslands, it strives -- as directed by Congress -- to provide increasingly greater service to a growing Nation.

The United States Department of Agriculture (USDA) prohibits discrimination in its programs on the basis of race, color, national origin, religion, age, disability, political beliefs, and marital or familial status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means of communication of program information (Braille, large print, audiotape, etc.) should contact the USDA Office of Communications at (202)720-2791 (voice) or (800)855-1234 (TDD).



**Department of Administrative Services**

Information Resources Management Division

Geospatial Enterprise Office

1225 SE Ferry St., 2<sup>nd</sup> Floor

Salem, OR 97301

(503) 378-2166

May 10, 2004

Dawn J. Wright  
Department of Geosciences  
104 Wilkinson Hall  
Oregon State University  
Corvallis, OR 97331-5506

Dear Dawn,

We are pleased to offer support for your NSF PFI proposal entitled "The Virtual Oregon Map: A Partnership to Enhance Geospatial Awareness and Interoperability for Improved Business Processes and Decision Making" and to be entered into a partnership commitment should the proposal be funded. Natural resource data distribution, archiving and exploration are extremely important to our organization and our state, and we would like to be involved with you in enabling and encouraging the productive interchange of high quality data, scientific knowledge, and informed environmental policy. We also share your goal of helping us all to avoid mass duplication of effort and prevention of the development of fragmented digital systems.

Furthermore, in our role as the Geospatial Enterprise Office for state government in Oregon, we are extremely interested in the collateral benefits this project will provide to inform our efforts toward improving data distribution, archiving, and exploration for all other data types, including data about human resources, economic conditions and development, and public safety. We look forward to working with you on this important project.

Sincerely,

Cyril R. Smith  
Statewide GIS Coordinator  
Oregon Dept. of Administrative Services  
Geospatial Enterprise Office



# Global Mapping Technology

1107 NW Oak Avenue  
Corvallis, Oregon 97330 USA

Products and Training for GPS/GIS/SURVEYING  
Tel: 541-754-3488 Email: <gmtgps@peak.org>

March 8, 2004

Dawn J. Wright  
Department of Geosciences  
104 Wilkinson Hall  
Oregon State University  
Corvallis, OR 97331-5506

Dear Dawn,

Global Mapping Technology is pleased to offer support for your NSF PFI proposal entitled "Virtual Oregon: A Center of Innovation for Data Cataloging, Access, and Geospatial Awareness" and to be entered into a partnership commitment should the proposal be funded. Natural resource data distribution, archiving and exploration are extremely important to our organization and our state, and we would like to be involved with you in enabling and encouraging the productive interchange of high quality data, scientific knowledge, and informed environmental policy. We also share your goal of helping us all to avoid mass duplication of effort and prevention of the development of fragmented digital systems.

In particular, Global Mapping Technology's expertise in implementing Global Positioning Systems (GPS) for field-based GIS data capture, and the necessary training and support, can bring a powerful and effective team member to this project. We are an Oregon based company and we would take great pride to work with Oregon State University and other key organizations

Please keep us closely informed on the progress of this important project. We look forward to working with you.

Your committed partner,

Richard G. Ash  
President  
Global Mapping Technology



**Newlands &  
Company, Inc.**  
*Design Visualization Services*

1926 NE 10th Avenue  
Portland, Oregon 97212  
503.287.8000  
www.nc3d.com

May 11, 2004

Dawn J. Wright  
Oregon State University  
104 Wilkinson Hall  
Corvallis, OR 97331-5506

Re: Virtual Oregon NSF Proposal

Dear Dawn:

We are very happy to support your NSF PFI proposal, "The Virtual Oregon Map: A Partnership to Enhance Geospatial Awareness and Interoperability for Improved Business Processes and Decision-Making", and look forward to working with you in partnership if your proposal is funded.

We are especially interested in helping to develop this project to facilitate our collaboration with businesses, public agencies and academic institutions. We need a system which will allow us to capture and integrate data from different sources with different levels of detail, accuracy and visual quality. All too often, effort is repeated and data is lost because there are no standards or mechanisms for sharing heterogeneous data. We want to help develop tools which will enable people to contribute 3D models in a standard format and generate new versions of the 3D city through database queries.

We are also excited about working with OSU to develop methods of delivering geographic data over the web. We want to provide ways to utilize 3D data on the web with common hardware and software. We envision a system that will deliver 3D models of the city over the web with selective features in standard formats.

Sincerely Yours,

Donald T. Newlands  
Newlands & Company, Inc.



# Oregon

Theodore R. Kulongoski, Governor

Oregon Watershed Enhancement Board

775 Summer Street NE, Suite 360

Salem, Oregon 97301-1290

(503) 986-0178

FAX (503) 986-0199

March 22, 2004



Dawn J. Wright  
Department of Geosciences  
104 Wilkinson Hall  
Oregon State University  
Corvallis, OR 97331-5506

RE: NSF Proposal "Virtual Oregon: A Center of Innovation for Data Cataloging, Access, and Geospatial Awareness"

Dear Dawn:

We are pleased to offer the support of the Oregon Watershed Enhancement Board (OWEB) staff for your above referenced proposal. OWEB has a legislative responsibility to develop geographic data standards and cooperatively assist in the development of geospatial data for use in natural resource policy deliberation. The proposal you have developed assists OWEB in the pursuit of that mission. OWEB will become a partner should the proposal be funded.

OWEB has a communication network with watershed councils throughout the state who use natural resource data. The distribution of data and avoidance of duplication of efforts is critical to ensure the availability of accurate and complete geospatial data.

Thank you for the opportunity to participate in this important effort.

Sincerely,

Kenneth F. Bierly  
Deputy Director



CONFEDERATED TRIBES  
of the  
*Umatilla Indian Reservation*

P.O. Box 638  
PENDLETON, OREGON 97801  
Phone: (541) 276-3099  
Fax: (541) 278-5393



May 5, 2004

Dawn J. Wright  
Department of Geosciences  
104 Wilkinson Hall  
Oregon State University  
Corvallis, OR 97331-5506

Dear Dawn,

The Confederated Tribes of the Umatilla Indian Reservation are pleased to offer support for your NSF PFI proposal entitled "Virtual Oregon: A Center of Innovation for Data Cataloging, Access, and Geospatial Awareness" and to be entered into a partnership commitment should the proposal be funded. As a tribal government, we find natural resource data distribution, archiving and exploration are extremely important to the successful execution of our responsibilities. With this in mind, we would like to be involved with you in enabling and encouraging the productive interchange of high quality data, scientific knowledge, and informed environmental policy. We also share your goal of helping us all to avoid mass duplication of effort and prevention of the development of fragmented digital systems.

We look forward to working with you.

Sincerely,

Dan Haug  
GIS Manager  
Confederated Tribes of the Umatilla Indian Reservation



# Mid-Willamette Valley Council of Governments

105 HIGH STREET S.E. • SALEM, OREGON 97301-3667 • [www.mwvcog.org](http://www.mwvcog.org)  
TELEPHONE (503) 588-6177 • FAX (503) 588-6094 • e-mail: [mwvcog@open.org](mailto:mwvcog@open.org)  
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**EXECUTIVE DIRECTOR:**  
**DAVID A. GALATI**

March 8, 2004

Dawn J. Wright  
Department of Geosciences  
104 Wilkinson Hall  
Oregon State University  
Corvallis, OR 97331-5506

Dear Dawn,

The Willamette Valley GIS Users Group, in cooperation with its' host organization, the Mid-Willamette Valley Council of Governments, is pleased to offer support for your NSF PFI proposal entitled "Virtual Oregon: A Center of Innovation for Data Cataloging, Access, and Geospatial Awareness" and to be

entered into a partnership commitment should the proposal be funded. Natural resource data distribution, archiving and exploration are extremely important to our organization and our state, and we would like to be involved with you in enabling and encouraging the productive interchange of high quality data, scientific knowledge, and informed environmental policy. We also share your goal of helping us all to avoid mass duplication of effort and prevention of the development of fragmented digital systems.

Both the MWVCOG and the WVGISUG believe that this program will be a benefit to us and to agencies and individuals across the state, and support you in your efforts. We look forward to working with you.

Sincerely,

Lesley Hegewald  
Associate GIS Analyst/Data Specialist and  
Coordinator, Willamette Valley GIS Users Group

**Results from Prior NSF Support  
(not mentioned in NSF Program Solicitation 04-556  
but normally required in NSF proposals)**

**Lead PI Wright**

D.J. Wright: ACI-0081487; \$487,555, 9/1/00-2/29/04. *ITR: Computational Environment Infrastructure with Applications to Mid Ocean Ridge Research: The "Virtual Research Vessel" Prototype*, with J. Cuny, D. Toomey, and J. Cushing.

The University of Oregon was the lead institution on this collaborative project which sought to develop a prototype for a computational environment and toolset, called the Virtual Research Vessel (VRV), in order to provide scientists and educators with ready access to data, results, and numerical models. The specific vision of the VRV was to support data sharing by merging three technologies: geographic information systems (GIS), database management systems, and numerical tool composition. In addition, model coupling by developing support for exploring model correlations and relationships at a very high, domain-specific level in a fast prototyping environment is ongoing. The Oregon State portion of the project successfully designed and built a map and data server so that users could perform basic GIS functions such as spatial query and buffering over the Internet, as well simultaneous access to both web data from the server and local data from the client's desktop, and dynamic map editing and annotation. The engine was provided by Arc Internet Map Server (ArcIMS). This award provided part of a Master of Science thesis project for a female graduate student, who used the skills gained to obtain a full-time position as a GIS analyst with the Irish Coastal & Marine Resources Centre, Cork, Ireland.

In addition, Wright is nearing completion of the following NSF grant:  
EIA-011359; \$507,965, 10/1/01-8/31/04. *ITR/IM/Digital Government: Infrastructure for Data Sharing, Spatial Analysis, Resource Decision-Making, and Societal Impact: The Oregon Coastal Atlas.*

**Published Results from prior ACI-0081487, Virtual Research Vessel**

Wright, D.J., O'Dea, E., Cushing, J.B., Cuny, J.E., and Toomey, D.R., Why Web GIS may not be enough: A case study with the Virtual Research Vessel, *Marine Geodesy*, 26(1-2), 73-86, 2003.

Wright, D.J., Towards a data management infrastructure for MARGINS: Examples from Boomerang 8 and the Virtual Research Vessel [pdf], *MARGINS Newsletter*, 9:34-36, 38, 2002.

Wright, D.J., O'Dea, E., Toomey, D.R., Cushing, J.B., and Cuny, J.E., The Virtual Research Vessel: A prototype for coupling mid-ocean ridge data, maps, and models, *Geological Society of America, 2002 Abstracts with Programs, Cordilleran Section Meeting*, Corvallis, OR, 34(5): A-85, P-70, 2002.

Wright, D.J., O'Dea, E., Cushing, J.B., Cuny, J.E., Toomey, D.R., Hackett, K., and Tikekar, R., Developing a computational environment for coupling MOR data, maps, and models: The Virtual Research Vessel (VRV) prototype, *Eos, Trans. AGU*, 82(47), Fall Meet. Suppl., Abstract OS11B-0353, F590, 2001 (poster).

**Web sites** ñ Virtual Research Vessel Main site - [oregonstate.edu/dept/vrv/](http://oregonstate.edu/dept/vrv/)  
EPR 90N Viewer - [scallywag.science.oregonstate.edu/website/epr\\_html/viewer.htm](http://scallywag.science.oregonstate.edu/website/epr_html/viewer.htm)

**Published Results from current EIA-011359, Oregon Coastal Atlas**

- Mayer, L., Barbor, K., Boudreau, P., Chance, T., Fletcher, C., Greening, H., Li, R., Mason, C., Metcalf, K., Snow-Cotter, S., and Wright, D., *National Needs for Coastal Mapping and Charting*, Washington, DC: National Academies Press, in press, 2004.
- Wright, D.J., Interoperability among spatial data resources along a continuum: "Data-to-data", "data models" and "data-to-interpretation", *Eos, Trans. AGU*, 83(47), Fall Meet. Suppl., Abstract OS61C-09, F700, 2002.
- Wright, D.J. Internet GIS at Oregon State University, in Peng, Z.R. and Tsou, M.H., *Internet GIS: A Distributed Geospatial Information Service for Wired and Wire less Networks*, New York: John Wiley and Sons, 198-199, 2003.
- Wright, D., Haddad, T., Klarin, P., Dailey, M., and Dana, R., The Oregon Coastal Atlas: A Pacific Northwest NSDI contribution, *Proceedings of the 23rd Annual ESRI User Conference*, San Diego, CA, Paper 105, 2003.
- Wright, D. J., Haddad, T., Klarin, P., Dailey, M., Marra, J., Dana, R., Revell, D., Tavakoli-Shiraji, M., and Crouse, K., Infrastructure for data sharing, spatial analysis, resource decision-making, and societal impact: The Oregon Coastal Atlas, *Abstracts of the Association of American Geographers Annual Meeting*, New Orleans, Louisiana, Paper 827.16199, CD-ROM, 2003.



**Office of the Vice Provost for Research**

Oregon State University, 312A Kerr Administration Building, Corvallis, Oregon 97331-1234  
T 541-737-3437 | F 541-737-3093 | <http://oregonstate.edu/research/>

May 17, 2004

To: Dawn Wright, Department of Geosciences  
Tim Fiez, Valley Library

From: Jack Higginbotham, Faculty Liaison, Research Office

Re: NSF Partnerships for Innovation (PFI) Proposal, NSF 04-556

The Research Office is pleased to provide cost share at a level of 10% of the requested support in your NSF PFI proposal "The Virtual Oregon Map: A Partnership to Enhance Geospatial Awareness and Interoperability for Improved Business Processes and Decision Making". We will provide \$60,000 in FY05 Directed Research Funds toward the direct costs of your project. Good luck with your proposal.

05/17/2004 10:33 FAX 541 737 3093

OSU RESEARCH OFFICE



Office of the Vice Provost for Research  
Oregon State University, 312A Kerr Administration Building, Corvallis, Oregon 97331-1234  
T 541-737-3437 | F 541-737-3093 | <http://oregonstate.edu/research/>

May 17, 2004

To: Dawn Wright, Department of Geosciences  
Tim Fiez, Valley Library

From: Jack Higginbotham, Faculty Liaison, Research Office

A handwritten signature in black ink, appearing to be "JH", written over the "From:" line.

Re: NSF Partnerships for Innovation (PFI) Proposal, NSF 04-556

The Research Office is pleased to provide cost share at a level of 10% of the requested support in your NSF PFI proposal "The Virtual Oregon Map: A Partnership to Enhance Geospatial Awareness and Interoperability for Improved Business Processes and Decision Making". We will provide \$60,000 in FY05 Directed Research Funds toward the direct costs of your project. Good luck with your proposal.

THEODORE R. KULONGOSKI  
GOVERNOR



May 17, 2004

Dawn J. Wright  
Department of Geosciences  
104 Wilkinson Hall  
Oregon State University  
Corvallis OR 97331-5506

Dear Ms. Wright:

We are pleased to offer support for your NSF PFI proposal entitled "Virtual Oregon: A Center of Innovation for Data Cataloging, Access, and Geospatial Awareness" and to be entered into a partnership commitment should the proposal be funded. Natural resource data distribution, archiving and exploration are extremely important to our state, and we would like to be involved with you in enabling and encouraging the productive interchange of high quality data, scientific knowledge, and informed environmental policy. We also share your goal of helping us all to avoid mass duplication of effort and prevention of the development of fragmented digital systems.

We look forward to working with you.

Sincerely,

A handwritten signature in cursive script that reads "James E. Brown".

James E. Brown  
Governor's Natural Resources Policy Director

JEB/sm



<b>PARTNERS ACADEMIC</b>		
<b>Partner</b>	<b>Senior Personnel</b>	<b>Commitment/Role</b>
<b>Oregon Natural Heritage Information Center</b> (part of Oregon State University)	James S. Kagan, Director Kuuipo Walsh, Res. Asst. 1322 SE Morrison Street Portland, OR 97214-2531 jimmy.kagan@oregonstate.edu 503-731-3070	<i>Senior personnel on this grant.</i> Contribute large, spatial and tabular resource data, esp. vegetation; innovations in map services for complex data sets; workshop support
<b>Oregon State University</b>	Wright, Fiez, Achterman, Butcher, Keon, Pederson, Williams, 4 others	<i>PIs &amp; senior personnel on this grant. See sections above for description of OSU team</i>
<b>GOVT LAB</b>		
<b>Partner</b>	<b>Senior Personnel</b>	<b>Commitment/Role</b>
<b>USDA Forest Service Pacific Northwest Research Station</b>	Theresa Valentine, Tom Spies Forestry Sciences Lab 3200 NW Jefferson Way Corvallis, OR 97331 theresa.valentine@oregonstate.edu 541-750-7250	Provide critical researcher to OSU team at no cost. Assist in developing web services catalog services and applications
<b>STATE &amp; LOCAL GOVT</b>		
<b>Partner</b>	<b>Senior Personnel</b>	<b>Commitment/Role</b>
<b>City of Corvallis GIS</b> (Benton County)	Alice Grucza, City GIS Coordinator Jon Nelson, City Manager 501 SW Madison Avenue Corvallis, OR 97339-1083 alice.grucza@ci.corvallis.or.us 541-766-6901	Provide internships, workshop presentations, guest lectures in OSU classes; innovation transfer via Dept. of Public Works; GIS Day outreach participant
<b>State of Oregon Department of Administrative Services</b> (Oregon Geospatial Enterprise Office)	Cy Smith, State GIS Coordinator Michael Freese, Chief Information Officer 955 Center St. NE, Rm. 470 Salem, OR 97301 cy.smith@state.or.us 503-378-3160	Coordinate catalog and portal with state natural resources clearinghouse; coordinate with <b>National Biological Info. Infrastructure (NBII)</b> Pacific Northwest Information Node
<b>State of Oregon Office of the Governor Natural Resources Policy</b>	James Brown Governor's Natural Resources Policy Director State Capitol Salem, OR 97301-4047 503-378-3111	Coordinator with Oregon Geospatial Enterprise Office; participate in workshops; beta-tester for catalog and map viewer
<b>State of Oregon Oregon Watershed Enhancement Board</b> (with 89 local Watershed Councils throughout Oregon)	Kenneth Bierly, Deputy Dir. 775 Summer St. NE, Suite 360 Salem, OR 97301-1290 ken.bierly@state.or.us 503-986-0178	Provide input on design and usability of portal, catalog, and map services; disseminate results of project to watershed councils, implement statewide info. sys. strategy
<b>Willamette Valley Council of Governments</b> (includes Marion, Polk, Yamhill Counties; 31 Cities; 9 Special Districts; Confederated Tribes of the	Lesley Hegewald 105 High St. SE Salem, OR 97301-3667 lhegewald@mail.open.org 503-588-6177	Provide input on design and usability of catalog and portal; provide information to university partners on internships, innovation transfer via <b>Willamette</b>

Grande Rhonde Community)		Valley GIS User Group
<b>Partner</b>	<b>TRIBAL GOVT Senior Personnel</b>	<b>Commitment/Role</b>
<b>Confederated Tribes of the Umatilla Indian Reservation</b>	Dan Haug, GIS Manager P.O. Box 638 Pendleton, OR 97801 danhaug@ctuir.com 541-966-2594	Contribute data, internship info; help build local capacity to use GIS through training on reservation, teacher groups, tribal community organizations, related non-profits
<b>Partner</b>	<b>PRIVATE SECTOR Senior Personnel</b>	<b>Commitment/Role</b>
<b>Alsea Geospatial</b>	John Gabriel, General Manager Karen Gabriel, President 450 SW Madison Ave. Corvallis, OR 97339-2380 john@alsegeo.com 541-754-5034	Provide internships, workshop presentations, guest lectures in OrSt classes; technology transfer; GIS Day participant
<b>Environmental Systems Research Institute (ESRI)</b>	Rob McDougald John Sharrard ESRI Northwest Suite 300 606 Columbia Street NW Olympia, WA 98501-1099 McDougald@esri.com JSharrard@esri.com 360-754-4727	Consulting on commercial products underlying project (ArcIMS Metadata Server, ArcSDE, etc.); internships; help to teach workshops; provide software via site license; 2-way innovation transfer; GIS Day participant
<b>Global Mapping Technology</b>	Richard Ash, President 1107 NW Oak Avenue Corvallis, OR 97330 gmtgps@peak.org 541-738-2934	Provide expertise, advice, teaching materials in GPS, incorporation of field GPS data in to map services, service; GIS Day participant
<b>Newlands &amp; Company, Inc.</b>	Donald Newlands, President 1926 NE 10 <sup>th</sup> Ave. Portland, OR 97212 www.nc3d.com 503-287-8000	Collaboration on innovations in 3-D data and visualizations as part of map, web services, and analytical services; storage and update of 3-D models; provide student internships
<b>Titan Systems Corporation</b>	Roger Crystal, Site Manager Geospatial Info. Systems Division 4099 SE International Way, Suite 206 Portland, OR 97222-8853 rcrystal@averstar.com 503-794-1344	Provide input on effectiveness of catalog and portal; provide workshop, seminar presentation; provide internships; lend homeland security perspective
<b>Partner</b>	<b>OTHER Senior Personnel</b>	<b>Commitment/Role</b>
<b>The National Map, U.S. Geological Survey</b>	Nancy Tubbs, Oregon Liaison, USGS Oregon District Office 10615 SE Cherry Blossom Portland, OR 97216 Nancy.tubbs@usgs.gov 541-251-3210 oregon.usgs.gov	Maintain, update, and make Virtual Oregon data available through National Map for two-way innovation in WMS and WFS services; GIS Day participant