

Oregon Explorer Business Plan Table of Contents

Oregon Explorer Business Plan Table of Contents	1
Oregon Explorer Business Plan Executive Summary	2
Audience. The Oregon Explorer is initially targeted to natural resource decision-makers at local, state and federal levels and private practitioners to promote informed and streamlined public and private decision-making.	2
Oregon Explorer Business Plan	4
1. Background	4
2. Oregon Explorer: A Natural Resources Digital Library	5
A. <i>Vision, Goals and Objectives</i>	5
B. <i>Market Analysis (Needs Assessment)</i>	6
(1) Audience/Clients	6
C. <i>General Description</i>	8
(1) Products and Services	10
(2) Organization	11
(3) Partners/Strategic Relationships	12
(4) Competitive Advantage	14
(5) Risks	15
D. <i>Competition</i>	15
(1) Product and Service Delivery	17
(2) Oregon Explorer Site Architecture	18
(3) Component Descriptions	19
(4) Staffing for the Oregon Explorer build-out (current and proposed)	19
(5) Staff proposed for Oregon Explorer maintenance (after build-out)	20
(6) Performance measures	21
E. <i>Marketing</i>	21
3. Financial Plan	22
A. <i>Funding to date</i>	22
B. <i>Program Development and Operations Budget</i>	23
(1) Oregon Explorer Development Costs (based on FY 06-07 costs)	24
C. <i>Revenue Forecast</i>	26
Literature Citations	28

Oregon Explorer Business Plan Executive Summary

Citizens, government officials, and scientists all call for more changes in natural resources policy, management, business practices, and research. To inform their decision-making, high-quality, timely information is needed. Yet, Oregon's State of the Environment Report found that essential data, maps, and information on natural resources are largely inaccessible, unusable or non-existent. In spite of powerful new interconnected computer systems, the dream of anyone who needs information being able easily to find exactly what they seek has not been realized.

The Institute for Natural Resources (INR) at Oregon State University (OSU) is charged with creating a comprehensive coordinated natural resource information system for Oregonians. INR decided to combine efforts with the OSU Libraries because of their rich natural resource collections and their decision to create a natural resource digital library. INR and OSU Libraries are now building the *Oregon Explorer: a Natural Resources Digital Library*.

Three basin prototypes are built: the **Umpqua Explorer** (<http://umpquaexplorer.info>), the **North Coast Explorer** (<http://northcoastexplorer.info>), and the **Willamette Basin Explorer** (<http://willametteexplorer.info>). One topic portal, the Wildfire Risk Explorer (<http://oregonexplorer.info/wildfire>) has been completed. A home page for the **Oregon Explorer** (<http://oregonexplorer.info>) has now been developed to serve as blueprint for a fully functional natural resources digital library, and funding to make the home page functional by spring of 2006 has been obtained. Funding to create an imagery portal has been provided by DAS, the first part of making Oregon Explorer the site serving all spatial data in Oregon. We anticipate other place-based portals (e.g., County or Ecoregion Explorers) and topic portals (e.g., Wildlife, Plant and Wetland Explorers) in the Explorer Series as needs surface, funds become available and other organizations decide to help.

Vision. The Oregon Explorer uses the power of today's cutting edge information technology to create a state-of-the-art web-accessible natural resources digital library building on, accessing and integrating data from state and federal agencies, local governments, university scientists and citizens to support informed decisions and actions by people concerned with Oregon's natural resources and environment.

Audience. The Oregon Explorer is initially targeted to natural resource decision-makers at local, state and federal levels and private practitioners to promote informed and streamlined public and private decision-making.

Demand. Federal, state and local agencies have sought information services, like those the *Oregon Explorer* provides, for many years. People want a single place with the following features: (1) powerful search capability; (2) access to spatial data; (3) access to full text documents and reports; (4) immediate accessibility; and (5) access to synthesized information. They want to be able to quickly find, retrieve, integrate, and synthesize geo-referenced and well-organized documents, maps, spatial data, computer models, databases, spreadsheets, analytical results, video clips, audio clips, photographs, satellite imagery, presentation materials, and people contacts. They want to be able to identify a place and find the available information for that particular place. It is not enough to just make the information available, or to just focus on

data, users want the information to be fully integrated and support natural resource decision-making.

General Description. By integrating information across traditional agency and substantive discipline silos, the Oregon Explorer will be greater than the sum of its parts. The Oregon Explorer will provide a one-stop decision-support environment for natural resources.

A **Web Portal**, the Oregon Explorer home page, will provide access to a variety of integrated data, tools and expertise. Key components of the Oregon Explorer will be:

- **Natural Resource Data.** The initial focus will be on data needed to manage natural resources or that serve as framework data for the State. Data standards will be developed to facilitate data integration and information sharing. Most of the supporting datasets will be maintained outside of OSU in distributed databases in which information is harvested from existing sites. Users are able to add data based on the data standards.
- **Tools.** Analytical tools provide a way to turn data into information through a process of applying computer models to explain patterns, compare alternatives, and evaluate trends, as well as explore cause-and-effect relationships. These tools provide the means to integrate, analyze, and synthesize raw data into information that is useful to the decision-maker. The intent is to combine results and findings with web-accessible computer models, conclusions from analyses, and associated reports. Customized tools will be developed to support specific kinds of decisions such as water-related permitting and NEPA documentation.
- **Products and Services.** Core services of the Oregon Explorer include the ability to: (1) Search across natural resource collections; (2) Make a map and view data; (3) Download and combine data; (4) Upload metadata; (5) Generate local statistics on natural resource features; (5) Find a local expert or other resource; (6) Join a discussion; and (7) Submit information to the digital repository. Specialized services include: (1) Document digitizing to capture high priority legacy data; (2) Custom decision-making tool development; (3) Analysis and analytical tool development; (4) Synthesized information and tool development; (5) Data uploading and storage; and (6) Information archiving.

Financial Plan. To date, Oregon Explorer has been funded through a combination of grant funding (\$1,000,000), OSU Libraries gift funding and INR operation funds (\$400,000). With an investment of approximately \$2,750,000 over 5 years, the Oregon Explorer system architecture can be built along with ten specific basin, ecoregion or specific topic portals. The selection of the specific portals will be based upon user needs, partner interests and grant funding for particular projects. The combined total cost for staff, information technology, materials and supplies is approximately \$550,000 a year. After 5 years when the program is in a maintenance mode, the costs for staff, information technology, materials and supplies should be able to be reduced by \$100,000 a year.

Oregon Explorer Business Plan

December 2006

1. Background

Rich and abundant natural resources shape Oregonians' quality of life, but population pressure, growing demand for water, concerns about deteriorating environmental health and declining native species place this quality of life in jeopardy. Citizens, government officials, and scientists all call for more changes in natural resources policy, management, business practices, and research. To inform their decision-making, high-quality, timely information is needed. Yet, Oregon's most recent State of the Environment Report found that essential data, maps, and information on natural resources are largely inaccessible, unusable or non-existent (Oregon Progress Board 2000). This conclusion is not surprising. In spite of powerful new interconnected computer systems, the dream of anyone who needs information being able easily to find exactly what they seek has not been realized.

The Oregon Legislature responded to the problem in 2001 by creating the Institute for Natural Resources (INR) at Oregon State University (OSU) and charging it with creating a comprehensive coordinated natural resource information system for Oregonians. Simultaneously, the Legislature directed the Oregon Watershed Enhancement Board (OWEB) to develop data standards and information access to support implementation of the Oregon Plan for Salmon and Watersheds. INR and OWEB found the perfect partner in the OSU Libraries with their rich natural resource collections and their decision to create a natural resource digital library in order to make their collections and OSU's expertise broadly available. A unique partnership between OSU Libraries and INR emerged and resulted in a vision for the *Oregon Explorer: A Natural Resources Digital Library*.

The vision for the *Oregon Explorer* was developed in close cooperation with OWEB and the Oregon Geographic Information Council (OGIC) which adopted The Oregon Plan for Salmon and Watershed's Information System Strategy (OWEB 2003). Their strategy calls for a web-based system to provide the broadest use and opportunities for volunteer participation in contributing high quality natural resource data, tools and expertise to support decision-making at local watershed and statewide levels and communicating watershed health. The OWEB strategy was designed to align closely with, and support the goals and objectives of OGIC's broader *Strategic Plan for Geographic Information Management* (OGIC 2001). The *Oregon Explorer* will achieve the objectives of OWEB's strategy for Oregon Plan information, the web access aspects of the OGIC Plan, and the broader goal of building an integrated natural resource information system for Oregon.

This business plan was developed to define the *Oregon Explorer* and its goals to potential investors (including government agencies, the Oregon Legislature and private foundations). The plan describes the framework for the entire web-accessible, user-driven integrated natural resource information system Oregonians seek so that investors and anyone interested in helping to build it can see how they can contribute, and what it will take to achieve the vision.

Progress to Date

Four prototypes portals have been developed through 2006: the **Willamette Basin Explorer** (<http://willametteexplorer.info>), the **North Coast Explorer** (<http://northcoastexplorer.info>), the **Umpqua Basin Explorer** (<http://umpquaexplorer.info>), and the **Wildfire Risk Explorer** (<http://oregonexplorer.info/wildfire>). The Willamette Basin Explorer provides information access to help local landowners and policymakers make better decisions about land and water resources in the Willamette Basin. The North Coast Explorer and the Umpqua Basin Explorer focus on providing information access to watershed councils, decision-makers and natural resource practitioners. Both of these websites were built on the Willamette Basin Explorer prototype, but added new features to facilitate sharing of data from different sources, generate statistical reports, and enable discussion among interested users.

A home page for the **Oregon Explorer** (www.oregonexplorer.info) has also been developed to serve as blueprint for a fully functional natural resources digital library (Appendix 1). Fifteen domain names have been registered for each of the existing and potential “Basin Explorers” in the Explorer Series. We anticipate other place-based portals (e.g., County or Ecoregion Explorers) and topic portals (e.g., Wildlife, Plant and Wetland Explorers) in the Explorer Series as needs surface, funds become available and other organizations decide to help. The Oregon Explorer will serve as the entry point for all of the portals in the Explorer Series.

2. Oregon Explorer: A Natural Resources Digital Library

A. Vision, Goals and Objectives

Vision

The Oregon Explorer uses the power of today’s cutting edge information technology to create a state-of-the-art web-accessible natural resources digital library building on, accessing and integrating data from state and federal agencies, local governments, university scientists and citizens to support informed decisions and actions by people concerned with Oregon’s natural resources and environment.

Goals

- Be Oregon’s “go to” place for natural resources information
- Enable users to quickly find, retrieve, integrate and synthesize geo-referenced and well-organized natural resource and environmental information and access experts through a web portal.
- Develop customized data products and tools to provide decision support, streamline environmental permitting and target investments in order to improve natural resource and environmental management in the public and private sectors.
- Develop a statewide environmental assessment framework and apply it at recurring intervals as part of an overall statewide sustainability strategy.

- Empower users to share their information with others in order to create and build shared understanding about Oregon’s natural resource and environmental issues, problems and opportunities and build community networks.

Objectives

- Build a distributed network linking disparate users and encouraging them to publish on the Oregon Explorer.
- Assure value-free, neutral information with clear labeling of data quality allowing user evaluation of information quality.
- Provide search tools that enable searching across collections, inside and outside existing libraries, including spatial and non-spatial information.
- Allow integration and synthesis of varied types of information including digital documents, maps, computer models, data bases, photographs, video and audio and satellite imagery.
- Recover and digitize legacy data and literature from resource management agencies.

B. Market Analysis (Needs Assessment)

(1) Audience/Clients

The Oregon Explorer is initially targeted for natural resource decision-makers at local, state and federal levels and private practitioners to promote informed and streamlined public and private decision-making. Other clients for Oregon Explorer core services include researchers and scientists, educators and students, and ordinary citizens--basically anyone interested in learning about Oregon’s natural resources.

(2) Needs

The *Oregon Explorer* team has worked for several years with organizations interested in developing and improving natural resource information systems in Oregon and the Pacific Northwest. The key findings and conclusions from many different efforts are:

- “A statewide data center, to track the locations of data and to establish standards, is important to statewide and regional analyses. The State’s existing environmental data collection and management system must be improved to effectively measure ecological conditions, trends or risks (SOER 2000).”
- “Enable access to geographic data to support applications and solve problems or conduct analyses and report results, enable integration of geographic data, improve data quality and support data sharing (OGIC 2001).”
- “Create a web-based system to provide the broadest use and opportunities for volunteer participation in contributing high quality natural resource data, tools and expertise to

support decision-making at local watershed and statewide levels and communicating watershed health (OWEB 2003).”

- “Adequate access to high quality monitoring data, analyzed information and reports is a critical, and as yet, unmet need for many partners working to restore our watersheds and salmon populations. The U.S. Congress, the Northwest Power and Conservation Council and others have identified access and quality of information as a gap and a primary focus point (PNAMP 2005).”
- “Many different groups collect and manage data of interest to a wider audience; however, they mostly do it using different formats and methods. This has made data discovery and subsequent data sharing difficult, inefficient and expensive. Improved methods of data sharing and discovery across geographic and jurisdictional boundaries will improve our ability to answer management and scientific questions (NED 2005).”
- “Although data are available from various sources, a significant limitation is the lack of comprehensive regional datasets that can help managers understand and evaluate management options and impact on adjacent resources (PNWRC 2005).”
- “Consolidate waterway and wetland related permit information from all agencies on a single web site/link. Develop a super-application to assist applicants in providing all of the information required for all potential state approvals that may be required for a removal/fill project. An option would be to provide an interactive (question and answer) type of application that is web based, where information is automatically inserted into multiple applications (DSL 2005).”

To guide the design, content, and development of a natural resources digital library, the OSU Libraries commissioned a needs assessment in 2001 (Salwasser and Murray-Rust 2002) (Appendix 2). The goal was to determine if information needs were being met, and if not, what should be done. Potential users from academia, business, conservation groups, environmental consulting groups, extension service, government agencies, and watershed councils were interviewed. The results of thirty-five interviews conclude that users’ information needs were not being met. All interviewees welcomed the Libraries’ intent to develop such an information resource.

A variety of features were mentioned as useful components of a digital library. In order of importance, these features were: (1) powerful search capability; (2) access to spatial data; (3) access to full text documents and reports; (4) immediate accessibility; and (5) access to synthesized information. Information needs go beyond traditional library holdings and services. Specifically, users want to be able to quickly find, retrieve, integrate, and synthesize geo-referenced and well-organized documents, maps, spatial data, computer models, databases, spreadsheets, analytical results, video clips, audio clips, photographs, satellite imagery, presentation materials, and people contacts. They want to be able to identify a place and find the available information for that particular place. It is not enough to just make the information available, or to just focus on data, users want the information to be fully integrated and support natural resource decision-making.

(3) Demand. Federal, state and local agencies have sought information services, like those the *Oregon Explorer* provides, for many years. Three examples illustrate their expressed needs and the size of the demand.

- Partnership for Umpqua Rivers.. The Partnership for Umpqua Rivers (formerly the Umpqua Watershed Council) has spent the last decade working with state and local support to collect data about their basin. They did not have the expertise or technological resources to integrate and provide access to this data and use it in support of their restoration decisions. They liked what they saw in the North Coast Explorer and approached OSU in developing a basin portal for their use. There are over 80 watershed councils in Oregon and all of them have similar needs for data access, management and decision support tools.
- Water-Related Permitting. Over 19 separate federal, state and local permits or reviews are often required to undertake any activity affecting Oregon's water resources, such as wetland fill and removal. These multiple approvals require significant time and money and can too often result in conflicting requirements and duplicative effort. A Water-Related Permit Process Improvement Team has developed recommendations for streamlining this process. The Team recently recommended creating a consolidated web-based interactive application. The *Oregon Explorer* is ideally suited to build the needed system. Once created, the decision support tools could be expanded to apply to other environmental permitting requirements.
- Oregon Department of Fish and Wildlife. ODFW field biologists have surveyed Oregon's fish and wildlife for decades. Today many of their old field books and reports are stored in barn lofts or in the personal files of retirees by employees who do not want to see these priceless documents lost in the shuffle of agency office moves. ODFW asked the *Oregon Explorer* team for help setting up a system for prioritizing historic records to digitize and catalog so that they can be used in the future. All of the 12-plus state natural resource agencies face similar problems.

C. General Description

Decision-makers at many levels will access information through the Oregon Explorer. It will provide people exactly what they need. By integrating information across traditional agency and substantive discipline silos, the Oregon Explorer will be greater than the sum of its parts. The Oregon Explorer will provide a one-stop decision-support environment for natural resources. A decision-support environment is a physical or virtual place where data, tools and expertise are integrated and used to help people compare ideas, discuss alternative solutions, look at issues within a larger context, prioritize and weigh tradeoffs, and move toward resolution of complex issues. The Oregon Explorer will be a tremendous resource with experts providing data quality assurance and transparency unique to great university research libraries.

Oregon Explorer Components

Specific web portal, data, and tool components of the Oregon Explorer are described below. Each of these components is crucial since the usefulness of the Oregon Explorer depends on the data and tools components being fully integrated and accessible from a single point of access, the web portal.

Web Portal

A portal is a web interface to a variety of integrated data, tools, and expertise. It offers a way to provide users with a convenient starting point, such as geographic location or a specific topic, for accessing information (e.g., data, documents, photographs) that exists, but currently is inaccessible or not integrated. Creating a web portal for a decision-making environment takes this notion a step further. Here, the portal design can take into account specific questions and/or decision points to provide users with access to a customized set of packaged data, analytical tools, and reports relevant to the issue at hand.

Natural Resource Data

The Oregon Explorer will initially focus on providing access to data needed to manage natural resources or that serves as framework data for the State. Ultimately, the Oregon Explorer will make accessible all public natural resource information. INR, through the Oregon Natural Heritage Information Center (ORNHIC), is working with partners, including the National Biological Information Infrastructure (NBII) of the U.S. Geological Survey and the Oregon Department of Fish and Wildlife to provide the most comprehensive information on plants, wildlife, fish, fungi, and vegetation throughout Oregon. INR and Library staffs are collaborating with the Department of Administrative Services staff to facilitate easy access to the state's 2005 1 meter and 0.5 meter aerial photography and statewide framework data housed at the Oregon Geospatial Data Clearinghouse.

Data standards facilitate efficient data integration and information sharing. To address natural resources issues, Oregon Explorer must provide access to standardized data that are consistent, comprehensive, and of known quality. The source and quality of data will be disclosed. It will be necessary to identify information priorities, rather than attempting to address all existing data available and useable without considering its relevance to users. Similarly, serious consideration must be given to other issues, such as the format and level of specificity of data, which may limit the ability of users to draw upon relevant data when tackling natural resource problems.

Although the Oregon Explorer will provide centralized access to natural resource information, it is anticipated that most of the supporting datasets will be maintained outside of OSU. The ability to access information from distributed databases was demonstrated by the North Coast Explorer prototype, in which information is harvested from the Oregon Department of Fish and Wildlife's Natural Resource Information Management Program database for use by Explorer users, and which provides users the ability to add to this external database. Any information added by users must be reviewed to assure that it meets agreed upon data quality standards and that it is properly characterized.

Tools

Data retrieval tools enable the delivery of data through electronic downloads and map- and text-based interfaces. Two types of data retrieval tools exist: exploration tools and data-mining tools. Exploration tools help you to find the data you are looking through search engines. Standardized metadata are the key to thorough and successful digital exploration using such tools. Data-mining tools help you to integrate, discover or consolidate data from a variety of sources.

Analytical tools provide a way to turn data into information through a process of applying computer models to explain patterns, compare alternatives, and evaluate trends, as well as

explore cause-and-effect relationships. These tools provide the means to integrate, analyze, and synthesize raw data into information that is useful to the decision-maker. For example, statistical reporting tools provide users with the ability to query database for information about a specific topic — such as watershed restoration activities — and obtain results about this topic for a range of locations and/or dates. The intent is to combine results and findings with web-accessible computer models, conclusions from analyses, and associated reports.

Presentation tools help to make data and information understandable to the user through aesthetically pleasing displays. Interactive map-making is a type of on-line presentation tool that enables the display and creation of map products using different combinations of spatial data. Presentation tools can be very important to decision-making. An example is the Culvert Prioritization flash demonstration tool developed for the Siuslaw Watershed as part of the North Coast Explorer project. Just being able to clearly see the culverts in a basin, and the entire current list of projects, make choosing where to work much simpler.

Decision-support tools or systems are designed to allow users to access data and tools to perform computer-generated analyses on their own. Customized tools that support specific kinds of decisions and questions will need to be developed based on high-priority natural resource questions. The types of questions and decisions that users have today and in the future will influence the types of data and tools that are integrated and available through the Oregon Explorer.

The Florida Department of Transportation has developed a decision support tool that dramatically reduces the amount of time it takes to obtain the NEPA documentation required for any construction or maintenance project. Called the ETDM, or the Efficient Transportation Decision Making tool, it is a password protected site that creates the necessary documentation for developing an impact statement, and the data necessary for all of the state and federal regulatory agencies. It also allows for a comparison of alternate projects to determine which would have the least impact. It was created by integrating information on species, wetlands, habitats, roads and other data required for the analysis. Florida DOT is willing to allow the software to be used in Oregon, as part of the Oregon Explorer. Another tool is called NatureServe Vista, developed by NatureServe to allow County and City planners to analyze information on species and habitats found throughout their area, to assist in planning new developments or urban growth boundary expansions. This tool was developed for use in desktop systems, but NatureServe is interested in working to convert it to an online tool.

(1) Products and Services

Services to be provided by Oregon Explorer are divided into two categories: core services and specialized services. Core services and products are those that are developed with the proposed Oregon Explorer base funding and core staff. Specialized services and products would require additional funds, and possibly additional staff or contracted services. All services and products are aimed at making data more meaningful and useful.

Core services of the Oregon Explorer include the ability to:

- Search across natural resource collections
- Make a map and view data

- Download and combine data
- Upload metadata
- Generate local statistics on natural resource features
- Find a local expert or other resource
- Join a discussion
- Submit information to the digital repository

These core services meet the needs of watershed councils, soil and water conservation districts and landowners interested in restoration. They also meet the needs of government agencies to access information and data from other organizations. An example would be the ability of a watershed council to generate reports on the restoration projects they have funded or a state agency to access reports on a particular area prepared by other agencies.

Specialized services of the Oregon Explorer include:

- Document digitizing to capture high priority legacy data
- Custom decision-making tool development
- Analysis and analytical tool development
- Synthesized information and tool development
- Data uploading and storage
- Information archiving

An example of a specialized service could be a consolidated application tool to assist consultants and developers in dealing with the wetland fill and removal permit process. This tool is recommended by the Water-related Permit Process Improvement Team. A simple process could use available spatial data and simple questions to identify whether a permit is required. A more complex tool could provide information necessary for the permit itself. Project review would include an assessment of potential Endangered Species locations near the project, as well as identification of important environmental resources that may be near a potential project. Tools to search the state endangered species database at ORNHIC, to search spatial data layers identifying other sensitive resources, known wetland soils, and other information can significantly reduce the amount of work necessary to obtain a permit. Information entered in an online interactive application form could be used to complete the applications required by multiple agencies.

Another example of a specialized service would be a tool that would allow farmers to determine whether endangered salmon use the rivers and streams on their property. A system could be developed using readily available information from OSU's Integrated Plant Protection Center that would then allow the landowner to map the stream buffers for various pesticides, herbicides and fertilizers. The landowner could also obtain information on alternatives that would reduce risk to listed species.

(2) Organization

Oregon Explorer is a collaborative site between OSU Libraries and INR. It is jointly directed by Karyle Butcher, University Librarian, and Gail Achterman, INR Director. The project is jointly managed by Janine Salwasser, OSU Libraries' Natural Resources Digital Library Program Director and Jimmy Kagan, INR Information Office Director.

OSU Libraries and INR have both overlapping and independent roles and responsibilities. Overlapping roles and responsibilities include neutrality, public outreach (needs and opportunities), GIS and database management, project management, and organizing information. Roles and responsibilities unique to the OSU Libraries include cataloging information, displaying information, selecting information, providing access points to the information, preserving information, providing help for users, and creating library-based technical tools. Roles and responsibilities unique to INR include framing questions, integrating and synthesizing information, and securing funding for and coordinating natural resource projects.

An Oregon Explorer Development Team has been working together for four years and consists of the following staff:

- Janine Salwasser, OSU Libraries, Natural Resource Digital Library Program Director
- Jimmy Kagan, INR, Information Office Director
- Bonnie Avery, OSU Libraries, Natural Resources Digital Collections Librarian
- Renee Davis-Born, INR, project manager and policy analyst
- Tim Fiez, OSU Libraries, system architect/lead programmer
- Jeremy Frumkin, OSU Libraries, Gray Family Chair for Innovative Technologies
- Larry Landis, OSU Libraries, University Archivist
- John Pollitz, OSU Libraries, Associate University Librarian
- Marc Rempel, OSU Libraries, GIS programmer
- Kuuipo Walsh, INR, GIS analyst/web developer
- Janet Webster, OSU Libraries, Department Head Guin Library

Resumes of the management and development team members are presented in Appendix 3. Working together with local, state, and regional partners, four successful Oregon Explorer prototypes have been completed: the Willamette Basin Explorer (www.willametteexplorer.info), the North Coast Explorer (www.northcoastexplorer.info), and the Umpqua Basin Explorer (www.umpquaexplorer.info) as the three basin portals, and the Wildfire Risk Explorer (<http://oregonexplorer.info/wildfire>) as the first topic portal. Final reports describing the development processes are available for both the Willamette Basin Explorer and the North Coast Explorer (Institute for Natural Resources 2005).

The Oregon Explorer development team meets on a weekly basis to discuss issues relating to the development of the Oregon Explorer and related portals (The Explorer Series). On a bi-monthly basis, the broader Oregon Explorer coordination team reviews progress on all of the funded and proposed Oregon Explorer projects.

The development of the Oregon Explorer also is guided by the advice given from members of both the INR advisory board and OSU Libraries advisory board. A list of these advisory board members is provided in Appendix 4.

(3) Partners/Strategic Relationships

The 2001 needs assessment revealed that partnerships are essential to develop the digital library environment desired by the user. It also identified needed expertise, acknowledging that much information resides with local groups. One goal of Oregon Explorer is to provide access to

natural resource information at many levels, from the local watershed up to a regional scale. The most realistic means of achieving this goal is to create a distributed digital library that draws upon the strengths and knowledge of various partners.

OSU Libraries and INR recognize we cannot realize this vision alone and, for this reason, partnerships have formed and continue to be established in each of four digital library areas: development, content, funding and usability. The result is an expanding base of expertise to:

- Help develop the digital library infrastructure
- Identify the depth and breadth of content needed
- Explore cost sharing and fundraising opportunities and
- Engage with users and assure that the solutions created work for them.

To date, Oregon Explorer project partners include:

- Defenders of Wildlife
- Meyer Memorial Trust
- Oregon Community Foundation
- Oregon Department of Administrative Services
- Oregon Department of Environmental Quality
- Oregon Department of Fish and Wildlife
- Oregon Department of Forestry
- Oregon State University College of Agriculture
- Oregon State University College of Forestry
- Oregon State University Extension Service
- Oregon State University Foundation
- Oregon State University Rural Poverty Research Center
- Oregon Watershed Enhancement Board
- Pacific Northwest National Laboratories/PNW Regional Collaboratory
- Pacific Northwest Regional Geographic Information Council
- Partnership for Umpqua Rivers, and other local watershed councils
- Portland State University, Institute for Portland Metro Studies
- The Nature Conservancy
- University of Oregon InfoGraphics Lab
- University of Oregon Institute for Sustainable Environment
- Willamette Partnership

Specific partnerships are formed with the development of each Explorer series site (e.g., Willamette Explorer and North Coast Explorer). INR and OSU Libraries anticipate a long list of partners as the Oregon Explorer is built out for each of Oregon's 15 basins, 11 ecoregions, and 33 counties. A more comprehensive list of existing and potential Oregon Explorer partners is provided in Appendix 5.

For those basins and ecoregions that extend into Washington, Idaho, California, and/or Nevada, it will be important to have good working relationships with partners in neighboring States. The intent of the Explorer is to provide seamless access to information for basins and ecoregions in their entirety — even for those which cross state borders. Often, information systems stop at

state borders, thus constraining the ability of users to do a full analysis or make an informed decision about natural resource issues that are not limited by jurisdictional boundaries. Oregon Explorer's capacity to provide scale-appropriate information will be incredibly important in addressing such issues as water use, migratory species conservation, and climate change.

Working with the Pacific Northwest Regional Collaboratory (PNWRC), a new Sustainability Portal has been built (<http://sustainability.pnwrc.org/>). PNWRC is developing a Northwest Sustainability Decision Support System (DSS) to help inform government agencies, policymakers, interest groups and commercial entities on issues critical to the sustainability of our region. The DSS will be comprised of a set of web-based decision models that utilize remotely sensed data, in combination with additional data sources. It will provide both datasets and higher-level analysis of past, current and forecasted conditions against critical regional sustainability parameters. The relationship with PNWRC allows us to create a unique partnership to incorporate this information into the Oregon Explorer.

(4) Competitive Advantage

A land grant university is the best place to build the Oregon Explorer because of the public service mission, credibility, and natural resource talent. OSU is unique in the Nation in that it is not only the State's land grant university, but also a sea, space and sun-grant institution. At Oregon State University, three of its natural resource-based colleges — Forestry, Agriculture, and Oceanic and Atmospheric Sciences — are ranked among the top 10 in the nation. OSU has specifically recognized the topic of natural resources as one of five strategic goals. As a result, academic resources and investments will be focused on “managing natural resources that contribute to Oregon's quality of life, and growing and sustaining natural resources-based industries in the Knowledge Economy” (OSU 2004).

The statewide network of OSU Extension Service agents also provide a trusted outreach and delivery mechanism for getting information and useful tools to landowners and citizens so that they can be better stewards of Oregon's environment.

With the formation of the OSU Institute for Natural Resources in 2001, Oregon leaders have a place to get ready access to current, science-based information and methods for better understanding Oregon's resource management challenges and developing solutions. The Institute expands OSU's leadership role in coordinating research, supporting policy analysis, and facilitating information-sharing and action by partnering with natural resource agencies, other universities, private businesses, conservation groups, and local-to-national levels of government.

OSU Libraries is one of the few in the country investing in the collaborative development of a digital library that seeks to provide easy access to all forms of natural resource information — including the knowledge of real people — in user designed, “place-based” and purposeful ways. Oregon Explorer maintains a competitive advantage in part because librarians are noted for their expertise in organizing, preserving, and providing access to information in a neutral environment.

Building an integrated natural resource information system requires a broad range of expertise. Universities, like OSU, have the requisite expertise in everything from computer science and web design to library cataloging, search and archiving to substantive knowledge in a wide array

of academic disciplines. No government agency or consulting firm brings the same range of skills to bear on the task.

(5) Risks

- Lack of long-term financial support
We intend to use this business plan to make the business case to potential public and private funders for long-term financial support for both the development and maintenance of the Oregon Explorer. A vision for a natural resources digital library exists, a strong partnership between OSU libraries and INR has been demonstrated, the need for better access to natural resource information has been expressed—all of these elements help to overcome this risk.
- Inability to effectively market the Oregon Explorer and other Explorer series may result in reduced use
The hiring of a marketing specialist is intended to address this need. We have in place free bi-monthly training sessions to assist users of the Explorer basin portals in achieving maximum use of the available information and tools..
- Executive leadership may change in the Institute, OSU Libraries and/or state agencies (e.g., DAS and OWEB), resulting in leaders who are not supportive of the Oregon Explorer collaboration
Because Oregon Explorer has incredible potential for addressing serious information needs facing natural resource decision-makers, INR and OSU Libraries are committed to achieving this goal over the coming years and securing necessary long-term support—both institutional and financial—from appropriate leaders from the public and private sector.
- Inappropriate application of the data may result in reduced use
Although the uses of information from the Oregon Explorer cannot be controlled, the access which Oregon Explorer provides to knowledgeable and neutral experts helps to minimize misuse or inaccurate characterization of natural resources information.
- Lack of quality data may result in reduced use
At a minimum, the high quality statewide framework data will be accessible for use. Oregon Explorer mapping and reporting tools will also focus on data of highest quality. The Oregon Explorer will be useful for highlighting where new higher quality data needs to be developed to address high priority issues or perform statewide or regional assessments. Explicit disclosure of data sources and quality will be made.

D. Competition

Other digital libraries (and information systems) providing access to natural resource information in Oregon by way of a web portal and could be perceived as in competition with the Oregon Explorer are discussed below. Our strategy is to work with as many of these potential competitors, and divide the work up, creating partnerships. The scope of the overall effort is large enough that resources from many agencies and teams are required to succeed.

Northwest Environmental Data Network (NED) <http://www.nwcouncil.org/ned/Default.asp>
Proposed by the Bonneville Power Administration and the Northwest Power and Conservation Council, NED is working cooperatively on actions and joint activities to improve the collection, management and sharing of environmental data and information. NED goals include supporting

and coordinating production of a regional data dictionary, the common use of query tools to metadata and the development of a data networking plan with funding support. NED is interested in supporting agreements, standards and protocols and the technology necessary to improve data sharing and discovery across multiple regional partners, and in identifying and promoting administrative and organizational and funding arrangements needed to support regional data management.

NED initially did not intend to be a provider or a manager of data, but some NED partners such as the Bonneville Power Administration and the Northwest Habitat Institute are interested in being information providers and managers. NED has focuses primarily on the Columbia Basin, and its primary project leaders are the Northwest Power Conservation Council and NOAA Fisheries, so they have had a decidedly aquatic focus. To date NED has viewed their primarily clients to be professional federal and state agency scientists and data managers who seek to share their data. They have access to sophisticated software and know how to use it.

BPA and NED are working to create a regional data portal, which can provide an important regional link between the Oregon Explorer and National Portals such as the National Map. To date, their regional portal is focusing on geospatial data, related to fish and streams, but they hope to eventually expand the focus to include most (all?) natural resources spatial data. They are also exploring the use of data exchanges to promote sharing of non-spatial datasets.

StreamNet

<http://www.streamnet.org/>

StreamNet is a cooperative venture of the Pacific Northwest's fish and wildlife agencies and tribes, administered by the Pacific States Marine Fisheries Commission, and funded by the Bonneville Power Administration. StreamNet and its state partners provide data and data services in support of the region's Fish and Wildlife Program and other efforts to manage and restore the region's aquatic resources. StreamNet has focused primarily on the needs of their clients, the fish and wildlife agencies and tribes, but they are often one of the few, secure sources of funding these entities have for data management. StreamNet funding, as is NED's funding, is focused on the Columbia River Basin and information necessary to address regional fisheries questions. They have excelled in assuring data gets created regionally, and do a better job than most other programs at making sure data is available and shared.

Klamath Waters Digital Library

<http://klamathwaterlib.oit.edu>

The Klamath Waters Digital Library is a centralized clearinghouse for information on water issues in the Klamath Watershed. The library currently contains documents, reports, maps and images. Future plans include expanding into other formats such as video and audio, as well as mapping tools and spatial data. This digital library could be an important future partner providing coverage of a key water basin, although long-term funding may not be secure.

Southern Oregon Digital Archives

<http://soda.sou.edu/index.html>

The Southern Oregon Digital Archives was funded by a grant from the Institute of Museum and Library Services. They developed an extensive digital library primarily from the SOU Library's rich collections of federal, state, and county publications. The Library concentrated its efforts on

collections of regional materials pertaining to 1) the Southern Oregon Bioregion and 2) the First Nations/Tribal Collection. This digital archive can be an important future partner allowing rich content to be provided in a specific geographic area, although SODA will require long-term funding to assure the collection is maintained and new regional publications are incorporated.

National Biological Information Infrastructure Pacific Northwest Information Node

<http://pnwin.nbi.gov/>

The National Biological Information Infrastructure (NBII) is a broad, collaborative program to provide increased access to data and information on the nation's biological resources. The NBII links diverse, high-quality biological databases, information products, and analytical tools maintained by NBII partners and other contributors in government agencies, academic institutions, non-government organizations, and private industry. NBII assists partners in the development of standards, tools, and technologies to make it easier to find, integrate, and apply biological resources information. The Northwest Node of the NBII historically was managed by the University of Washington (UW), focusing on information relevant to forest resources in the Pacific Northwest. The UW node has been shut down, and the NBII developed a new NW Collaboration with the College of Natural Resources at the University of Idaho (UI) to build an integrated Fire Research portal (<http://frames.nbi.gov/portal/server.pt>). UI and the NBII are currently developing a strategic plan for the PNW node, and are familiar with our wildfire risk portal and the Oregon Explorer project. They are also working with NACSE at OSU to develop much of the FRAMES portal. As a result, the NBII has the potential to both complement and provide content to the Explorer site.

Operations

The operations explained below address the ongoing support needs for the Oregon Explorer, based on an estimated 5 year plan. The assumptions are that a core support staff will be necessary to maintain the content, services, preservation, and development of the Oregon Explorer over the next five years.

(1) Product and Service Delivery

It is anticipated that the ongoing operations to maintain the Oregon Explorer will entail a variety of duties, including maintenance and support of current portals, services, and content, the creation of new content, the expansion of services and functionality over time, and the preservation of data and information resources. Apart from projects which are specifically funded through one-time grants and targeted monies, it is assumed that the Oregon Explorer team will expand the Oregon Explorer site by building at a minimum two new portals per year. Additionally, it is recognized that new technologies and services may be created that will need to be retrofitted to various parts of the Oregon Explorer series. The following products and services are seen as core to each portal that is developed within the Oregon Explorer:

- Portal framework
- GIS tools and data handling (ArcInfo or other GIS software)
- Search tools (metasearch)
- Reporting tools
- Document repository (ScholarsArchive@OSU)

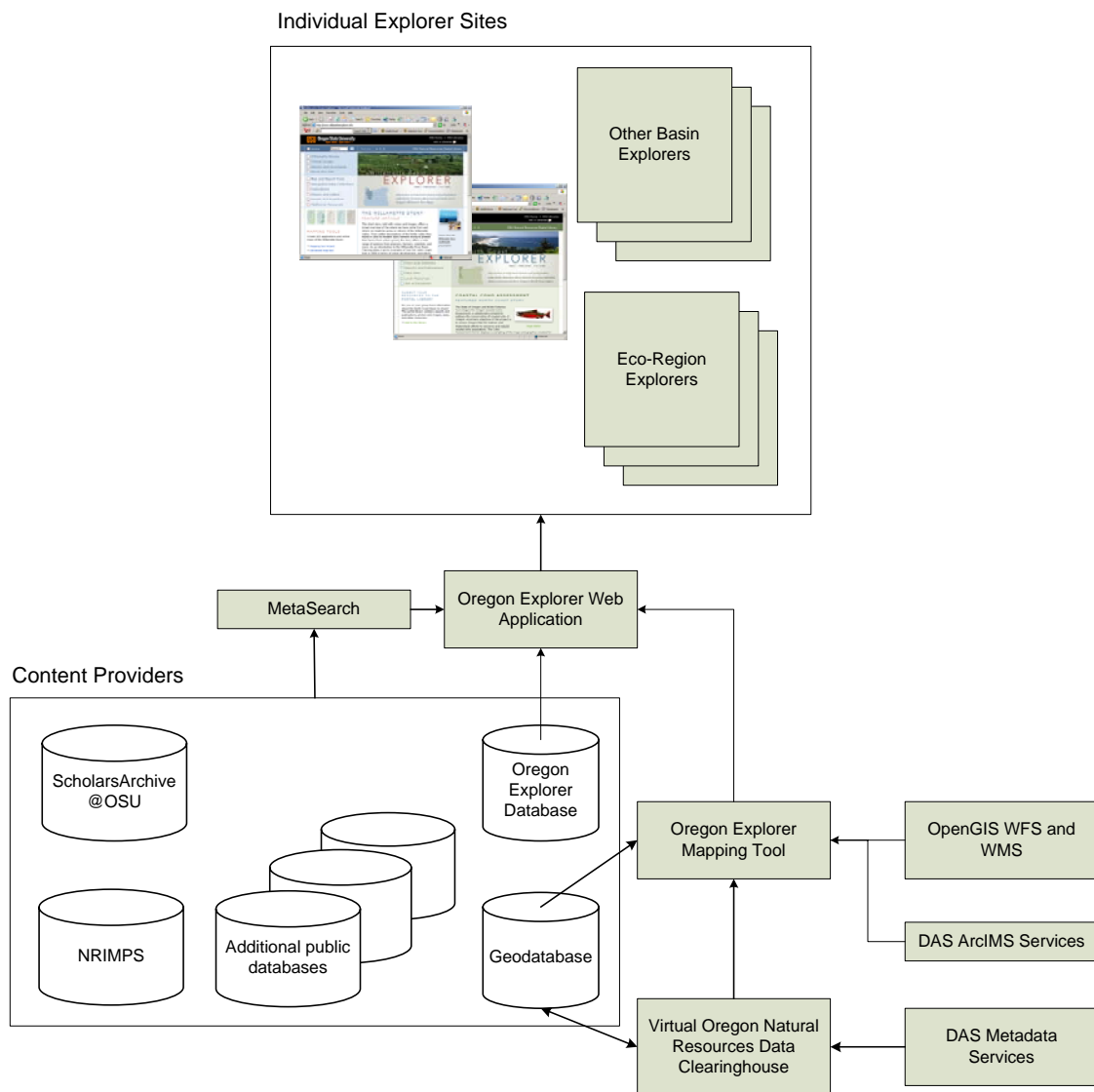
- Discussion space and community building tool (Wiki and bulletin board)
- Catalog of metadata (natural resources data clearinghouse)

Specialized products and services would be developed at additional costs with specific clients and development partners. These include:

- Customized decision tools
- Digitization of non-electronic resources
- Content editing and organization

(2) Oregon Explorer Site Architecture

The following diagram shows the underlying components of the Oregon Explorer



(3) Component Descriptions

Oregon Explorer Web Application

The Oregon Explorer web application provides the framework for creating the explorer websites. It draws content from its own database as well as content provider databases via the MetaSearch application described below. The Oregon Explorer web application pulls mapping and other geospatial services from the Oregon Explorer mapping tool and the Natural Resources Data Clearinghouse.

MetaSearch

MetaSearch is a search application that integrates content from multiple content providers. It utilizes metadata harvesting and federated searching to provide single point access to wide variety of online content. With MetaSearch, users of the Oregon Explorer sites can search and browse content from our partners without having to go to multiple web locations.

Oregon Explorer Mapping Tool

The Oregon Explorer mapping tool provides web-based map services. Users can browse, query, print, and extract map data without using specialized geographic information system software.

Natural Resources Data Clearinghouse

A database of geospatial metadata, the Natural Resources Data Clearinghouse allows Oregon Explorer users to search for and view descriptions of available spatial data. All data presented in the Oregon Explorer mapping tool are documented with metadata.

(4) Staffing for the Oregon Explorer build-out (current and proposed)

Current Positions	Activities/Products
Institute for Natural Resources Director	Co-direct the development of the Oregon Explorer; project marketing and fundraising
University Librarian	Co-direct the development of the Oregon Explorer; digital library oversight; project marketing and fundraising
Natural Resource Digital Library Program Director	Co-manage the development of the Oregon Explorer; coordinate digital library activities among partners; liaison with library executive staff, digital library users, and other interested parties
Information Office Manager	Co-manage the development of the Oregon Explorer; liaison between Oregon Explorer and other state and regional information system efforts; identification of the information needs for the site, project marketing, fundraising and development.
Natural Resource Librarian	Selection and content advisor for in-house natural resources, collection digitization projects; promotion of ScholarsArchive@OSU (institutional repository) as a major source of content for Oregon Explorer.
System architect	Lead for development of website design, architecture, and programming, including GIS
Technical assistant/GIS analyst	Assistance with website design, architecture, and programming, including GIS

Project manager	Grant project management and implementation; coordination of project activities among partners; liaison with granting agency, users, and other interested parties
Database and GIS Programmer	Supporting programmer for developing and integrating databases onsite and offsite.
Head of Library Technology	Assistance with digital library technology needs and requirements
Gray Family Chair for Innovative Technologies	Assistance with digital library technology needs and requirements

New Positions Needed	Activities/Products
System Administrator	Lead for systems administration as the number of portals in the Oregon Explorer Series expands.
Database Programmer	Supporting programmer for developing and integrating databases onsite and offsite.
Programmer	Supporting programmer for new decision support tools and other programming needs
Web Designer	Lead for web design on future basin portals, topic portals, and other portals in the Oregon Explorer Series (could be outsourced)
Science Writer	Lead for writing feature stories and annotations (could be outsourced)
Marketing and Outreach Specialist	Lead for developing and implementing a marketing and outreach strategy, including training and continued user needs assessments and evaluations (could be outsourced)

(5) Staff proposed for Oregon Explorer maintenance (after build-out)

Positions	Activities/Products
Natural Resource Digital Library Program Director	Co-manage Oregon Explorer; coordination of digital library activities among partners; liaison with library executive staff, digital library users, and other interested parties.
Information Office Director	Co-manage Oregon Explorer; liaison of Oregon Explorer to other state and regional information system efforts, identification of the information needs for the site, fundraising and development.
Natural Resource Librarian	Selection and content advisor for in-house natural resources collection digitization projects; promotion of Scholars Archive @OSU as a major source of content for Oregon Explorer.
System architect	Lead for development of Oregon Explorer specialized services
Project manager	Grant project management and implementation; coordination of new project activities among partners
Technical assistant / GIS analyst	Assistance with website design, architecture, and programming, including GIS
System Administrator	Lead for systems administration for all portals in the Oregon Explorer Series expands.
Database Manager	Supporting programmer for maintaining databases and other digital content

Programmer	Supporting programmer for new decision support tools and other programming needs
Marketing and Outreach Specialist	Lead for implementing a marketing and outreach strategy, including training and continued user needs assessments and evaluations (could be outsourced)

(6) Performance measures

Users of the Oregon Explorer will evaluate the effectiveness and reliability of the digital library to provide relevant and useful natural resources information to inform decision-making. The Oregon Explorer evaluation will include many of the same elements as were used for the North Coast Explorer prototype evaluation. Categories of success and the associated measures are those common to the DeLone & McLean Information System Success Model (for more information, see http://jmis.bentley.edu/articles/v19_n4_p9/) for information quality, system quality, service quality, usage, user satisfaction, and net benefits.

Specific performance measures tied to the primary goals and objectives of the Oregon Explorer include:

- Use of the Oregon Explorer web portal
The usage of the Oregon Explorer and associated portals are measured by the OSU Libraries, using WebTrends software. Overall use is measured, and should continually increase.
- Comprehensiveness of natural resources information accessible through the site
The Oregon Explorer will be developed over time, to include information on natural resource subject areas (topics) and on places (watershed basins, counties, and ecoregions). The development of the core products and services for these places and topics is a measure.
- Ability of users to find information
The performance of the site in searching or browsing information for information is critical. Measures of information access time, determined by users in training sessions, are being established.
- Ability to retrieve information
The time necessary to download or create reports once the information is located, will be measured at training sessions.
- Access to decision support tools
Significant reporting and decision-making tools have been identified, while others have been developed by agencies in other states, by NGO and others. Providing access to these tools is a performance measure.

E. Marketing

To adequately market the Oregon Explorer, a new marketing and outreach position either at INR or the OSU libraries will be essential. Until a new position can be secured, we plan to take advantage of the marketing and fundraising expertise at the Oregon State University Foundation

and from members of the INR and Library advisory boards. The use of pro bono staff may be required over the short run. A marketing and outreach strategy and plan needs to be developed and implemented, particularly for the Oregon Explorer Series already developed (Willamette Basin Explorer, North Coast Explorer, and Umpqua Basin Explorer). A partnership with the Oregon State University Extension Service will help us to utilize the trusted and informed network of Extension Agents throughout Oregon to inform and empower citizens through better information access.

3. Financial Plan

It is our intention to provide free access to all core services that have been developed as part of the Explorer Series (e.g., Willamette Explorer, North Coast Explorer, and Oregon Explorer).

Potential paying customers for specialized services include businesses and government agencies (e.g., digitizing and/or archiving of hard copy natural resource documents). If the Oregon Explorer and its decision support tools can provide faster access to information, streamline permitting through consolidated applications or analysis, subscription services could be developed.

Depending upon the nature of the intellectual property developed to create the Explorer, it may be possible to license software to generate additional revenue.

A. Funding to date

To date, Oregon Explorer has been funded through a combination of grant funding, OSU Libraries gift funding, and INR operation funds. Three basin portals serve as prototypes and the proof of concept for the statewide Oregon Explorer: a natural resources digital library. The total grant monies received to fund the Oregon Explorer basin and topic portals is nearly \$1,000,000. The Willamette Basin Explorer was built for approximately \$180,000 in direct support. The North Coast Explorer only cost \$150,000 because of efficiencies from the Willamette project. Currently work is underway on enhancements to the Umpqua Basin Explorer, which has received a total of \$67,500, and much of the new programming and improved functionality for this site will be used to enhance the Oregon Explorer site.

In addition to the grant funds, OSU Libraries and INR have dedicated discretionary funds to the effort. For OSU Libraries, this includes \$34,400 in information technology and approximately \$250,000 of staff, and consulting time since 2003. Detailed breakdowns of the annual OSU Libraries and INR staff salaries and information technology investments are shown in Appendix 7. The total investment of OSU funds to the project since its inception in 2003 exceeds \$400,000.

Work on these projects gives the Oregon Explorer Team confidence in the funds we need to build and operate the system.

The Willamette Basin Explorer and the North Coast Basin Explorer serve as prototypes for the development of a statewide natural resources digital library—the Oregon Explorer. OSU Libraries and the INR continue to jointly lead the development of the Oregon Explorer. OSU

Libraries intends to continue to build the collection of information that is available from the Willamette Basin and North Coast Basin Explorer sites, while work proceeds on the Oregon Explorer. For example, OSU Libraries is retaining staff to continue the management, programming, maintenance, coordination, training and outreach of the existing Explorer sites (Willamette and North Coast), as well as the integration of this information and these services within the larger statewide Oregon Explorer site. INR intends to continue to seek additional funds and participants interested in helping to build the site, such as local restoration groups, local governments and additional state and federal agencies.

B. Program Development and Operations Budget

With an investment of approximately \$2,750,000 over 5 years, the Oregon Explorer system architecture can be built along with ten specific basin, ecoregion or specific topic portals. The selection of the specific portals will be based upon user needs, partner interests and grant funding for particular projects. No funds are now available for this work at the statewide level across all basins and high level natural resource topics. In addition, the existing Oregon Explorer sites will be maintained and enhanced as new data and tools are developed. New positions have been identified and included to address areas where new skills and expertise are needed to achieve the Oregon Explorer vision within a 5-year period. The combined total cost for staff, information technology, materials and supplies is approximately \$550,000 a year. After 5 years when the program is in a maintenance mode, we expect the costs for staff, information technology, materials and supplies to be reduced by \$100,000 a year. A detailed budget is shown on the following page.

(1) Oregon Explorer Development Costs (based on FY 06-07 costs)

Staff Expenses		
Position	Cost	FTE
INR Director	\$18,500	0.1
Natural Resource Digital Library Program Direct	\$45,900	0.45
INR Information Office Director	\$38,500	0.45
Natural Resource Librarian	\$18,900	0.25
System Architect	\$73,210	0.75
INR Project Manager	\$46,938	0.65
Technical Assistant/GIS Analyst	\$57,717	1
System Administrator	\$36,750	0.5
Database Programmer	\$36,750	0.5
Marketing and Outreach Specialist	\$35,000	0.5
Web Designer	\$31,500	0.5
Science Writer	\$15,750	0.2
Total Proposed Staffing Costs:	\$455,415	5.85
IT Hardware and Software Costs		
	Costs	Notes
Data storage	\$20,000	Continual expansion of existing storage array
GIS Servers (2)	\$10,000	3 year upgrade replacement
Search Engine Server	\$3,000	
Backup tape library	\$3,000	Includes secure off-site storage
Web Server	\$3,000	
Development Server	\$3,000	
Staging Server	\$3,000	
Work stations (4)	\$6,000	For new staff positions
Color printer and supplies	\$4,000	5 year upgrade replacement;
Miscellaneous hardware	\$15,000	Network switches, UPS, power supplies, etc.
Software	\$20,000	SQL server, Moxi Media IMF
Total Annual Hardware and Software Costs	\$90,000	All costs based on 3 year
Other Annual Expenses		
Travel	\$8,000	
Materials and Supplies	\$2,500	
Total Other Costs	\$10,500	
Total Oregon Explorer Build-Out Annual	\$555,915	

(2) Oregon Explorer Maintenance Costs

Staff Expenses		
Position	Cost	FTE
Natural Resource Digital Library Program Director	\$45,900	0.45
INR Information Office Director	\$38,500	0.45
Natural Resource Librarian	\$18,900	0.25
Marketing and Outreach Specialist	\$17,500	0.25
Database Manager	\$36,750	0.5
Technical Assistant/GIS Analyst	\$57,717	1
System Administrator	\$36,750	0.5
Total Program Maintenance Staff Costs	\$252,017	3.4
System Architect *	\$77,700	0.75
INR Project Manager *	\$39,900	0.5
Web Designer *	\$15,750	0.25
Total Additional Development Expenses	\$133,350	1.5
Total Proposed Staffing Costs	\$385,367	6.40
IT Hardware and Software Costs		
	Costs	Notes
Data storage	\$5,000	Continual expansion of
GIS Servers (2)	\$3,300	3 year replacement cycle
Search Engine Server	\$1,000	3 year replacement cycle
Backup tape library	\$3,000	Includes secure off-site
Web Server	\$1,000	3 year replacement cycle
Development Server	\$1,000	3 year replacement cycle
Staging Server	\$1,000	3 year replacement cycle
Work stations (4)	\$2,000	3 year replacement cycle
Color printer and supplies	\$4,000	5 year replacement cycle
Miscellaneous hardware	\$3,000	Network switches, etc.
Software	\$10,000	SQL server, Moxi Media
Total Annual Hardware and Software Costs	\$34,300	
Other Annual Expenses		
	Costs	
Travel	\$8,000	
Materials and Supplies	\$2,500	
Total Other Costs	\$10,500	
Total Project Annual Maintenance Costs	\$296,817	
Total Explorer Annual Maintenance Costs	\$430,167	

After the first five years, many of these costs should be able to be covered through a combination of state appropriations and subscription fees. On-going operation could be permanently endowed if \$7.5 million were to be contributed to a project endowment fund.

Specialized Service Costs

Supplemental costs for specialized services and products, such as the costs to set-up and operate digital library services (digitizing and archiving) for the State natural resource agencies, could more than double the projected annual costs for core Oregon Explorer operations and maintenance. It has been estimated that an additional \$1.3 million/year would be needed to address the back-log of natural resources information (hard copy documents, photos, etc.) This funding would enable OSU Libraries to digitize 500,000 document pages per year. The maintenance costs, which include the incorporation of newly developed reports, documents, and publications in digital format, are expected to be an additional \$900,000 year for this type of digital library service.

C. Revenue Forecast

Short-Term Revenue

Funding for the Oregon Explorer will initially come from grants and contracts to build portions of the overall structure with a client having available funding, or foundations interested in supporting particular subject or geographic areas. Initial (FY 2006-2007) funding includes:

1. Department of Administrative Services - \$223,000
Funding to build the Oregon Explorer Imagery Portal, and eventually the Oregon Geospatial Data Portal. Additional funding for information coordination, building and stewardship of some framework data layers may also be acquired.
2. Oregon Watershed Enhancement Board - \$112,500
To support statewide access to salmon and watershed restoration information and develop the second phase of the Umpqua Basin Explorer
3. Oregon Community Foundation - \$175,000
To build an Oregon Explorer land use portal
4. Oregon Department of Fish and Wildlife - \$40,000
To build the first phase of an Oregon Explorer wildlife portal and conservation registry.

Long-term Revenue

Long term funding is anticipated to come from four primary sources.

1. Endowment Funds
An endowment created to provide long-term security to staff at INR and at the Libraries supporting the project. This will hopefully occur as part of the OSU campaign, with a focus

on large foundation funding. The objective is funding to generate \$ 110,000 per year to support this project.

2. Permanent Oregon Legislative Funding

The critical personnel to maintain the Oregon Explorer project, and the information infrastructure supporting it, could be supported by the Oregon Legislature. The objective is to have funding to OSU increased to support two additional FTE for this project.

3. Permanent Funding from the Department of Interior

Funding is being sought to maintain Natural Heritage Programs nationally by providing direct federal support for a full time data manager within each program. Additional funding through the FGDC and the USGS National Map and Geo-Spatial One-Stop should become available to support state implementation of this. This could provide funds for an additional FTE.

4. Funding from Fees and Subscriptions

A small part of the Oregon Explorer will include the development of fee-for-service applications which will support the business needs of consultants, developers and corporations. Applications which can ease the burdens related to completing Environmental Impact Statements, such as evaluating impacts of projects on important natural resources, will allow the consortium to charge subscriptions for use of the applications. These will be limited and specific, but could support a data manager and librarian.

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