

City of Corvallis Natural Features Inventory

Introduction Geographical Context City Council Acceptance

September 2, 2003

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II. Introduction

Purpose

The purpose of the Natural Features Project is to provide comprehensive information about the location and condition of natural resources and hazards within the Corvallis urban growth boundary (UGB). This information is needed by the City of Corvallis, Benton County, property owners, and the general public to make decisions about land use planning. The Natural Features Project and the associated inventories respond to the requirements of the Oregon statewide planning goals, primarily Goals 5, 6, and 7, and associated administrative rules. The Natural Features Project information will be used, in conjunction with other information and with substantial public input, to implement the Corvallis 2020 Vision Statement and the Corvallis Comprehensive Plan (1998). Both the statewide planning goals and the Corvallis Comprehensive Plan direct the City to gather information about natural features and use it, along with other data, to achieve a balance between providing a sufficient supply of buildable lands to meet the City's needs for housing and economic development while protecting significant natural features and reducing risks from natural hazards. The Oregon Department of Land Conservation and Development has directed the City of Corvallis to complete this work within the next several years.

Natural Features Project Planning Process

The Natural Features Project is a multi-year community project to inventory (systematically map and describe) and prioritize (determine the “significance” of) the natural features within the Corvallis UGB. The inventories are used to balance the community's need for buildable land for housing and economic development with natural resource protection and reducing risks from natural hazards. The Natural Features Project has four major phases, consistent with State requirements:

Phase 1 - Scoping (completed)

The *Natural Features Scoping Project* was completed in January 2002. It determined what natural features to inventory, provided a methodological framework for conducting natural feature inventories, and established preliminary criteria for ranking each of the natural features.

Phase 2 - Inventory (February 2002 – June 2003)

The natural features identified by the *Scoping Project* were inventoried. This Natural Resources Inventory Report is the inventory for the wetlands, riparian areas, wildlife habitats and tree groves. A separate Natural Hazards Inventory Report includes the inventories for natural hazards including floodplains, steep slopes/hillsides, earthquake associated hazards, landslides, alluvial fans, and wildfires.

Preliminary resource sites were identified using 2002 aerial photos. Property owners within these potential resource sites were sent information explaining the inventory process and a request for access permission to conduct the inventory. A series of open houses was held in May and June 2002 to explain the inventory process and review the preliminary maps. The draft

inventories were completed in Fall 2002 and all of the reports, maps and data sheets were available on the City's web site. Property owners within the draft resource sites were sent notice of the inventory availability and invited to open houses to review the draft maps and findings. Over 85 people participated in the open houses in January 2003. In addition, the draft inventories were given to eight peer reviewers, who were asked to review and comment on the drafts¹. The public and peer review comments were reviewed and incorporated into another draft report. This inventory report is the result of another round of public and peer review comments that took place in Spring 2003.

Phase 3 - Establish Priorities and Balance Needs (June 2003 – April 2004)

Not all natural features identified in the inventories will be considered significant and warrant protection. During this stage, the community will establish criteria for determining which natural features are significant (except for wetlands, which are defined by State administrative rules). Alternative scenarios will analyze the economic, social, environmental, and energy (ESEE) consequences of different levels of significance and protection. Some of these scenarios will use the State's Goal 5 "safe harbor" protections for riparian and wetland areas.²

At the same time, the City will be reviewing and updating the Buildable Lands Inventory data, population projections, and forecasting other land use needs. This information will be used to "balance" the community's need for adequate buildable land to serve the community's anticipated growth with protection of significant natural features and reduced risk from natural hazards.

Phase 4 - Develop Implementation Program (January - July 2004)

The final stage of the project will be to develop a combination of incentives, educational materials, and regulations to protect the significant natural features and reduce the risks associated with natural hazards. Significant natural features maps, revised Comprehensive Plan maps, and revised Zoning maps will be adopted. Resource protection programs will incorporate clear and objective protection standards in the Land Development Code and provide more certainty to property owners and the broader community regarding where development can occur, and where it will be limited.

Important Considerations

The study area is the entire Corvallis UGB, but not all areas examined during the inventory process are on the inventory maps. The maps indicate resources that were actually found. For example, not all areas examined for potential wetlands had wetlands on them. Only the wetlands found through the inventory process are included in the inventory data sheets and on the maps.

¹ The peer reviewers included: Bob Hughes, Chip Andrus, John Runyon, Kim Bredensteiner, Gerald Heilman, Rebecca Goggins, Rob Pabst, and David Dodson.

² "Safe harbor" protections for wetlands and riparian areas are an optional course of action that satisfies certain Goal 5 requirements based on the Oregon Administrative Rule (OAR) 660-023-0020(2). Local governments may follow the standard ESEE (Economic, Social, Environmental, and Energy) consequences analysis approach or they may adopt safe harbor standards for riparian and wetland protection

The inventory does not, by itself, establish which lands will be available for development or which natural features will be protected. Not all of the natural features included in the inventory will be considered “significant” and not all of the significant natural features will be protected. Each phase of the Natural Features Project will include decisions to balance conflicting or competing goals, which will reduce the number of natural feature areas under consideration (see figure below). These decisions will be made in future phases through a collaborative process with significant input from property owners and the general public.

For example, some Riparian Assessment Areas provide low or no riparian functions. There are other areas that provide medium or high functional values. There are still other areas that currently do not provide medium or high functional values but could do so if they were restored to a more natural state. The balancing process may allow for the development of some of the lower functioning riparian areas.

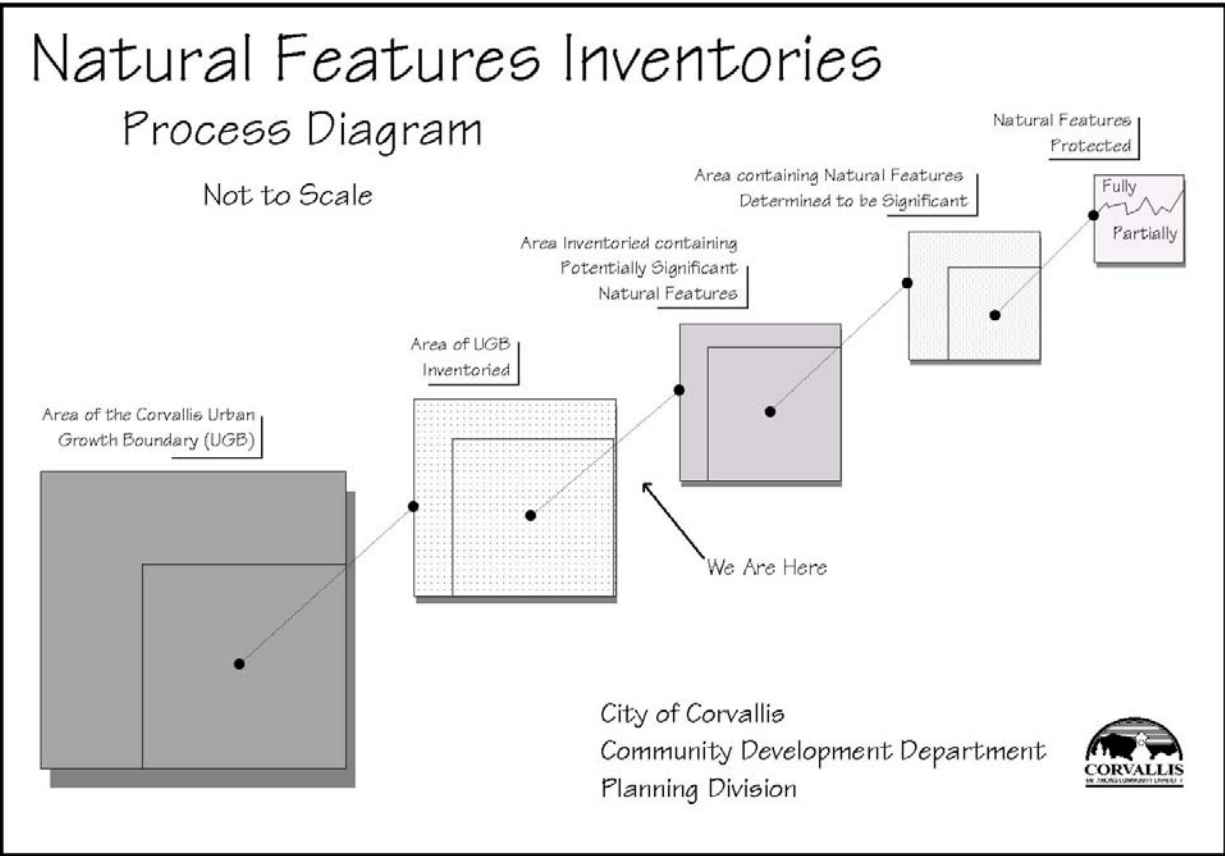
The inventory also does not consider the needs of specific land use that may override full protection of an important natural feature, even though the feature provides very high functional values. Examples may include the need to place a water intake facility in a stream, or the need for a bridge across a stream and associated riparian area. These sorts of decisions will be arrived at through the “balancing” portion of this project, when the community examines overall land use patterns, community needs, resource inventory information, and potential impacts. All of these factors will be considered before arriving at the proper balance among these competing needs.

Conversely, the inventory identifies buildable areas where no significant natural features were found. Once the inventory is adopted, a property owner can rely on the mapped inventory information to prepare development applications and have increased certainty about the outcome of development permit reviews. If a resource is not mapped, the City of Corvallis cannot consider any testimony in a future land use decisions for a development proposal that indicates that there may be a significant natural feature on the site.³ This reduces both the costs of preparing an application and the risk of having the application denied or modified.

The inventory is a planning-level reconnaissance of the natural features of the Corvallis UGB. The inventory process anticipates that changes may occur in the inventory as property owners submit more detailed information, such as a Division of State Lands (DSL) approved wetlands delineation. The regulatory process will include procedures and criteria for property owners to submit more detailed information, which could further reduce the amount of land afforded protection.

The following diagram illustrates how areas with natural features will be adjusted through the inventory, significance determination, and balancing processes.

³ Property owners should be aware that they are not exempt from State and Federal regulations, such as those for wetlands and endangered species. Please see “Cautionary Note 1.”



Cautionary Notes

Only Locally Significant Wetlands will be regulated by the City of Corvallis or Benton County. However, non-Locally Significant Wetlands may continue to be regulated by the U.S. Army Corps of Engineers and/or the Division of State Lands. The property owner could still be required to meet the standards enforced by these agencies.

Also, there are other natural features identified in the Comprehensive Plan for protection that were not inventoried as part of the Natural Features Project. These include individual trees over eight inches in diameter as measured four feet above grade and shrubs over three feet in height (excluding blackberries, poison oak, and similar noxious vegetation). Other examples include viewsheds and viewpoints. Because these natural features are not part of this inventory, they will not be part of the balancing process and the City will continue to consider them in land use approvals on a site-by-site basis.

The Natural Resources Inventory Report

This report includes the inventory information for:

- Streams and Wetlands
- Riparian Areas
- Wildlife Habitat (including Significant Vegetation)
- Tree Groves

In addition, the City of Corvallis is preparing separate inventory information regarding the following natural hazard areas:

- Floodplains
- Steep Slopes/Hillsides
- Earthquake Associated Hazards
- Landslides
- Alluvial Fans
- Wildfire Potential

How To Use This Inventory

The [Executive Summary](#) and [Introduction](#) provide an overview of the Natural Features planning process and the preliminary results of the inventory.

The Natural Resources Inventory planning area is the Corvallis UGB.

The planning area is divided into three study areas based generally on watershed boundaries (see Figures 1 and 2):

- North Corvallis Study Area
- South Corvallis Study Area
- West Central Corvallis Study Area

Each resource inventory has three parts:

- A **Technical Report** that describes the detailed methodology with summary tables and analysis.
- Detailed **Field Data Sheets** for each resource site.
- **Maps** at three different scales that provide increasing detail.
 1. A **Summary Map** identifies the resource location within the Corvallis UGB.
 2. **Locator Maps** for each study area (north, west-central, south) that provide a map index to the detailed map sheets.
 3. **Map Sheets** provide the greatest detail at 1:600 scale with 2002 aerial photos as a base layer.

The maps are divided into two categories: water-related resources (wetlands and riparian corridors) and upland resources (wildlife habitat and tree groves).

Figure 1. Study Areas within Corvallis Urban Growth Boundary

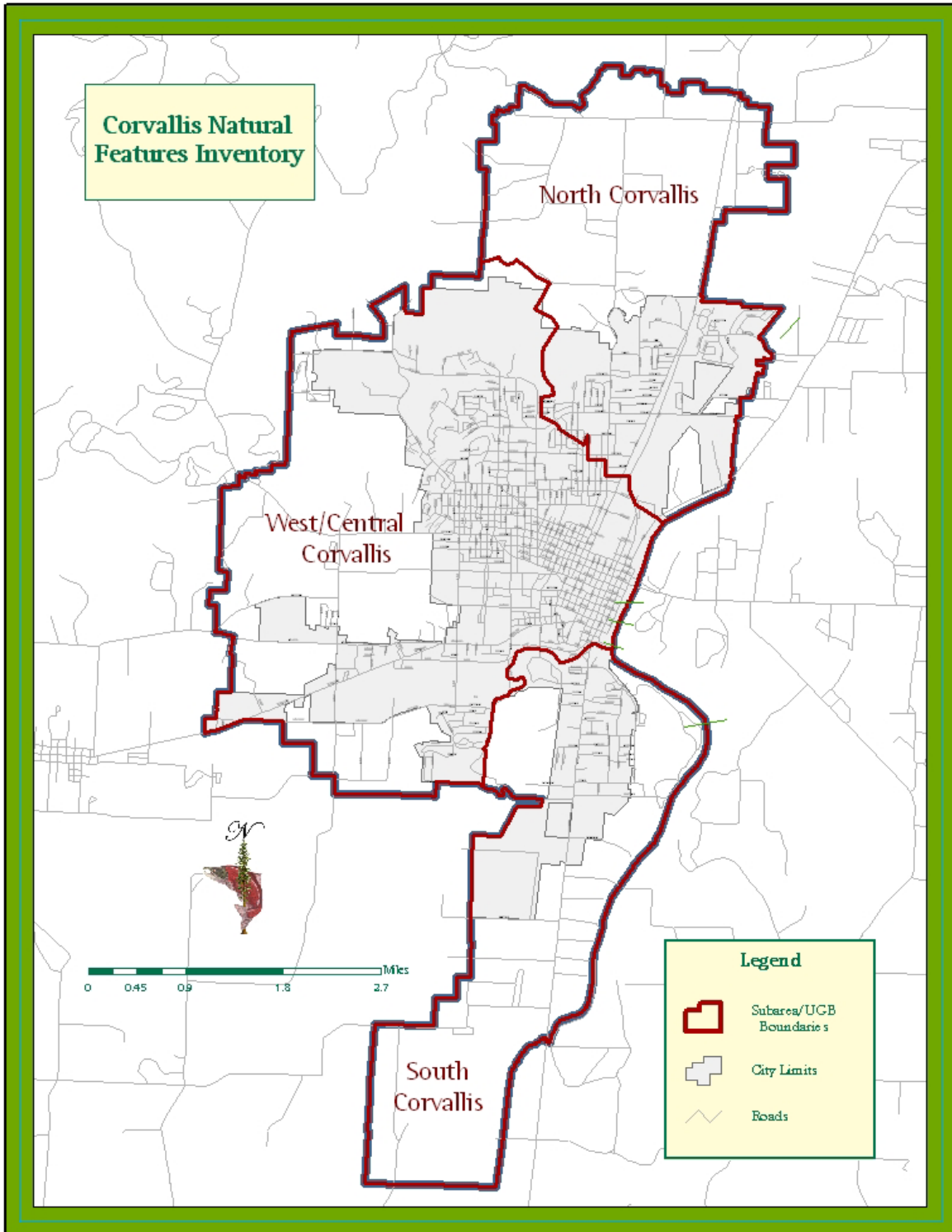
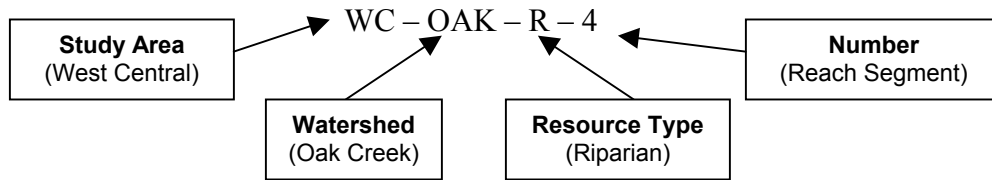


Figure 2. Watershed Basins within Corvallis Urban Growth Boundary



Each resource has a unique identifier or code based on the study area, watershed, and resource type. This **Resource Code** is the key to the results in the maps, report tables, and data sheets. For example:



Inventory Methodology Overview

Specific methods are used for each of the natural features in this inventory. The inventory and assessment methods described in this report are based on the *Natural Features Scoping Project Report* (2002) prepared by the Corvallis Natural Features Technical Advisory Committee (NFTAC). The scoping report provides clear direction regarding what natural features to inventory further and provides the methodological foundation for determining how to inventory the natural features. Detailed descriptions of the methods are found in each of the technical reports. Briefly:

Local Wetlands Inventory (LWI)

The LWI includes all wetlands at least 0.5 acres in size, either isolated or within riparian assessment areas or wildlife habitat assessment areas. The methods are determined by Oregon Division of State Lands administrative rules.⁴ The LWI is unique in that it is the only resource in which “significance” of a local wetland is determined by state administrative rules. The Oregon Freshwater Assessment Methodology (OFWAM) is used to assess whether or not a wetland meets the criteria for a Local Significant Wetland.

Riparian Assessment

The riparian assessment is conducted within riparian assessment areas (RAA), which vary in width depending on stream type (perennial or intermittent) and the presence of locally significant wetlands and/or continuous riparian vegetation. The width of the RAA extends beyond the width of the riparian vegetation to identify potential offsite impacts. Each RAA is mapped with subareas or subpolygons that indicate different vegetative cover types (i.e. trees, shrubs, grasses, developed). RAAs do not include drainage channels that typically have water present only during storm events. RAAs extend up each stream or tributary where riparian vegetation or channel characteristics are visible.

The methodology is based on the *Urban Riparian Inventory and Assessment Guide* (URIAG) and a supplemental Riparian Corridor Survey to provide additional information on vegetation cover and stream conditions consistent with the *Natural Features Scoping Project Report* (2002).

⁴ OAR 141-86-110 through 141-86-240

Wildlife Habitat Assessment (WHA)

The WHA includes all areas of at least five acres with natural vegetation, except for areas within riparian assessment areas. The WHA inventories and assesses six general categories of habitat features or conditions: water, food, cover, human disturbance, patch size and connectivity, and unique features. Vegetation subpolygons are defined within each WHA area based on vegetative cover types. Each vegetation subpolygon includes a description and characterization of the vegetation and identification of any rare, threatened or endangered species associations.

Tree Grove Assessment (TGA)

The TGA is conducted for all areas with trees that are predominantly 25 feet or more in height with a continuous canopy cover of 0.5 acres or more located outside developed areas (which are defined as lots less than 10,000 square feet within the urban area or lots with 15,000 square feet and a structure in rural areas) and riparian assessment areas.

The TGA distinguishes between isolated tree groves (less than five acres in size) and vegetative subpolygons within WHA areas (greater than five acres), but does not include tree cover within developed areas or riparian assessment areas. The TGA evaluates tree groves for scenic, aesthetic, and other functional values.

In many cases, resource boundaries overlap. For example, tree groves may be isolated or part of a wildlife habitat assessment area; or, a riparian corridor may be located within a wildlife habitat assessment area. Similarly, wetlands may be part of either a wildlife habitat assessment area or a riparian assessment area. The application of the methods has been organized to ensure comprehensive coverage while avoiding “double counting” resources. Table II-1 identifies the assessments required for different situations.

Table II-1. Summary of Field Assessment Methods

Assessment Type	Condition	Qualifications
Riparian Assessment*	Intermittent streams with riparian vegetation or channel characteristics; no wetlands	<i>If natural vegetation extends beyond RAA but less than 100 ft., then RAA boundary is adjusted to include natural vegetation.</i>
Riparian Assessment Local Wetland Inventory	Perennial streams or intermittent streams with wetland(s)	<i>If wetland within 50 ft. of top-of-bank, then RAA measured from wetland edge.</i>
Riparian Assessment Local Wetland Inventory Wildlife Habitat Assessment* Tree Grove Assessment	Perennial streams or intermittent streams with wetland(s) and natural vegetation with one or more tree groves ≥ 0.5 acres	<i>If natural vegetation extends more than 100ft from RAA, then WHA required.</i>
Wildlife Habitat Assessment Tree Grove Assessment Local Wetland Inventory	Intermittent streams with no riparian vegetation or channel characteristics or upland area with wetland(s) within natural vegetation with tree grove(s) ≥ 0.5 acres	<i>If isolated wetland within WHA, then LWI required. WHA includes description of width and depth of intermittent stream channel. Indicates high quality site.</i>
Wildlife Habitat Assessment Local Wetland Inventory	Intermittent streams with no riparian vegetation or channel characteristics with wetland(s) within WHA, but no tree groves ≥ 0.5 acres	Vegetation subpolygon assessment includes description of width and depth of intermittent stream channel.
Wildlife Habitat Assessment Tree Grove Assessment	Natural vegetation outside RAA with continuous tree cover ≥ 5 acres with development < 2 units per acre	<i>If these conditions met, then WHA required.</i>
Local Wetland Inventory	Isolated wetland not part of RAA or WHA	Map wetland only; show location in relation to intermittent stream if present.
Tree Grove Assessment	Isolated tree grove with continuous tree canopy with average 25 ft. tall trees and > 0.5 acres in undeveloped area	<i>If tree grove is less than 5 acres, developed with more than 2 units per acre, or has no water source within 50 ft., then no WHA is necessary.</i>

* Riparian Area Assessments and Wildlife Habitat Assessments include vegetation subpolygons.

Interpretation of 2002 aerial photos and other GIS maps was used to identify potential resource sites. The maps were revised based on the field surveys to more accurately locate and describe the natural features.

The goal was to conduct field surveys of all sites or at least of portion of the site that appeared to be representative or typical of the conditions in that resource site. Field surveys were conducted on-site where access permission was obtained. The preliminary maps were used to generate a mailing list. All property owners within potential resource sites were mailed an introduction letter with a request for permission to enter their property to conduct the field survey. In addition, all property owners were invited to a series of public meetings to discuss the inventory process. Access permission was given in writing on a postcard, which was tracked on a database and indicated on field maps.

Field crews were instructed not to enter private property without the expressed written permission of the property owner. Where access was not obtained, assessments were “field verified” with observations from adjacent roads, public lands, or properties that had granted access. For difficult to observe sites, an off-site assessment was conducted using aerial photographs and existing data sources. Table 6 provides a breakdown between the on-site, field verified and off-site surveys for each resource.

Table 6. Field Survey Methods

Resource	On-Site		Field Verified		Off-Site	
	No. of Sites	%	No. of Sites	%	No. of Sites	%
Wetlands	59	49%	43	36%	19	15%
Riparian Areas	104	74%	25	18%	11	8%
Wildlife Habitat	16	50%	15	47%	1	3%
Veg Subareas	61	37%	74	44%	32	19%
Tree Groves						
Inside WHA	45	39%	48	42%	22	19%
Isolated	-	-	67	100%	-	-

Quality Control and Quality Assurance

Quality Control and Quality Assurance are important to establish the reliability or integrity of the inventories. Careful attention was paid to ensure consistent application of the inventory methodologies throughout the Corvallis UGB. In addition, experienced scientists, who have conducted similar inventories for other jurisdictions, completed the field surveys.

At the start of each resource inventory, all participating field staff visited selected calibration sites (e.g., individual wetlands) that represented the likely range of conditions for each type of resource found in the Corvallis UGB. The purpose of visiting calibration sites as a group was to ensure that all personnel were interpreting the assessment methodology and data elements in the same manner. To determine if this was the case, each person assessed each site independently, then the results were immediately compared and discussed to identify possible reasons for any differences. This calibration process resulted in written clarification to the methodologies.

Throughout the inventory process, lead scientists reviewed the work of the other team members to continue to assure consistency in the methodology and findings of the team members.

A Public Review Draft of the inventory reports, maps, and data sheets was released in January, 2003. Notices were mailed to property owners and other interested parties to inform them about the draft inventory report and opportunities to provide comments and corrections. Copies of the January Public Review Draft were available at the Corvallis – Benton County Library, at City Hall, and on the project website. A series of open houses were held to give property owners and others an opportunity to review the inventory maps and data sheets and discuss the findings with the field survey scientists. A committee of local peer reviewers with expertise in each inventory specialty provided review comments and corrections.

In addition to responding to public and peer review comments on the January 2003 Public Review Draft, each resource site map was reviewed to make further adjustments and refinements to the site boundaries. The Local Wetland Inventory and Riparian Assessment databases were re-checked and revised to update the inventories. This revised information was used to prepare the May 2003 draft that went through an additional review by City staff, property owners, the general public, and the peer review team to form the basis of the June 2003 final inventory report.

III. Geographical Context

Location⁵

Corvallis is located in the center of the Willamette Valley, between the Coastal Range and the Cascades. The city lies approximately 85 miles south of Portland, Oregon and 50 miles east of the Pacific Ocean at the confluence of the Willamette and Mary's Rivers. The community is located on a plateau that extends to the foothills of the Coast Range.

Historical Context⁶

The area was originally settled by the Kalapuya, who lived in small bands and occupied the Willamette Valley south of Willamette Falls to the Umpqua River Valley.

Corvallis was settled by Euro-Americans due to its location in the central Willamette River Valley. In the early 1800's Euro-Americans came to the Corvallis area to trap furs and trade. In the mid 1800's, thousands of people migrated to the Willamette River Valley to benefit from the "Eden" at the end of the Oregon Trail by claiming free land for farming. The area was settled along the rivers and the route of the early pack trail between Washington and California. By the late 1840's to the mid 1850's land claims within the current downtown Corvallis area (then called "Marysville") were settled by the city's early founders. J.C. Avery created the first subdivision "Little Fields" by chaining off 12 acres of the land around his cabin for town lots. By 1859, the community had been incorporated and renamed "City of Corvallis" and had a population of almost 500 people. Corvallis had become a community and regional trading center with steamboat services, ferries, stagecoach services, and two major roads.

In 1862, the Oregon legislature, designated the previously established Corvallis College as the Agricultural College for Oregon. In 1871, 35 acres of land were purchased for the college experimental farm. This was the future site of today's Oregon State University, currently, the largest employer in Corvallis. By 1900, the State of Oregon had acquired exclusive control of the Corvallis College and had expanded the campus.

The first ten years of the twentieth century were a boom time for Corvallis. The population increased by 150 percent to 4,552 people in 1910. The population reached 8,393 in 1940. World War II pulled Oregon out of the Depression. Camp Adair was developed as a military training camp five miles north of Corvallis. At its peak, Camp Adair was the second largest city in Oregon serving 30,000 to 35,000 troops. Corvallis was directly impacted as families tried to find housing in Corvallis. Many of the large, older homes were converted into apartments. Churches and parks became meal sites. Overall, there was a 93 percent increase in the population of Corvallis between 1940 and 1950. However, the increase also reflected the fact that college students were counted for the first time in the 1950 census. By 1960, the population in Corvallis had increased to 20,669.

5 Excerpted from the Corvallis-Benton County Economic Development brochure.

6 Excerpted from the Corvallis Historic Context Statement written by Mary Gallagher, and the Corvallis-Benton County Economic Development brochure.

In 1974, Hewlett-Packard proposed a new facility in Corvallis. By then, Corvallis had grown to over 39,000 people. The company had approximately 4,200 employees by August 2002 and is the community's second largest employer.

The Corvallis Comprehensive Plan was developed during the late 1970s and acknowledged by the Oregon Land Conservation and Development Commission (LCDC) in 1981. Since that time, this plan has directed Corvallis and Benton County's resource conservation and development programs within the Corvallis Urban Growth Boundary (UGB).

In 1998, Corvallis refined its Buildable Lands Inventory (BLI). In 2000, Corvallis adopted the Corvallis 2020 Vision Statement, which supplements and refines the citizens' vision for Corvallis. Based on the 2020 Vision Statement and the BLI, the City adopted a revised Comprehensive Plan that was acknowledged by LCDC in June, 2002.

By 2002, Corvallis had grown to a population of approximately 50,800, a mid-sized community with one of Oregon's strongest local economies. Corvallis is the Benton County seat, with Oregon State University, Hewlett-Packard, Good Samaritan Regional Hospital, Corvallis Clinic, Environmental Protection Agency and CH2M Hill as the major employers.

Current Land Use

The Corvallis UGB contains approximately 17,963 acres or 28 square miles (including the City of Corvallis). Most of the approximately 9,023 acres of land in the urban fringe are either vacant or are developed to rural densities.

At the end of 2001, lands within the city limits were developed as shown in Table III-1 below. The figures are from the 2001 Land Development Information Report published by the City of Corvallis Community Development Department.

Table III-1. 2001 Land Uses in the City of Corvallis

	Total Acres	Use % of Total Land in City	Vacant Acres	% of Land in City is Vacant by Use	Developed Acres	% of Land in City is Developed by Use
Residential – Inc. Lands for Open Space/Schools/Parks & Other Civic/Inst. Uses	5,011	56%	900	10%	4,111	59%
Commercial	521	6%	51	1%	470	5%
Industrial	1,159	13%	487	5%	672	8%
Agricultural-Open Space	318	4%	NA		NA	NA
OSU	483	5%	0	0%	483	5%
Rights-of-Way	1,448	16%	0	0%	1,448	16%
Total Acres in City	8,940	100%				

The city has benefited from strong citizen involvement and support enabling Corvallis to provide parks, open spaces, trails, strong social and protective services, and a variety of pedestrian friendly neighborhoods with neighborhood services. Most of the city has full infrastructure providing public water, wastewater, and storm water facilities; streets, sidewalks, and bicycle facilities; and recreation facilities. The community is serviced with a mixture of public and private educational services extending from pre-school through doctorate programs. There is a mixture of housing types including apartments, townhouses, condominiums, and single-family homes. Neighborhoods vary in densities from highly urbanized to rural characteristics with a variety of architectural styles. Most buildings are one to three stories in height.

Future Land Use

Through the 2020 Vision Statement and the 1998 Comprehensive Plan, the citizens of Corvallis have identified their desires for the community’s future development patterns. The Vision Statement envisions that in 2020 Corvallis will be:

- a compact, medium-sized city (population 57,500 to 63,500) nestled in a beautiful natural setting⁷;
- the historic, civic, cultural and commercial heart of Benton County;
- an economically strong and well-integrated city, fostering local businesses, regional cooperation and clean industry;
- an environmentally-aware community with distinctive open space and natural features, protected habitats, parks and outdoor recreation;
- committed in its support for children and families;
- a highly livable city which employs local benchmarks to measure its progress in areas such as housing, economic vitality, educational quality, environmental quality, and

7 Corvallis Comprehensive Plan 2020 population projection is 61,029.

- overall quality of life;
- a community that values and supports quality education throughout the age continuum;
- known for its comprehensive health and human services, and for its services for the elderly and disabled;
- a hub in a regional transportation system that connects Linn and Benton counties and provides a link to the north-south high-speed rail system;
- blessed with an involved citizenry that actively participates in public policy and decision making;
- a community that honors diversity and is free of prejudice, bigotry and hate;
- home... a good place for all kinds of people to live and to lead healthy, happy, productive lives.

Recognizing that the community will continue to grow and develop, the City has initiated an environmental inventory process to determine the most appropriate development patterns to help assure that the community's vision is fulfilled. This inventory report is the first in a series designed to inventory all of the natural features and natural hazard risk areas identified by citizens as being important to sustaining the economic and social values of the community. After the inventories are completed, the community will use the information to balance the needs for various land uses and determine the most appropriate land use patterns for future development.

Climate

The Willamette Valley has one of the mildest climates in the United States. Spring, fall, and summer temperatures range from the upper 50s to upper 80s and mid-winter temperatures range in the 40s. Average annual precipitation is 40 inches. Sleet or snow of more than one inch occurs an average of one day a year or less.

Topography

From the Willamette River, at approximately 250 feet in elevation, broad terraces rise to the west in a stepwise fashion before reaching the base of the Corvallis foothills at an elevation of approximately 290 feet. These generally flat terrace landforms cover much of the eastern, southern, and central parts of the city. Downtown Corvallis is situated on a lower riverside terrace, while a second terrace rises to the west of 15th Street near the OSU campus (with a rise or step of approximately 20 feet). The terrain rises gently to the base of the foothills. The northern and western parts of the city are dominated by a series of foothills separated by smaller stream corridors and valleys; the streams are tributaries to the Willamette and Mary's Rivers and flow in an easterly direction. The hills rise abruptly from the terrace lowlands with moderate to steep side slopes ranging from 10 to more than 25 percent. From their base ground elevation (generally about 290 feet), the hills rise to over 500 feet and in some cases over 800 feet in height.

Geology

Corvallis is situated on the alluvial and lacustrine terraces of the southern Willamette Valley. Floodplains and terraces rise stepwise from the Willamette River and its primary tributary, Mary's River, towards the Corvallis foothills. The alluvial and lacustrine terrace deposits include sediments from repeated Missoula Flood events during the late Pleistocene and more recent floodplain deposits.



Figure 3. Distribution of Corvallis Geology Units
(Source: Geologic Hazards of Eastern Benton County, Oregon 1979).

The stepwise alluvial and lacustrine terrace deposits can be traced west from the Willamette River to the foothills. The lower (eastern) part of town is located primarily on Quaternary middle terrace deposits (Qtm) (Figure 3). Another terrace, on Quaternary higher terrace deposits (Qth), begins in the vicinity of the Oregon State University and extends to the foothills to the west and north. The foothills are composed primarily of sedimentary and volcanic rock units including Spencer sandstone (Ts), Flounoy sandstone (Tf), and Siletz River Volcanics (Tsr) located west of the Corvallis fault zone.

Hydrology

The Willamette and Mary's Rivers create the two primary hydrologic basins within the study area. The Willamette River along the eastern edge of the City is the dominant hydrological feature in the study area. The Willamette basin is 11,500 square miles in area, and all of the study area is contained within it. The Mary's River, a tributary to the Willamette with a 310 square-mile basin, is a prominent feature in the southern and western portion of the study area.

Two of the Mary's River tributary streams, Squaw Creek and Oak Creek, drain the western part of the city. Several other small to moderate sized perennial streams traverse the slopes and terraces of Corvallis and discharge to the Willamette River, including Dixon Creek, Jackson Creek, Frazier Creek, Lower Booneville Channel, Sequoia Creek, Stewart Slough, and their tributaries.

Soils

Soils within the study area can be grouped by their parent materials and geomorphic setting. The soils of the foothills of the coast range form the Dixonville-Philomath association. This association is above 350 feet NGVD, in the very northwestern portion of the study area, away from major drainages and is underlain by Siletz volcanics. These soils are moderately deep, well-drained silty clay loams and shallow, well drained, silty clays. These very dark brown mollisols are usually shallow (less than 40 inches) and frequently contain significant amounts of basalt cobbles. Minor quantities (less than 15 percent) of Hazelair complex, Witham silty clay loam, Bashaw clay, and Waldo silty clay are also found in this association.

The Woodburn-Willamette association is found on the highest of the Willamette Valley terraces and on slightly steeper slopes (0-12 percent) from 200-300 feet NGVD. This association developed on mixed alluvium from glacial outbreak floods in well-drained locations and contains moderately well drained and well drained silt loams. Both Woodburn and Willamette are very dark grayish brown to dark brown mollisols, but the Willamette (pachic ultic argixerolls) lie slightly above the Woodburn (aquultic argixerolls). The clay rich subsoil horizons tend to have less significance for soil hydrology for these well-drained soils than for less well-drained slope situations. Minor quantities (less than 15 percent) of Malabon silty clay loam and the less well-drained Dayton silt loam and Amity silt loam are also found within the association.

The Dayton-Amity association is found on the highest of the Willamette Valley terraces in poorly drained locations between 200-300 feet NGVD. These developed on mixed alluvium from glacial outbreak floods and contain poorly drained and somewhat poorly drained silt loams. These are found on flat (0-2 percent grade) terraces in mixed alluvium. The poorly drained Dayton silt loams (typic albaqualfs) lie below the somewhat poorly drained Amity silt loams (argiaquic xeric argiablolls). These soils have a pale clay-rich horizon beneath the surface silt loam. Minor quantities (less than 10 percent) of Woodburn silt loam is also found within the association.

Within the bottoms of tributary streams to the Willamette River is found the Waldo-Bashaw association: poorly drained silty clay loams and clays. These soils are formed on recent alluvium from higher landscape position washed into the flat (0-3 percent) bottoms of the stream valleys. The soils are generally black and frequently contain enough shrink-swell clay through the profile to crack and mix with seasonal wetting and drying.

In the coarser alluvial deposits from the recent Willamette River flooding are found the Chehalis-Newberg-Cloquato association: well-drained silty clay loams, silt loams, excessively drained loams, and fine sandy loams. These soils are well drained by their proximity to the Willamette River. The Chehalis silty clay loam lies further from the river than the other soils in the association. The Newberg fine sandy loam lies closest to the river within the association. Minor amounts (less than 15 percent) of the less well drained McBee silty clay loam and Wapato silty clay loam are also found within the association. All of these soils tend to have fluctuations in texture through the profile because deposition is occurring faster than soil mixing processes.

Soil Descriptions

Eighteen mapped soil units, listed in Table 6, were documented as part of the wetland inventory.

Table 6. Mapped Soil Units within Data Point Locations

Soil type	Classification	Hydric	Drainage Class
Amity silt loam	Argiaquic Xeric Argialbolls	No	somewhat poorly drained
Bashaw clay	Xeric Endoaquerts	Yes	poorly drained
Bashaw silty clay loam	Xeric Endoaquerts	Yes	poorly drained
Chehalis silty clay loam	Cumulic Ultic Haploxerolls	No	well drained
Coburg silty clay loam	Pachic Ultic Argixerolls	No	moderately well drained
Conser silty clay loam	Typic Argiaquolls	Yes	poorly drained
Dayton silt loam	Typic Albaqualfs	Yes	poorly drained
Dixonville silty clay loam	Pachic Ultic Argixerolls	No	well drained
Hazelair complex	Aquultic Haploxerolls	No	moderately well drained
Malabon silty clay loam	Pachic Ultic Argixerolls	No	well drained
McBee silty clay loam	Cumulic Ultic Haploxerolls	No	moderately well drained
Newberg fine sandy loam	Fluventic Haploxerolls	No	somewhat excessively/well drained
Philomath silty clay	Vertic Haploxerolls	No	well drained
Waldo silty clay loam	Fluvaquentic Endoaquolls	Yes	poorly drained
Wapato silty clay loam	Fluvaquentic Endoaquolls	Yes	poorly drained
Willamette silt loam	Pachic Ultic Argixerolls	No	well drained
Witham silty clay loam	Vertic Haploxerolls	No	somewhat poorly drained
Woodburn silt loam	Aquultic Argixerolls	No	moderately well drained

As demonstrated in the LWI Technical Report, a variety of soil types were sampled during field visits to the study area; surface features are described on data sheets in Appendix B. Hydric soil indicators observed during the survey included low chroma soils (both with and without mottling), a hydrogen sulfide odor, and an aquatic moisture regime in some locations.

Vegetation

Prior to Euro-American settlement, the Willamette Valley landscape consisted of mixed stands of Douglas fir, Oregon ash, cottonwood, oak, alder, willow, and big leaf maple, with a dense understory dominated by Oregon grape, salmonberry, elderberry, rose, hardhack, ninebark and cascara. The higher terraces above the river's flood plain were covered with a vast savanna dotted with stands of Oregon white oak. The landscape included meandering streams flowing into the broad plains of the Willamette and Marys Rivers.

Vegetation communities in the Willamette Valley have been shaped by human activities for centuries. Native Americans were known to use fire to aid their hunting and gathering activities by favoring the growth of certain groups of plants. Euro-American settlement in the mid-19th century rapidly changed the composition of plant communities throughout the area, with urban areas, farmland, and other developments coming to dominate the landscape. Areas that now appear to retain natural vegetation have nevertheless been subject to fire suppression, clearing, logging, and grazing activities over the years.

The foothills of the Coast Range now consist of a mosaic of deciduous woodlands, coniferous forests, pasture lands, shrub communities, and riparian forests broken up by development. Climax communities are generally considered to be forest types dominated by Douglas fir and Oregon white oak, or by Oregon ash in wetter sites. Patches of remnant wet prairie exist in more undisturbed lands in the project area. Further discussion of plant communities within the interior valleys of western Oregon can be found in *Natural Vegetation of Oregon and Washington* (Franklin and Dyrness 1973).