

BEFORE THE BOARD OF COUNTY COMMISSIONERS
OF MULTNOMAH COUNTY, OREGON

In the Matter of Considering Approval)
of Event Sponsors Charging Admission) RESOLUTION
for Use of the Public Right-of-Way for) #90-39
a Special Event)

WHEREAS, ORS 374.310 grants counties the authority to control the use of county rights-of-way including streets, bridges, and facilities, and

WHEREAS, ORS 374.310 expressly requires a person to obtain written permission from the county before doing so, and

WHEREAS, MCC 11.60.070 establishes the requirement for a permit and a fee for use of the county right-of-way, and

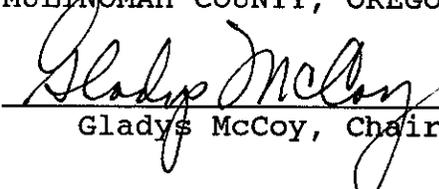
WHEREAS, the Multnomah County adopted street standards establish rules for special events in the public right-of-way, and

WHEREAS, those rules provide for use of the public right-of-way by private enterprise sponsors, but do not make provision for events at which admission is charged for the use of the public right-of-way.

NOW, THEREFORE, BE IT RESOLVED, that the Board of County Commissioners approves consideration of special events in which the sponsors will charge admission for use of the public right-of-way, and assigns the Director of Environmental Services the responsibility to create and implement such rules necessary to maximize public safety and convenience when such events are allowed.

ADOPTED this 8th day of March, 1990.

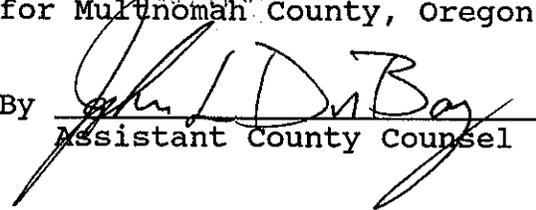
BOARD OF COUNTY COMMISSIONERS
MULTNOMAH COUNTY, OREGON



Gladys McCoy, Chair

REVIEWED:

LAURENCE KRESSEE, County Counsel
for Multnomah County, Oregon

By 

Assistant County Counsel

Multnomah County

Natural Area Protection and

Management Plan

Board of County Commissioners

Gladys McCoy, Chair of the Board

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Commissioner Gary Hansen

Commissioner Rick Bauman

Commissioner Sharron Kelley

Department of Environmental Services

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Charles Ciecko, Director Parks Services Division

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Jean Ridings
Vivian Starbuck
Dr. Charles Becker Sr.
Christine Lightcap
Greg Wolley

Natural Area Subcommittee

Jean Ridings, Parks Advisory Committee
Dr. Arch Diack, Parks Advisory Committee
Christine Lightcap, Parks Advisory Committee
Nancy Diaz, Mt. Hood Forest Service
Dean Apostle, Mt. Hood Forest Service
Jim Morgan, Metro
Ralph Rogers, EPA
Bill Bakke, Oregon Trout
Ron Klein, PGE, Environmental Division
Dr. Susan Foster, Mt. Hood Community College

Consultants

Esther Lev
Lynn Sharp
Maurita Smyth

Project Planner

Nancy Chase

Word Processor

Rosemary Justice

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THE VISION

Multnomah County will be a community where both people and nature flourish.

PLAN PURPOSE:

In acknowledgment of the 20th anniversary of Earth Day, the Multnomah County Board of County Commissioners passed a resolution which created a Natural Area Acquisition and Protection Fund. The creation of this fund coincided with the dedication of Multnomah County's first wildlife refuge, Beggars Tick Marsh, a 20 acre wetland in SE Portland.

These actions are reflective of a growing awareness that the natural resources in and around the Metropolitan Area are essential to maintaining the quality of life associated with a healthy community.

Clean air, water, a diversity of fish and wildlife, accessible and beautiful natural areas affording a wide range of recreational and educational opportunities have all made Multnomah County a desirable place to live, work and recreate. As more and more people are attracted to our region, it is essential to develop strategies which promote well planned growth. A healthy, viable natural area system which conserves the region's natural resources is an integral element of successful growth management.

The Natural Area Protection and Management Plan is a conscious effort by the Board of County Commissioners to be proactive rather than reactive in regard to this critical issue. The purpose of this plan is to create a framework to select natural areas for acquisition by the county and to identify means to preserve, protect and enhance natural resource values on such lands. Because natural areas often transcend political boundaries, the county must work cooperatively with other agencies to protect biologically functional systems in natural areas included on Goal 5 inventories.

A critical element in the long-term protection of a viable natural area system will be the creation of a comprehensive environmental education and interpretation program for county residents and visitors. This program will promote the wise use and enjoyment of natural areas and informed decisions regarding environmental issues facing the region.

Direct daily contact with nature should not become a story from our past but rather a living legacy for future generations.

POLICIES

POLICIES:

To achieve the vision the following policies are hereby adopted:

Policy #1 - Acquisition and Protection

- A. The county shall work towards the restoration/protection of the region's natural area systems by acquiring ownership of sufficient habitat to support the historic diversity of flora and fauna native to Multnomah County. The following areas may include remnants of functioning natural area systems:

Southwest Hills - Tryon Creek

Tualatin Mt. Corridor

Columbia River Lowlands/Slough/Islands

Willamette River

Fairview Lake and Creek

Multnomah Channel/Sauvie Island

Sandy River/Tributaries

Columbia River Gorge

Larch Mountain

Boring Lava Hills

Volcanic Buttes

Johnson Creek and tributaries/Beggars Tick Marsh

However, this list is not intended to identify Goal 5 resources.

Additional study may indicate that an update to the county's Goal 5 inventory is necessary.

NOTE: See page 28 for system descriptions.

B. Corridors that connect and help form these natural area systems shall be protected in order to minimize fragmentation of habitat and isolation of species.

C. Publicly-owned natural areas should be protected and their value enhanced through the appropriate management of adjacent properties.

This may be achieved by:

- the adoption of land use regulations to protect Goal 5 resources listed on the county's inventory,
- the provision of incentives which encourage wise land stewardship and
- education of property owners.

D. Through its Department of Environmental Services, the county shall act as an advocate for the protection, conservation and

restoration of natural areas.

- E. The county shall work cooperatively with appropriate federal, state, regional, local agencies and non-profit organizations to protect and enhance the natural resources of Multnomah County.

Policy #2 Finance

- A. The county shall endeavor to review, evaluate and dispose of surplus property in a timely manner in order to provide revenue for the implementation of this plan. (In April 1990, the Board of County Commissioners created a Natural Areas Acquisition and Protection Fund, and allocated 50% of the proceeds from the sale of unrestricted county surplus property.)
- B. In order to leverage county resources, efforts will be made to create and foster partnerships with other agencies, businesses, service groups and citizens.
- C. The county shall support the development of new funding sources on a regional, state and federal level.
- D. When feasible, the county shall recover a portion of operation and maintenance costs through the implementation of a user fee system

and/or development of revenue generating recreational facilities.

Policy #3 Management

- A. As natural areas are acquired, measures shall be taken to protect the land from uses that have had or may have a detrimental impact on fish and wildlife habitat or recreational resources.
- B. A resource information base shall be established for the purpose of monitoring the ongoing integrity and health of each site.
- C. To ensure wise stewardship, a management plan shall be adopted for each site. The plan shall identify guidelines for resource protection, enhancement, utilization and maintenance.
- D. Prior to allowing public use, sufficient funds shall be appropriated for operations and maintenance costs consistent with the approved management plan.
- E. The development of recreational facilities may be pursued when consistent with approved management plans.

Policy #4 Public Involvement

- A. The public shall be encouraged to participate in the selection of natural area sites for acquisition of fee title or conservation

easements.

- B. The management planning process for each site shall incorporate a public involvement element.
- C. The county will foster the development and use of alternative labor, in the form of citizen volunteers, service groups, inmate crews, etc., for various aspects of operations and maintenance of natural areas.

Policy #5 Education

- A. The county shall endeavor to provide an educational and interpretive program which:
 - 1. Promotes public awareness of our relationship to and dependence on finite natural resources.
 - 2. Provides a foundation for informed public decisions regarding the management of natural resources.
 - 3. Encourages appropriate use and appreciation of publicly-owned natural areas.
- B. Site specific educational and recreational opportunities shall be identified in each management plan.

Policy #6 Land Use and Development

- A. It is not feasible to protect all natural areas and corridors by placing them in public ownership. The county should utilize its land use planning authority to protect significant natural areas by amending the county's land use planning documents where appropriate.

Policy #7 Transportation

- A. It is the intent of Multnomah County to design, construct and maintain transportation systems which avoid or minimize impacts to the natural areas identified under Policy #1 of this plan.

PLAN IMPLEMENTATION

POLICY IMPLEMENTATION PLAN:

The work tasks outlined in the implementation plan are dependent on budget and staffing constraints. Consequently, a phased schedule may be required.

Policy #1 Acquisition and Protection

The remaining natural areas in Multnomah County range in size from tiny islands surrounded by urbanization to areas over 100 acres located outside of the urban growth boundary. Preliminary figures indicate governments own approximately 10% of the natural areas in the Metropolitan area.

In order to create a viable system of natural areas with the funding available, the county should concentrate its resources on acquiring areas that are of county-wide significance, while encouraging private and local government protection of other significant areas.

Conservation will, in most cases, require cooperative partnerships with other jurisdictions, citizens groups and private property owners.

The values of natural areas are greatly increased if sites are connected by natural land and water corridors that prevent isolation of animal and plant species. Prior to acquiring natural areas attention will be given to how a site will enhance the connectivity of a system. Interconnected natural areas contribute to the long-term integrity of natural area systems. A diverse biological habitat is possible only if corridors of sufficient size are preserved or restored. Smaller natural area remnants or "islands" of natural areas are vulnerable to human disruption and require constant management and protection to maintain their natural condition (Pyle 1980).

Acquisition of property or conservation easements will be evaluated based on criteria listed on page 42-43.

In order to implement Policy #1, the following work tasks should be initiated or continued:

1a. The Parks Services Division shall work with the Metropolitan Greenspaces Program to identify natural areas to be acquired and to designate the lead agency for acquisition. For instance, Multnomah County may be the lead agency for acquisition of properties along the portion of Johnson Creek located outside the urban growth boundary, while Gresham or Portland may be the lead agency within their jurisdictional boundaries with the county as a potential partner.

Where Multnomah County will be the lead agency, the county will develop a work plan to identify property boundaries, existing zoning, ownership patterns, protection strategies, potential partnerships and other relevant factors.

1b. Establish procedures to regularly review all county properties and tax foreclosed properties to determine if any have value as natural areas. Properties with natural area values may be retained by the county or transferred to another appropriate jurisdiction.

- 1c. Continue biological surveys and data analysis necessary to identify target sites for acquisition or protection.
- 1d. Share information with cities and service groups and non-profit organizations about natural areas of interest and encourage their participation in the protection of these areas.

Policy #2 Finance

The vision of creating a community where nature and people both flourish can be accomplished only by timely action. Multnomah County is expected to experience significant growth over the next 20 years. As the region continues to urbanize, land values will escalate and opportunities to acquire large tracts of undeveloped land will become increasingly rare. To assure adequate open space and protection of natural systems, the majority of the Parks Services Division's resources should be concentrated on acquisition and revenue generation. Since revenue for the acquisition fund is derived from the sale of county surplus property (see page ___), it is essential that surplus properties be reviewed and sold expeditiously. As Fund resources will be limited in relationship to the need, all opportunities to leverage county funds should be explored.

In the past, the Park Services Division has emphasized revenue generation in order to minimize dependence on the general fund. This emphasis should continue to assure a financially secure future for the maintenance and management of the county's natural area sites. It is likely, however, that "user fees" will not provide adequate resources for this purpose. Therefore, the Division must pursue other funding options outside of the General Fund.

In order to implement Policy #2 the following work tasks are recommended:

- 2a. The Property Management Division and the Park Services Division will develop a work plan for the sale of surplus properties and the purchase of natural area sites. This work plan will include a process to evaluate natural area values on land which may be sold.
- 2b. The Park Services Division will determine methods by which new revenue can be generated and resources leveraged after reviewing existing roles, responsibilities and budget resources.

Policy #3 Management

Once acquired, natural areas will need clear, concise management plans to guide current and future administration.

Without a management plan, well intentioned improvements can quickly become threats to the integrity of the resources which acquisition was intended to protect. Too many trails, roads, parking lots, etc., and the resulting visitation can quickly erode a site's value. The type and level of public use should be determined with the appropriate expertise and public participation.

To measure the impact of outside influences and public use, an information base of a site's air and water quality, soil condition, botanical and wildlife components should be developed and regularly updated. Resource monitoring is essential to maintain the integrity of the site and the public's investments.

In addition to a specific management plan for each site, appropriate maintenance techniques should be identified to guide park staff. Maintenance of a natural area will require, for example, education in areas such as Integrated Pest Management, and the identification and removal of exotic plant species. Appropriate maintenance techniques shall be incorporated into the Division Maintenance Standards and Baseline Maintenance Schedule documents.

In order to implement Policy #3 the following work tasks should be initiated:

Task 3a. The Park Services Division shall establish indicators by which site quality can be monitored.

3b. The Park Services Division shall develop a work plan for the gathering of historical, current and future base information for all county-owned natural areas.

3c. The Park Services Division shall develop a management manual or incorporate into existing manuals appropriate techniques for the maintenance of natural areas.

Policy #4 Public Involvement

Historically the Park Services Division has encouraged and solicited public involvement not only for planning and policy guidance but also for the donation of individual skills and services.

Participating in the Environmental Education program, leading salmon walks, serving on the Park Advisory Committee or the Blue Lake Task Force, or providing labor for maintenance and conservation projects are all examples of citizen involvement with Multnomah County park programs.

As part of this plan, the public was encouraged to become involved by nominating natural area sites worthy of consideration for protection. In all, 20 sites were nominated. This nomination process will occur annually to help communicate to the County, a site's importance to residents. Public interest is an important factor to consider in ranking sites for acquisition. For long-term stability and protection of a site, public involvement and support is essential. Development of "friends" groups also involves residents effectively.

In order to implement Policy #4 the following work tasks should be initiated:

- Task 4a. The Park Services Division will continue established public involvement procedures.
- 4b. The Park Services Division will continue co-operative efforts with the Metropolitan Greenspaces Program to heighten public awareness regarding natural area values.
- 4c. The office of Citizen Involvement shall develop a work plan to facilitate and encourage the development of "friends" groups.

Policy #5 Education

The long-term success of any program undertaken by a governmental agency depends on public education. Education is a prerequisite to public involvement and the development of a constituency for natural areas.

Taxpayers should be made aware of the resources available for their enjoyment, and the long-term economic value of wise land stewardship.

Education programs can include passive elements such as signage and brochures or active elements such as school programs, living history, nature centers and special events.

To be effective, a multifaceted education program will be required.

In order to implement Policy #5 the following work tasks should be initiated:

- 5a. The Park Services Division will maintain or expand educational efforts within financial constraints.
- 5b. The Park Services Division will develop partnerships with other agencies, non-profit organizations, and volunteers to leverage education resources.

5c. The Park Services Division will identify educational opportunities as part of the management planning process for natural area sites.

Policy #6 Land Use and Development

As the county's land use and development focus continues to shift from urban issues to rural issues, significant natural areas on privately-owned lands that are listed on the Goal 5 inventory must be protected to conserve resource values without preventing reasonable use of the land.

Private land, within identified natural systems, may be integral to maintaining valuable habitats, connecting corridors and their associated values.

Development densities, vegetation management, development setbacks, storm water management, and construction site standards are elements which may affect the quality and viability of natural systems.

Although the Board of County Commissioners is mindful of concerns regarding the rights of property owners, it also recognizes the responsibility of all landowners to develop and manage property in a manner which is consistent with the conservation of "publicly-owned" resources such as fish, wildlife, scenery, air and water.

In order to implement Policy #6 the following work tasks should be initiated:

The Land Use and Development Division will:

- 6a. Evaluate whether lands acquired by the county as natural areas and nearby lands should be considered for protection under Goal 5.
- 6b. Determine if sufficient information exists about the location, quality and quantity of Goal 5 resources on such lands to properly complete the Goal 5 process.
- 6c. Identify the steps necessary to obtain additional information and the estimated costs if insufficient information exists to complete the Goal 5 process.
- 6d. Begin the Goal 5 process where indicated if sufficient information is available to complete the Goal 5 process in accordance with statewide land use planning goals and implementing regulations.

Policy #7 Transportation

Policy #7 also recognizes the need for an integrated approach to natural resource conservation. As new road systems are designed and existing roads reconstructed, potential impacts on natural resources should be assessed and efforts made to avoid or mitigate these impacts.

The proliferation of heavily traveled roads within Multnomah County can contribute to the degradation of natural areas in several ways. Examples include:

- increased storm water run-off.
- barriers to migration - both terrestrial and aquatic species.
- potential contamination of surface water resulting from the use of herbicides.
- sedimentation of streams resulting from road construction projects.
- high "road-kill" rates along seasonal migration routes.

In order to address these concerns and implement Policy #7, the Transportation Division should develop a work plan to:

- 7a. Identify roads within natural area systems in Multnomah County.

- 7b. Develop road design and construction standards which incorporate bio-engineering techniques.
- 7c. Review and evaluate use of herbicides along roads located adjacent to perennial streams.
- 7d. Document locations of chronic unauthorized garbage dumping for clean-up and installation of physical barriers.
- 7e. Develop a storm water management program which meets or exceeds current state and federal standards.
- 7f. Work with Oregon Department of Fish and Wildlife to identify stream crossings which have created migration barriers and schedule corrective measures.
- 7g. Work with Oregon Department of Fish and Wildlife to identify areas with high "road-kill" rates and develop strategies to reduce mortality.

NATURAL AREA SYSTEMS

NATURAL AREA SYSTEMS:

Southwest Hills - Tryon Creek

The Southwest Hills are located in southwest Portland, south of the Balch Creek Watershed and downtown. It is an area characterized by steep forested ravines and drainages. This landscape was once dominated by fir, hemlock, maple, and a few stands of Oregon ash. Many of the once forested tracts have been replaced by residential development, resulting in a highly urbanized area of the city.

Tryon Creek is a 4,477 acre drainage basin with its headwaters at the confluence of Fall Creek near SW 26th and Taylors Ferry and an unnamed creek. The tributaries and mainstem of Tryon Creek flow through narrow canyons primarily forested with deciduous species. Residential development is beginning to encroach on many of the steep narrow drainages that are tributary to Tryon Creek, affecting water quality and wildlife habitat values. However, Tryon Creek still supports a remarkable assemblage of natural vegetation and wildlife. Tryon Creek and its tributaries create linkages to the upland

forests of the Tualatin Mountains. Tryon Creek State Park, located within this drainage, is rather unique for its size and natural qualities, although it is somewhat overshadowed in the Portland area by the much larger Forest Park.

Tualatin Mt. Corridor

The Tualatin Mountains, named by Native Americans, are commonly known as the Northwest Hills. They are a narrow northwest trending, complexly faulted range that rises about 1,000 feet above the City of Portland and Tualatin Basin. The eastern slopes of the Tualatin Mountains are drained by creeks flowing to the Willamette River. Several of these creeks have managed to escape the ravages of urban development and continue to support viable population's of resident and anadromous fish species. Examples of these important remnants include Balch, Miller and McCarty Creeks. The western face of the range slopes more gently to the Tualatin Valley. This mountainous landscape was once dominated with fir, hemlock and maple forests, with a few stands of Oregon ash along streams. Many of the once forested tracts have

been cleared and large tracts of residential development now prevail. Five thousand acre Forest Park, the largest natural park in the Portland/Vancouver Metro area is located within the Tualatin Mountains. The range provides a travel corridor for wildlife between Forest Park, the Tualatin Valley and Coast Range to the west and northwest.

The Fanno Creek Corridor drains the west side of the Tualatin Mountains including Portland, portions of Multnomah County, Beaverton and Tigard. Fanno Creek meanders 14 miles through residential, commercial and industrial lands before entering the Tualatin River. The upper reaches and headwater tributaries of Fanno Creek (to SW Oleson Road), partially within Multnomah County, flow through densely forested and residential areas. There are still scattered wetlands throughout the upper reaches of the creek. Cutthroat trout are known to spawn in the few remaining silt-free gravel beds. The lower stretches of the creek have been seriously degraded due to increased urbanization, residential, commercial and industrial encroachment.

Columbia River Lowlands/Slough/Islands

The Columbia River, the largest river on the Pacific Coast of North America, cuts through the Cascade Mountains on its course westward to the Pacific Ocean. The Columbia River lowlands were once a mosaic of lakes, sloughs, creeks and wetland forests. Within Multnomah County, Smith and Bybee Lakes, Burlington Bottom (and adjacent lands to the north and south), the Columbia Slough and parts of Sauvie Island are remnants of this historic landscape. Columbia River dams, levee systems and industrial, commercial and agriculture development have contributed to the decline of this historic wetland landscape. Bald eagles, yellow-billed cuckoos, western pond turtles, red-legged frogs, wapato and Columbia cress, formerly common plant and animal inhabitants of the Columbia River system, are currently rare at best.

From its headwaters at Fairview Lake, the Columbia Slough flows west through agricultural, industrial and airport properties, 21 miles to its confluence with the Willamette River at Kelly Point Park. Formerly an active floodplain, lands surrounding the Slough have been diked, drained and filled leading to their utilization for agricultural and industrial purposes.

These alterations have transformed a system of braided channels, wetland and riparian areas into a single channel plagued with water quality problems associated with storm water run-off, sewage discharges and nearby land uses.

Despite its problems, the Columbia Slough continues to provide the important function of linking remnants of this once vast complex.

Blue Lake and the various Columbia River Islands (i.e., Government, McGuire, Gary, Flagg Islands, Hayden, etc.) are included in this Natural Area System.

Willamette River

The Willamette River weaves its way through the Willamette Valley from its headwaters in both the Cascades and Coast Ranges south of Eugene to its confluence with the Columbia River at Kelly Point Park. Once a mosaic of braided channels, lakes, sloughs, creeks and wetland forests, the Willamette has been altered by intensive dredging, filling and development along its banks. Within Multnomah County, the shores of the Willamette are predominated by industrial, commercial and residential uses including downtown Portland.

Elk Rock Island, Ross and Toe Islands, Oaks Bottom Wildlife Refuge, Kelly Point Park and portions of Sauvie Island are examples of natural areas remaining along the river. Today, place names on a map of the city describe rich wetland and riparian areas once prevalent. These names are poetic reminders of a time when Swan Island actually was an island, Mock's Bottom--a productive wetland system and Guild's Lake--a 50-acre pond.

Fairview Lake and Creek

Fairview Creek originates in a highly urbanized portion of Gresham, and flows north passing through areas characterized by urban development. After passing under Interstate 84 at Fairview, the creek flows briefly through agricultural lands and then into Fairview Lake. The entire Fairview Creek watershed is located within the Urban Growth Boundary. This stream is characterized by a patchwork of healthy native riparian vegetation, urban development, agricultural uses (to the edge of the creek) and underground culverted portions. Fairview Lake, the headwaters of the Columbia Slough was formerly an emergent wetland that has been dredged to enhance storm water retention. Fairview Creek and Lake links the forested buttes in Gresham with the Columbia Slough and the Columbia River.

Multnomah Channel/Sauvie Island

Multnomah Channel/Sauvie Island are located in northwest Multnomah County near the confluence of the Willamette and Columbia Rivers. The area is a remnant of a once vast system of braided channels, wetlands and riparian areas along the Willamette and Columbia Rivers. The combination of wetland forests, upland forests, emergent wetlands, open water and agricultural areas contribute to great biodiversity. This area provides habitat for tundra swan, bald eagle, western pond turtle, yellow-billed cuckoo, red-legged frog, Columbia White-Tailed Deer and several rare plant species.

Sandy River

The Sandy River rises on the west side of Mt. Hood at the Reid and Sandy glaciers and flows northwest to its confluence with the Columbia River. The Sandy River is notable for its oxbows, timber growth down to the waterline, native salmon and steelhead populations and recreation opportunities. Early surveyors described the Sandy drainage as a township containing a large amount of fine farming lands and some excellent fir and cedar timber. Today, the general health and vitality of the Sandy's aquatic and adjacent riparian and

upland habitats are good to excellent. The Sandy River is an important corridor connecting the Cascade Forests with the Columbia River while providing important habitat for a myriad of wildlife including elk, bear, deer, coyote, beaver, osprey and bald eagle. The segment of the Sandy located between Dodge and Dabney Parks is included in both the State Scenic Waterway Program and National Wild and Scenic River System. The lower six miles is included in the Columbia Gorge National Scenic Area.

Salmon and Steelhead utilize the Sandy and its tributaries for spawning and rearing purposes. A variety of resident fish species are also found throughout the basin.

Several tributaries (Gordon Creek, Buck Creek, Trout Creek and Big Creek) flow into the Sandy near Oxbow Park from the northeast. These streams are considered to be some of the healthiest in the Metropolitan region.

Beaver and Kelly Creeks flow northeast into the Sandy near Lewis and Clark State Park. The latter originates near Pleasant Home and flows into Beaver Creek near Mt. Hood Community College. Much of the area surrounding Kelly

Creek is currently being developed for residential uses. Agricultural uses are common in the upper reaches of Beaver Creek while residential uses predominate within Troutdale city limits. These land uses have degraded the value of these two riparian systems as well as water quality, quantity and associated fish production potential. Nonetheless, Beaver and Kelly Creeks continue to provide riparian corridor habitat for a variety of birds, deer, and small mammals.

Columbia River Gorge

The Columbia River Gorge National Scenic Area extends 80 miles along the Columbia River, from the Sandy River east to the Deschutes River. The diverse and unique features and formations within the Gorge are a result of cataclysmic floods, volcanic action and landslides. A combination of moss covered basalt cliffs, lush temperate rain forest and waterfalls characterize the portions of the scenic area within Multnomah County. The National Scenic Area is jointly managed by the U.S. Forest Service and Columbia Gorge Commission. A Comprehensive Management Plan was adopted by the Gorge Commission in late 1991.

Larch Mountain

At 4,056 feet, Larch Mountain is the highest point in Multnomah County. Much of Larch Mountain is located within the Mt. Hood National Forest where streams rise and flow north to form the Columbia Gorge waterfalls or southwest into the Sandy River. These streams provide important habitat for resident and anadromous fish species.

Larch Mountain's elevation makes it the only place in the County where Pacific Silver and Noble Fir grow. The forests of Larch Mountain are habitat for a variety of large mammals including elk, deer, cougar and bobcat while providing a scenic backdrop to the urbanized lowlands.

Boring Lava Hills

The Boring Lava Hills, located in southern Multnomah and eastern Clackamas Counties, are of the Kelso Slope geologic formation and are characterized by clay soils and steep slopes. The hills form a forested mosaic resulting from logging practices, agriculture and residential development. The forested area are dominated by mixed conifer and deciduous species (Douglas fir, red alder, and big leaf maple). The Boring Lava Hills are linked to many of the forested buttes by the Johnson Creek Corridor.

Volcanic Buttes

East of the Willamette, the nearly flat terrain which rolls gently upward toward the foothills of the Cascades is broken by numerous forested, volcanic buttes. The volcanic buttes begin at Mt. Tabor and extend east and include Rocky Butte, Powell Butte, Gresham Butte, Gabbert Hill, Towle Butte, Butler Ridge, Jenne Butte, Grant Butte, and Hogan Butte. Historically, the buttes were heavily timbered with fir, cedar, hemlock and maple. Hillsides that were once covered by predominantly coniferous forest are now characterized by mixed forests--a successional stage of regrowth associated with forest practices. Some volcanic buttes are subject to increasing residential development pressures.

These major topographic features provide relatively large blocks of upland forest habitat which are loosely connected by riparian corridors such as Johnson Creek. The volcanic buttes also provide scenic overlooks and backdrops throughout urbanized East Multnomah County.

Johnson Creek and Tributaries/Beggars Tick Marsh

Johnson Creek is a tributary of the Willamette River originating west of the Sandy River near Orient. Flowing approximately 18 miles west through the City of Gresham, unincorporated East Multnomah County, Portland, and unincorporated North Clackamas County, Johnson Creek enters the Willamette River in the City of Milwaukie. The Johnson Creek Corridor is a mosaic of natural areas interspersed with large areas which have been developed to various intensities, integrated with the water course which provides food, shelter, breeding and rearing areas for aquatic and terrestrial wildlife. Agricultural and residential uses characterize the Creek from the headwaters to SE 92nd Avenue. West from this point, predominant land uses include: residential, industrial and commercial development. Land uses throughout the watershed have impacted water quality and quantity. Subsequently, the productivity of this urban stream has been significantly compromised. Johnson Creek is an important wildlife corridor connecting various volcanic buttes and

wetland areas with the Willamette River. It is one of the few remaining free-flowing creeks of its size in the Metropolitan Area. The less disturbed stretches of the creek are characterized by western red cedar, red alder, cottonwood and willow riparian forests. Beggars Tick Wildlife Refuge, located within the Johnson Creek watershed, is a 20+ acre wetland complex situated near SE 111th and Foster Road.

SITE EVALUATION CRITERIA

Natural Area Site Evaluation Form:

In addition to a biological survey (see page _____) all sites considered for acquisition will be reviewed based on the items listed in this form. The criteria in this form is a mixture of objective and subjective observations on the part of the field inspector. This information will be used to narrow down properties targeted for acquisition. A copy of the form is on page 44.

The topics evaluated are:

Rare or Unique Plants, Plant Communities or animals:

Are there any rare species on the site?

Does the site provide habitat or a food sources for a rare species in the general area?

Are the above questions relevant to any species that is unique to the urban area?

Connectivity:

Does the site provide a linkage to other natural areas?

Is the site important in preserving a terrestrial or aquatic migration corridor?

Does the site provide habitat in the life cycle of a species, i.e., nesting area for birds, winter range, etc.

Is the site hydrologically important to adjacent streams or wetlands?

Biodiversity:

How many habitat types are represented on the site?

Are the habitat types sufficient in size to support a variety of species.

Historic Losses:

Is the site representative of a vegetative community that is threatened or in short supply in the region?

Expansion to a protected natural area:

What protected natural area is the site related to?

Will the site help expand or buffer the protected natural area?

Will protection of this site increase the protected site's biodiversity or connectivity?

Resource degradation:

Does the site show evidence of anything that could prove a management problem?

For instance is there illegal dumping, off-road vehicle use, evidence of hazardous waste, or poaching activity?

How serious is this problem?

Developments Potential:

What types of development, if any, can take place without jeopardizing the resource?

Does the whole site need to be acquired?

What kind of development would be compatible with the resource?

**MULTNOMAH COUNTY NATURAL AREA PROTECTION AND
MANAGEMENT PROGRAM**

SITE EVALUATION FORM

Site Name:

Natural Area System:

Site Location; streets, tax lots:

Site Size:

Numbers of Applicable Polygons:

One paragraph overall description of site:

Rare plants or animals yes or no
Description:

Connectivity yes or no
Description:

Biodiversity yes or no
Description:

Site Evaluation Form
Page 2

Historic losses yes or no
Description:

Area Deficient in Natural Areas yes or no
Description:

Expansion to Existing Natural Area yes or no (polygon numbers)
Description:

Preliminary Assessment of Resource Degradation:

Development Potential: (What types of development, if any, can take place on the site without conflicting resource.)

Recommendation for Acquisition yes or no
Rationale:

Info. Source Code _____ Site Code _____

Date this form filled out: _____

NATURAL AREA INFORMATION DATABASE

The items on the left side of the page are coded into the master database which will eventually go into Metro's arcinfo system for their Natural Area inventory. A number of other data files containing species occurrence information for plants and animals will also be generated. For details, see the attached appendices.

____ (1-4) Site Number (from workshop)

____ (5-7) Information Source Code ____ W - workshop, F-field trip, O - other including subsequent professional field surveys, S - field ABC survey by Natural Area Inventory (NAI) staff, H - historical survey

____ (8-17) Investigator's Name(s) _____

____ (18-23) Date of field survey of site _____ MM/DD/YY
MMDDYY

____ (24-27) Time of field survey ____ : ____ to ____ : ____ HH:MM, use 24-hour
0000

Date(s) of other visit(s) _____
_____ MM/DD/YY

____ (28-30) Total hrs on site, should be cumulative total as additional
000 time is spent there.

Purpose of visit _____ for other
and workshop data

____ (31-36) Site Number 0:00:000 County:City:Number
000000 County: 1-Clackamas, 2-Clark, 3-Multnomah, 4-Washington
Cities: 1-Beaverton, 2-Camas, 3-Cornelius, 4-Durham, 5-Fairview,
6-Forest Grove, 7-Gladstone, 8-Gresham, 9-Happy Valley, 10-
Hillsboro, 11-Johnson City, 12-King City, 13-Lake Oswego, 14-
Milwaukie, 15-Oregon City, 16-Portland, 17-Rivergrove, 18-Sherwood,
19-Maywood Park, 20-Tigard, 21-Tualatin, 22-Troutdale, 23-
Vancouver, 24-Washougal, 25-West Linn, 26-Wilsonville, 27-Wood
Village.

Site Number: 1-999

Subbasin _____ Use State Water Resources or ODFW codes
River mile _____
Site name _____ (words)

Info. Source Code _____ Site Code 09

_____ (37-48) Site coordinates _____ (gis
000000000000 coordinates)

_____ (49-51) Land Classification Code _____ 3-letter code, same as used
AAA in NY City study (Cornell Laboratory for Environmental
Applications of Remote Sensing, undated).

_____ (52-57) Cover type code from aerial photo _____ : upland or
AAA00A wetland, veg code, density, percent deciduous, riparian

(52) Upland or wetland: U-upland, W-wetland; based on National
Wetland Inventory maps or other wetland inventories

(53) Veg code: F-forest (dominated by trees), S-shrub-scrub
(dominated by shrubs, few or no trees present), M-meadow,
grassland, or emergent (dominated by herbaceous
vegetation, few or no trees or shrubs present), B-bare
ground (little or no vegetation present), R-rock outcrop,
W-water body (these are self-explanatory)

(54) Veg density:

C-closed, crowns mostly touching or open by less than 1/4
crown diameter

O-open, crowns mostly not touching, separated by 1/4 to
1 1/2 crown diameter

S-savannah like, scattered crowns separated by more than
1 1/2 crown diameter

(55-56) Percent deciduous species, estimated visually and
recorded as increments of 10%: e.g., 0,10,20,...90,99.
Ninety-nine percent is used to represent 100% to save
space in the database. This variable relates only to
woody vegetation classes (forest and shrub-scrub).

(57) Riparian or adjacent to water body. If this is the case,
an R is added as the last letter of the code.

— (58) Site Character: _____ 1-natural, 2-developed/disturbed, 3-agri-
cultural

Trees: (Information to TREES file, place 1 for each species
present)

— (59-60) Number of tree species identified _____
Dominant species (most abundant species whose percent cover
collectively reaches 50% or more, plus any other species
comprising 20% cover or more [as defined in Wetland
Training Institute 1989]): _____

Listed as 4-letter species codes given in Garrison and
Skovlin (1976, first two or three letters of genus
and species)

Place a mark in the square containing all species
observed on the TREES sheet, attached.

— (61) Rare/Unique species: _____
Y for yes _____ list codes, drawn from

Info. Source Code _____ Site Code _____

above lists

- (62) Does this forest have old-growth elements (big native trees > 36" dbh, usually more than one) present? ___ y/n
Approx. forest height in ft _____

Shrubs: (woody vegetation 3-15 ft tall) This will need to be filled in for all forest and shrub sites, plus any other types which have shrubs present.

- (63) Shrub density:
C-closed, crowns mostly touching or open by less than 1/4 crown diameter
O-open, crowns mostly not touching, separated by 1/4 to 1 1/2 crown diameter
S-savannah like, scattered crowns separated by more than 1 1/2 crown diameter

- (64-65) Percent deciduous species, estimated visually and recorded as increments of 10%: e.g., 0,10,20,...90,99. Ninety-nine percent is used to represent 100% to save space in the database.

- (66-67) Number of shrub species identified _____

Dominant shrub species. This information is placed in the SHRUBS file, where 1 is placed by each species present. Dominants are defined as the most abundant species whose percent cover collectively reaches 50% or more, plus any other species comprising 20% cover [as defined in Wetland Training Institute 1989]: _____

_____ Listed as 4- or 5-letter species codes given in Garrison and Skovlin (1976, first two or three letters of genus and species)

Other species: _____

_____ list codes, as above

y for yes

- (68) Rare/Unique species: _____
_____ list codes, drawn from above lists

Ground Cover: (herbaceous and small shrub vegetation 0 to 3 ft), this will be filled in for probably almost all sites.

- 00 (69-70) Density of ground cover _____ Estimate of percent of ground covered by vegetation, to nearest 10 percent, 99=100%.
— (71) Mowed or grazed? ___ y=yes, n=no

- 000 (72-74) Number of ground cover species observed _____
Dominant species: Species observed are given 1's in the GROUND file, codes used are as above for trees, shrubs) _____

Other species: (as above) _____

Info. Source Code _____ Site Code _____

- ____ (75) Rare/Unique species: (as above) _____
y for yes _____
____ (76-77) Percent bare ground: _____ (to nearest 10 percent)
____ (78-79) Percent rock outcrop: _____ (to nearest 10 percent)
[NOTE: percent veg. cover, bare ground, rock outcrop should total 100%]

Community Type: _____ listed by
abbreviations of dominant species
Comments on Apparent History of Site: _____

Plant Interest:

- ____ (80) Bryophytes ____ y - yes, n - maybe
____ (81) Lichens ____ y - yes, n - maybe

Wetlands:

- ____ (82-85) Wetland Classification of Site: _____ 3- or 4-letter
code, from National Wetland Inventory USGS Quadrangle Maps

POW - Palustrine open water
PEM - Palustrine emergent
PSM - Palustrine emergent/shrub-scrub
PSS - Palustrine shrub-scrub
PFO - Palustrine forested
LOW - Lacustrine open water
ROW - Riverine open water
REM - Riverine emergent
RRB - Riverine rock bottom
RUB - Riverine unconsolidated bottom
RAB - Riverine aquatic bed
RFL - Riverine flat
RSB - Riverine stream bed
RRS - Riverine rocky shore
RBB - Riverine beach bar

- ____ (86) Springs present? ____ y=yes, n=no
____ (87) Storm drainage sources present? ____ y=yes, n=no
____ (88) Other sources of pollution? ____ y=yes, n=no
comments _____
____ (89) Water ____ 1-stagnant, 2-seasonally flushed or inundated for
standing water areas, 3-flowing
____ (90) Water appearance ____ 1-clear, 2-scummy, 3-foamy,
4-muddy, 5-milky, 6-oily sheen, 7-green,
8-other
____ (91) Stream bottom color ____ 1-none, 2-yellowish, 3-orange to
red, 4-brown, 5-black, 6-green, 7-other
____ (92) Water odor ____ 1-none, 2-rotten egg, 3-musky, 4-
acid, 5-chlorine, 6-other
____ (93-94) Estimated water depth ____ in ft. (use decimals if < 1 ft)
____ (95-96) Stream width ____ ft.

Info. Source Code _____ Site Code _____

- ____ (97) Stream/pond substrate _____ 1-rock, 2-mud, 3-gravel, 4-sand, 5-can't tell, 6-other
- ____ (98) Stream flow _____ 1-fast moving, 2-slow moving, 3-pools
- ____ (99) Stream cover _____ At time of leaf-on:: 1-Fully shaded: at noon, 75-100% of stream is shaded from the sun; 2-partially shaded (50-75% shaded); 3-partially exposed (25-50% shaded); 4-fully exposed (0-25% shaded)
- ____ (100) Stream channel alterations _____ 1-none, banks appear natural, 2-dredged or ditched, 3-wall/bulkhead, 4-riprap, 5-culverts, 5-stream is in underground pipe, 6-other
- ____ (101) Structures or barriers in the stream _____ 1-dams, 2-bridges, 3-islands, 4-waterfalls, 5-rapids, 6-debris jams, 7-other
Paper & small trash litter in representative 100-ft stretch of stream _____ 1: 0-5, 2: 5-10, 3: 10-50, 4: over 50
Cans and bottles litter in representative 100-ft stretch of stream _____ 1: 0-5, 2: 5-10, 3: 10-50, 4: over 50
Large items litter in representative 100-ft stretch of stream _____ 1: 0-5, 2: 5-10, 3: 10-50, 4: over 50
Hazardous waste litter in representative 100-ft stretch of stream _____ 1: 0-5, 2: 5-10, 3: 10-50, 4: over 50
Yard debris litter in representative 100-ft stretch of stream _____ 1: 0-5, 2: 5-10, 3: 10-50, 4: over 50
- ____ (102) Undercut banks _____ y-yes, n-no
- ____ (103) Large organic debris _____ 1-log piles, 2-tree roots, 3-logs or stumps, 4-other
- ____ (104) Rocks _____ 1-rock ledges, 2-gravel deposits, 3-large boulders, 4-small boulders
- ____ (105) Bank erosion severity: N - none, M - moderate, S -severe
- ____ (106) Bank erosion distribution: L - local, W - widespread
- Adjacent Corridors:
- ____ (107) Number of adjacent corridors _____
- ____ (108) Presence of game or people trails? _____ y-yes, n-no
Other comments on quality, etc. of corridors _____
-

Generalized Adjacent Land Uses:

List types, using the NYC inventory 3-letter codes (see Appendices)

Comments _____

Water Uses:

Circle appropriate known uses:

1-recreation, 2-swimming, 3-fishing, 4-drinking water, 5-industrial water, 6-irrigation, 7-livestock, 8-other
_____ describe other uses

Sources of Wastewater:

Are there pipes emptying into the stream? _____ yes/no

Source of pipes _____ 1-industry, 2-farm lots, 3-streets 4-roadside ditches, 5-unknown, 6-other

Info. Source Code _____ Site Code _____

Potential Problems:

Circle problems: 1-overflowing manholes, 2-water running into manholes, 3-fish kills, 4-construction activities, 5-trucks with hoses down manholes or other evidence of illegal dumping, 6-illegal fill of wetlands, 7-possible illegal fills (need to check with DSL to see whether permits were obtained), 8-other (describe)

Wildlife Species Observed: use 4- or 5-letter codes given in Brown (1985), write out insect species names

Insects: species observed are given 1's in the INSECTS file.

___ (109-111) Number of Species observed: ___
- (112) Insect Interest: ___ y - yes, m - maybe, blank - no
Species observed: _____
Rare/unique species: _____

Macroinvertebrates: MACROINV file.

___ (113-115) Number of Species observed: ___
- (116) Macroinvertebrate Interest: ___ as in insects
Species observed: _____
Rare/unique species: _____

Fish: FISH file.

___ (117-118) Number of species observed: ___
- (119) Fish Interest: ___ as in insects
Species observed: _____
Rare/unique species: _____

Reptiles: REPTILE file.

___ (120-121) Number of species observed: ___
- (122) Reptile Interest: ___ as above
Species observed: _____
Rare/unique species: _____

Amphibians: AMPHIB file.

___ (123-124) Number of species observed: ___
- (125) Amphibian Interest: ___ as above
Species observed: _____
Rare/unique species: _____

Info. Source Code _____ Site Code _____

Birds: BIRDS and BRDBR file.

____ (126-128) Number of species observed: _____

____ (129) Bird Interest: _____ as above

Breeding bird survey results in BRDBR file. List species codes and number of each observed during the 8-minute count period (after Reynolds et al. 1982) to gather information on relative abundance, numbers placed by species in the BRDBR file.

Additional species observed during rest of field visit or during other observations. In the case of woodpeckers and other species leaving signs rather than being actually observed, use the species code followed by S-seen, H-heard, O-old sign, N-new sign, B-nest, R-remains Example: pileated woodpecker new sign observed would be coded as drpin. These species are recorded in the BIRDS file as 1's by species occurring.

Rare or unique species

Mammals: Additional information goes into the MAMMAL file, where species known to occur are indicated with a 1 by the species name.

____ (130-131) Number of species observed: _____

____ (132) Mammal Interest : _____ as above

Species observed on standard transect of variable length and width walked through the site. Length and width will be determined by size and layout of site and visibility through the vegetation. List species, number of animals when actually observed, leave number blank for recognizable signs. Observation type: S-seen, H-heard, D-droppings, T-tracks, B-burrows, M-gopher/mole dirt mounds, R-remains, etc. Code species abbreviation and observation type as for birds.

Example: coyote tracks coded as calat

Other species observed elsewhere during survey

Rare/unique species

Info. Source Code _____ Site Code _____

Fish and Wildlife Habitat Features -- list presence of:

- ___ (133) Snags _____ (defined as dead trees 6 inches or larger dbh, classed as 4-abundant, 3-common, 2-uncommon, 1-rare, 0-none)
- ___ (134-136) Number of snags observed from bird point survey site _____
- ___ (137-139) Radius to which snags can be accurately censused _____ in yds
- ___ (140) Dead/down wood _____ as above for snags
- ___ (141) Rocks _____ as above
- ___ (142) Cover type _____ 2-year round, 1-seasonal, 0-none
- ___ (143) Obvious barriers present? _____ y=yes, n=no
- Barriers to:
- Insects _____ y=yes, n=no
- Fish _____ y=yes, n=no
- Reptiles _____ y=yes, n=no
- Amphibians _____ y=yes, n=no
- Birds _____ y=yes, n=no
- Mammals _____ y=yes, n=no
- Describe barriers _____
-
- ___ (144) Fish habitat variable (Fishman will provide)
- ___ (145) Fish habitat variable (Fishman will provide)
- Evidence of human use?
- ___ (146) Informal trails _____ y/n
- ___ (147) Formal trails _____ y/n
- ___ (148) Debris/trash _____ 2-lots, 1-some, 0-none
- ___ (149) Camps _____ y/n
- Other indications/comments _____
-
- ___ (150) Special/Unique Features _____ y=yes, n=no
- Describe these features _____
-
- ___ (151) Natural Heritage Database Information - whether species of concern are listed by the database: y=yes, n=no.
- list species (use codes as described above) and year of last observation
-
-

Blue Currant
Ribes brachycosum
 Red Currant
Ribes sanguineum
 Sticky Currant
Ribes viscosissimum
HYDRANGEA (Hydrangeaceae)
 Mockorange
Philadelphus lewisii
ROSE (Rosaceae)
 Western Serviceberry
Amelanchier alnifolia
 Goatsbeard
Aucuba sylvestris
 Bick Hawthorn (wetland form)
C. douglasii variety *douglasii*
 Black Hawthorn (upland form)
C. douglasii variety *suksdorfii*
 Wood Strawberry
Fragaria vesca
 Broadpetal Strawberry
Fragaria virginiana
 Oregon Avens
Geum macrophyllum
 Ocean-spray
Holodiscus discolor
 Indian Plum
Osmorhiza cerasiformis
 Pacific Ninebark
Physocarpus capitatus
 Sticky Cinqufoil
Potentilla glandulosa
 Norwegian Cinqufoil
Potentilla norvegica
 Marsh Cinqufoil
Potentilla palustris
 Common Chokecherry
Prunus virginiana
 Bitter Chokecherry
Prunus emarginata
 Cultivated Plum
Prunus domestica
 Cultivated Pear
Pyrus communis
 Cultivated Apple
Pyrus malus
 Western Crabapple
Pyrus fusca
 Bakship Rose
Rosa gymnocarpa
 Noodka Rose
Rosa nutkana
 Evergreen Blackberry
Rubus laciniatus
 Trailing Blackberry
Rubus ursinus
 Blackcap
Rubus leucodermis
 Thimbleberry
Rubus parviflorus
 Freckle-faced Bramble
Rubus pedatus
 Salmonberry
Rubus spectabilis
 Himalayan Blackberry
Rubus discolor
 Annual Burned
Sanguisorba occidentalis
 Side Mountain-ash
Sorbus sitchensis
 Douglas's Spice
Spicea douglasii
PEA (Leguminosae)
 Scotch Broom
Cytisus scoparius
 Everlasting Pea-vine
Lathyrus latifolius
 Hairy vetchling
Lathyrus hirsutus
 Grass Pea-vine
Lathyrus sphaericus
 Small-flowered Deer-vetch
Lotus micranthus
 Meadow Lotus
Lotus densiculatus
 Field Lupine
Lupinus micranthus
 Two-color Lupine
Lupinus bicolor
 Spurred Lupine
Lupinus hispidus
 Sulfur Lupine
Lupinus albus
 Broadleaf Lupine
Lupinus latifolius
 Large-leaved Lupine
Lupinus polyphyllus
 Alkali
Medicago sativa
 White Sweet-clover
Medicago alba
 Hare's Foot
Trifolium arvense
 Suckling Clover
Trifolium dubium
 Red Clover
Trifolium pratense
 Hop Clover

Tenegrass
Vicia cracca
 American Vetch
Vicia americana
 Hairy Vetch
Vicia hirsuta
 Winter Vetch
Vicia villosa
 Stender-Vetch
Vicia tetrasperma
 Common Vetch
Vicia sativa
GERANIUM (Geraniaceae)
 Stork's-bill
Erodium cicutarium
 Carolina Geranium
Geranium carolinianum
 Cut-leaf Geranium
Geranium dissectum
 Dove-foot Geranium
Geranium molle
 Small-flowered Crane's-bill
Geranium pusillum
WOOD-SORREL (Oxalidaceae)
 Creeping Yellow Wood-sorrel
Oxalis corniculata
 Western Yellow Oxalis
Oxalis suksdorfii
 Oregon Oxalis
Oxalis oregana
 Trillium-leaved Wood-sorrel
Oxalis trillifolia
SPURGE (Euphorbiaceae)
 Penny Spurge
Euphorbia pepus
WATER-STARWORT (Callitrichaceae)
 Oil-leaf Water-starwort
Callitriche heterophylla
SUMAC (Anacardiaceae)
 Poison Oak
Rhus diversiloba
STAFF-TREE (Celastraceae)
 Western Wahoo
Euonymus occidentalis
MAPLE (Aceraceae)
 Vine Maple
Acer circinatum
 Big-leaf Maple
Acer macrophyllum
BUCKTHORN (Rhamnaceae)
 Cascara
Rhamnus purshiana
 Oregon tea-tree
Ceanothus sanguineus
MALLOW (Malvaceae)
 Dwarf Mallow
Malva neglecta
 Meadow Sidalcea
Sidalcea campestris
ST. JOHN'S-WORT (Hypericaceae)
 Common St. John's-wort
Hypericum perforatum
WATERWORT (Elatinaceae)
 Bergia
Bergia texana
 Three-stamen waterwort
Elatine triandra
VIOLET (Violaceae)
 Early Blue Violet
Viola adunca
 Pansy
Viola arvensis
 Marsh Violet
Viola palustris
 Stream Violet
Viola glabella
 Evergreen Violet
Viola sempervirens
EVENING-PRIMROSE (Onagraceae)
 Enchanter's Nightshade
Circaea alpina
 Fireweed
Epilobium angustifolium
 Wilson's Willow-weed
Epilobium watsonii
 Common Willow-weed
Epilobium glandulosum
 Red-veined Evening-primrose
Oenothera erythrocephala
WATER-MILFOIL (Haloragaceae)
 Water-milfoil
Myriophyllum species
MARE'S-TAIL (Hippuridaceae)
 Common Mare's-tail
Hippurus vulgaris

PARSLEY (Umbelliferae)
 Sharp-tooth Angelica
Angelica arguta
 Poison-hemlock
Conium maculatum
 Queen Ann's Lace
Oenanthe carota
 Cow-parsnip
Heracleum lanatum
 Parsley-leaved Lovage
Ligusticum apollofium
 Grey's Lovage
Ligusticum grayi
 Common Lomatium
Lomatium utriculatum
 Pacific Water-parsley
Oenanthe sarmentosa
 Mountain Sweet-root
Osmorhiza chilensis
 Pacific Sanicle
Sanicula crassicaulis
DOGWOOD (Cornaceae)
 Western Flowering Dogwood
Comus nuttallii
 Red-osier Dogwood
Comus stolonifera
HEATH (Ericaceae)
 Madrone
Arbutus menziesii
 Salal
Gaultheria shallon
 Indian-pipe
Monotropa uniflora
 Western Rhododendron
Rhododendron macrophyllum
 Western Azalea
Rhododendron occidentale
 Red Huckleberry
Vaccinium parviflorum
 Evergreen Huckleberry
Vaccinium ovatum
PRIMROSE (Primulaceae)
 Pimpernel
Anagallis arvensis
 Fringed Loosestrife
Lysimachia ciliata
 Tufted Loosestrife
Lysimachia thyrsiflora
 Western Starflower
Trientalis latifolia
ASH (Oleaceae)
 Oregon Ash
Fraxinus latifolia
GENTIAN (Gentianaceae)
 Common Contoury
Centaurium umbellatum
 Staff Gentian
Gentiana scabra
 Northern Gentian
Gentiana amarella
BUCK-BEAN (Monyanthaceae)
 Buckbean
Monyanthus trifoliate
DOGBANE (Apocynaceae)
 Spreading Dogbane
Apocynum androsaemifolium
 Periwinkle
Veronica major
MORNING-GLORY (Convolvulaceae)
 Field Morning-glory
Convolvulus arvensis
 Night-blooming Morning-glory
Convolvulus nycotagines
 Lady's-nightcap
Convolvulus seppium
DODDER (Cuscutaceae)
 Common Dodder
Cuscuta epithymum
PHLOX (Polomonaceae)
 Varied-leaf Collomia
Collomia heterophylla
 Large-flowered Collomia
Collomia grandiflora
 Bicolored Linanthus
Linanthus bicolor
 Microsteris
Microsteris gracilis
 Stunkwood
Navaretia squarrosa
WATERLEAF (Hydrophyllaceae)
 Pacific Waterleaf
Hydrophyllum tenuipes
 Small-flowered Nemophila
Nemophila parviflora
 Shady Phacelia
Phacelia nemoralis
BORAGE (Boraginaceae)
 Borage
Borago officinalis
 Common Forget-me-not

Western Bluebells
Mertensia platyphylla
 Common Forget-me-not
Myosotis scorpioides
 Blue Scorpion-grass
Myosotis micrantha
 Yellow @ Blue Forget-me-not
Myosotis discolor
 Fragrant Plagiobotrys
Plagiobotrys figuratus
 Common Comfrey
Symphytum officinale
 Rough Comfrey
Symphytum asperum
VERBENA (Verbenaceae)
 Wild Hyssop
Verbena hastata
MINT (Labiatae)
 Hemp Nettle
Galeopsis tetrahiti
 Ground Ivy
Glechoma hederacea
 Red Henbit
Lamium purpureum
 Horshound
Marrubium vulgare
 Pennyroyal
Mentha pulegium
 Field Mint
Mentha arvensis
 Round-leaved Mint
Mentha rotundifolia
 Spearmint
Mentha spicata
 Peppermint
Mentha piperita
 American Bee-balm
Monarda didyma
 Savory
Satureia douglasii
 Marsh Skullcap
Scutellaria galericulata
 Great Hedge-nettle
Stachys cooleyae
 Mexican Hedge-nettle
Stachys mexicana
 Marsh Betony
Stachys palustris
 Wood Sage
Teucrium canadense
NIGHTSHADE (Solanaceae)
 Blue Bindweed
Solanum dulcamara
 Hairy Nightshade
Solanum sarrachoides
 Garden Nightshade
Solanum nigrum
FIGWORT (Scrophulariaceae)
 Lesser's Snopdragon
Antirrhinum orontium
 Golden-Indian-paintbrush
Castilleja levisecta
 Sm.-flowered Blue-eyed Mary
Collinsia parviflora
 Lg.-flowered Blue-eyed Mary
Collinsia grandiflora
 Foxglove
Digitalis purpurea
 Madwort
Limnolobos aequalis
 Butler And Eggs
Linaria vulgaris
 Yellow Monkey-flower
Mimulus guttatus
 Musk-flower
Mimulus moschatel
 Chickweed Monkey-flower
Mimulus alsinoides
 Hairy Owl-Clover
Orthocarpus hispidus
 Broad-leaved Penstemon
Penstemon oregonus
 California Figwort
Scrophularia californica
 Snow Onion
Synthlipsis rufiformis
 Small-flowered Tonella
Tonella tenella
 Common Mullein
Verbascum thapsus
 Moth Mullein
Verbascum blattaria
 American Brooklime
Veronica americana
 Common Speedwell
Veronica arvensis
 Paul's Betony
Veronica officinalis
 Persian Speedwell
Veronica persica
BLADDERWORT (Lentibulariaceae)
 Common Bladderwort
Utricularia vulgaris
PLANTAIN (Plantaginaceae)
 English Plantain

Compact *Selaginella*
Selaginella densa

HORSETAIL (Equisetaceae)
 Common Horsetail
Equisetum hyemale
 Marsh Horsetail
Equisetum palustre
 Giant Horsetail
Equisetum telmateia

COMMON FERN (Polypodiaceae)
 Northern Maidenhair Fern
Adiantum podatum
 Maidenhair Spicewort
Asplenium trichomanes
 Ladyfern
Athyrium filix-femina
 Deerfern
Blechnum spicant
 Brittle Bladder-fern
Cystopteris fragilis
 Spreading Wood-fern
Dryopteris austriaca
 Licorice-fern
Polypodium glycyrrhiza
 Licorice-fern
Polypodium hesperium
 Anderson's Swortfern
Polystichum andersonii
 Swortfern
Polystichum munium
 Bracken Fern
Pteridium aquilinum
 Wood-fern
Thelypteris nevadensis

WATER-FERN (Salvinaceae)
 Duckweed Fern
Azolla filiculoides

YEW (Taxaceae)
 Yew
Taxus brevifolia

CEDAR (Cupressaceae)
 Western Red Cedar
Thuja plicata

PINE (Pinaceae)
 Grand Fir
Abies grandis
 Lodgepole Pine
Pinus contorta
 Ponderosa Pine
Pinus ponderosa
 Douglas Fir
Pseudotsuga menziesii
 Western Hemlock
Tsuga heterophylla

WATER-PLANTAIN (Alismaceae)
 American Water-plantain
Alisma plantago-aquatica
 Wapato
Sagittaria latifolia

FROG'S-BIT (Hydrocharitaceae)
 American Waterweed
Elodea densa

RUSH (Juncaceae)
 Short-leaved Rush
Juncus brachyphyllus
 Field Woodrush
Luzula campestris
 Smallflowered Woodrush
Luzula parviflora
 Batic Rush
Juncus balticus
 Toad Rush
Juncus bulbosus
 Common Rush
Juncus effusus
 Dagger Leaf Rush
Juncus ensifolius

SEDGE (Cyper)
 Slenderbeaked Sedge
Carex stricta
 Columbia Sedge
Carex acuta
 Dewey's Sedge
Carex doweyana
 Henderson's Wood Sedge
Carex hendersonii
 Pale Sedge
Carex frida
 Slough Sedge
Carex obnupta
 Meadow Sedge
Carex praeicola
 Sawbeak Sedge
Carex stipata
 Inflated Sedge
Carex vesicaria
 Creeping Spikesedge
Eleocharis palustris
 Small-leaved Bulrush
Scirpus microcarpus

GRASS (Gramineae)
 Silver Hairgrass
Aira canadensis

Water-Foodal
Alopecurus geniculatus
 Foodal
Alopecurus pratensis
 Sweet Vernalgrass
Anthriscanthum odoratum
 Tall Oatgrass
Arrhenatherum elatius
 Common Oat
Avena sativa
 Rippgut Brome
Bromus rigidus
 Alaska Brome
Bromus sachsenis
 Chualgrass
Bromus tectorum
 Orchard-grass
Dactylis glomerata
 Hairy Crabgrass
Digitaria sanguinalis
 Large Barnyard-grass
Echinochloa crusgalli
 Ala Fescue
Festuca arundinacea
 Oniongrass
Melica bulbosa
 Old-witch Grass
Panicum capillare
 Reed Canarygrass
Phalaris arundinacea
 Common Timothy
Phleum pratense
 Annual Bluegrass
Poa annua
 Bulbous Bluegrass
Poa bulbosa
 Kentucky Bluegrass
Poa pratensis

CATTAIL (Typhaceae)
 Common Cattail
Typha latifolia

CALLA-LILY (Araceae)
 Stunk Cabbage
Lysichiton americanum

DUCKWEED (Lemnaceae)
 Water Lentil
Lemna minor

LILY (Liliaceae)
 Wild Onion
Allium species
 Slim-leaved Onion
Allium ampelopras
 Howell's Brodiaea
Brodiaea howellii
 Leichlin's Camas
Camassia leichlinii
 Common Camas
Camassia quamash
 Hooker Fairy-bell
Disporum hookeri
 Large-flowered Fairy-bell
Disporum smithii
 Giant Fawn-lily
Erythronium oregonum
 Mission Bells
Fritillaria lanceolata
 Columbia Lily
Lilium columbianum
 Red Lily
Lilium philadelphicum
 Deerberry
Maianthemum dilatatum
 Western False Solomon's Seal
Smilacina racemosa
 Stany False Solomon's Seal
Smilacina stellata
 Oregon Fetid Adder's-tongue
Scelopopus hallii
 Claspng-lyd Twisted-stalk
Streptopus amplexifolius
 Western Trillium
Trillium ovatum
 Giant Trillium
Trillium chloropetalum
 False Hellebore
Veratrum californicum

IRIS (Iridaceae)
 Oregon Iris
Iris tenax
 Yellow Flag
Iris pseudacorus
 Blue-eyed grass
Sisyrinchium angustifolium

ORCHID (Orchidaceae)
 Fairy Slipper
Calypto bulbosa
 Pacific Coral-root
Corallorhiza maculata
 Hooded Coral-root
Corallorhiza striata
 Snow-orchid
Europhyton americanum
 Giant Rattlesnake-plantain
Goodyera oblongifolia
 Heart-leaved Listera
Listera cordata

Cottonwood
Populus trichocarpa
 Columbia River Willow
Salix fluviatilis
 Pacific Willow
Salix lasiantra
 Piper's Willow
Salix piperi
 Scouler Willow
Salix scouleriana
 Soft-leaved Willow
Salix sessilifolia

BIRCH (Betulaceae)
 Red Alder
Alnus rubra
 Hazelnut
Corylus cornuta

BEECH (Fagaceae)
 Garry Oak
Quercus garryana

NETTLE (Urticaceae)
 Stinging Nettle
Urtica dioica

MISTLETOE (Loranthaceae)
 Western Dwarf Mistletoe
Arceuthobium campylopodium
 American Mistletoe
Phoradendron flavescens

SANDALWOOD (Santalaceae)
 Bastard Toad-flax
Comandra umbellata

BIRTHWORT (Aristolochiaceae)
 Wild Ginger
Asarum canadense

BUCKWHEAT (Polygonaceae)
 Doonweed
Polygonum aviculare
 Water Smartweed
Polygonum coccineum
 Common Waterpepper
Polygonum hydropiperoides
 Climbing Bindweed
Polygonum convolvulus
 Red Sorrel
Rumex acetosella
 Curly Dock
Rumex crispus
 Western Dock
Rumex occidentalis

GOOSEFOOT (Chenopodiaceae)
 Lambquarters
Chenopodium album

AMARANTH (Amaranthaceae)
 Green Amaranth
Amaranthus retrofractus

PURSLANE (Portulacaceae)
 Branching Monardella
Monarda diffusa
 Narrow-leaved Monardella
Monarda linearis
 Streambank Springbeauty
Monarda pavlovii
 Siberian Monardella
Monarda sibirica
 Common Purslane
Portulaca oleracea

PINK (Caryophyllaceae)
 Bigleaf Sandwort
Arenaria macrophylla
 Common Chickweed
Cerastium vulgatum
 Grass Pink
Dianthus armeria
 Western Peartwort
Sagina occidentalis
 Starwort
Spergula arvensis
 Crisped Starwort
Stellaria crispata
 Chickweed
Stellaria media

WATER-LILY (Nymphaeaceae)
 Water-child
Brasenia schreberi
 Yellow Water-lily
Nuphar polysepakum
 American Water-lily
Nymphaea odorata

HORNWORT (Ceratophyllaceae)
 Hornwort
Ceratophyllum demersum

BUTTERCUP (Ranunculaceae)
 Barberran
Actaea rubra
 Western White Anemone
Anemone deltoidea
 Lyall's Anemone
Anemone lyallii
 Oregon Anemone

Red Columbine
Aquilegia formosa
 Western Clematis
Clematis ligusticifolia
 Cutleaf Goldthread
Coptis laciniata
 Pale Larkspur
Delphinium leucophaeum
 Menzies' Larkspur
Delphinium menziesii
 Nuttall's Larkspur
Delphinium nuttallii
 Macoun's Buttercup
R. macounii variety oregonum
 Western Buttercup
Ranunculus occidentalis
 Creeping Buttercup
Ranunculus repens
 Little Buttercup
Ranunculus uncinatus
 Western Meadowrue
Thalictrum occidentale
 Buttercup
Ranunculus sardous

BARBERRY (Berberidaceae)
 Vanillaleaf
Achlys triphylla
 Tall Oregongrape
Berberis aquifolium
 Duff Oregongrape
Berberis nervosa
 White inside-out Flower
Vancouveria hexandra

POPPY (Papaveraceae)
 Gold Poppy
Eschscholzia californica

FUMITORY (Fumariaceae)
 Pacific Bloodroot
Dicentra formosa

MUSTARD (Cruciferae)
 Pale Alyssum
Alyssum alyssoides
 Yellow Wintercress
Barbarea vulgaris
 Common Mustard
Brassica campestris
 Wild Mustard
Brassica kaber
 Shepherd's-purse
Capsella bursa-pastoris
 Angled Buttercress
Cardamine angulata
 Little Western Buttercress
Cardamine oligosperma
 Pennsylvania Buttercress
Cardamine pennsylvanica
 Slender Toothwort
Cardamine pulcherrima
 Spring Whitlow-grass
Draba verna
 Prairie Rocket
Erysimum asperum
 Honesty
Lunaria annua
 Wild Radish
Raphanus sativus
 Water-cress
Rorippa nasturtium-aquaticum
 Columbia Cress
Rorippa columbiac

STONECROP (Crassulaceae)
 Lanceleaved Stonecrop
Sedum lanceolatum
 Spittle-leaf Stonecrop
Sedum spathulifolium

SAXIFRAGE (Saxifragaceae)
 Bolandra
Bolandra oregana
 Greater Boykinia
Boykinia major
 Pacific Water-carpel
Chrysozomium glechomaeifolium
 Smallflowered Alumroot
Heuchera micrantha
 Smooth Alumroot
Heuchera glabra
 Leafy Märewort
Mitella caulescens
 Five-stamened Märewort
Mitella portlandia
 Rusty Saxifrage
Saxifraga ferruginea
 Swamp Saxifrage
Saxifraga integrifolia
 Western Saxifrage
Saxifraga occidentalis
 Sullivan's
Sullivantia oregana
 Fingecup
Tellima grandiflorum
 Yellowflower
Tierella trifoliata
 Thousand Mothers
Tolmiea menziesii

CURRENT (Grossulariaceae)
 Western Black Currant

Sweet Woodruff
Asperula odorata
 Clovers
Galium aparine
 Rough Bedstraw
Galium asperum
 Sweet-scented Bedstraw
Galium triflorum
 Small Bedstraw
Galium trididum
 Blue Field-madder
Shorardia arvensis
HONEYSUCKLE (Caprifoliaceae)
 Twinflower
Lonicera borealis
 Trumpet Vine
Lonicera ciliosa
 Black Twinberry
Lonicera involucrata
 Blue Elderberry
Sambucus corymbosa
 Red Elderberry
Sambucus racemosa
 Common Snowberry
Symphoricarpos albus
VALERIAN (Valerianaceae)
 Lamb's Lettuce
Valeriana locusta
TEASEL (Dipsacaceae)
 Teasel
Dipsacus sylvestris
CUCUMBER (Cucurbitaceae)
 Marrow
Marah oreganus
HAREBELL (Campanulaceae)
 Scouter's Bellflower
Campanula scouleri
 Canterbury Bell
Campanula medium
 Howells
Howells aequalis
ASTER (Compositae)
 Yarrow
Achillea millefolium
 Pathfinder
Adenocaulon bicolor
 Large-flowered Agoseris
Agoseris grandiflora
 Peary-everlasting
Anaphalis margaritacea
 Mayweed Chamomile
Anthemis cotula
 Common Burdock
Arctium minus
 Douglas's Sagewort
Artemisia douglasiana
 Columbia River Mugwort
Artemisia ludoviciana
 Common California Aster
Aster chilensis
 White-topped Aster
Aster curtus
 Douglas's Aster
Aster subspicatus
 English Daisy
Bellis perennis
 Water Marigold
Bidens beckii
 Nodding Beggar-tick
Bidens cernua
 Three-lobed Beggar-tick
Bidens tripartita
 Leafy Beggar-tick
Bidens frondosa
 Western Beggar-tick
Bidens vulgata
 Bachelor's Button
Centaurea cyanus
 Brown Knapsack
Centaurea jacea
 Marguerite
Chrysanthemum leucanthemum
 Jucoory
Cichorium intybus
 Canada Thistle
Cirsium arvense
 Common Thistle
Cirsium vulgare
 Torsewood
Coryza canadensis
 Rough Hawkbeard
Crepis solocq
 Smooth Hawkbeard
Crepis capillaris
 Annual Fleabane
Erigeron annuus
 Yellow Daisy
E. decumbens
 Variety decumbens
Hedolphia fleabane
Erigeron philadelphicus
 Fleabane
Galinzoga ciliata
 Large Cudweed
Gnaphalium palustre
 Nutweed
Helenium autumnale

White-flowered Hawkweed
Hieracium albiflorum
 Common Hawkweed
Hieracium vulgatum
 Spotted Cats-ear
Hypochaeris radicata
 Smooth Cats-ear
Hypochaeris glabra
 Prickly Lettuce
Lactuca scariola
 Nippewort
Lapsana communis
 Fall Dandelion
Lactodon autumnalis
 Cluster Tarweed
Madia glomerata
 Chile Tarweed
Madia sativa
 Pineapple Weed
Maticaria matricarioides
 Sweet Coltsfoot
Petasites frigidus
 Tansy Ragwort
Senecio jacobaea
 Common Groundsel
Senecio vulgaris
 Canada Goldenrod
Solidago canadensis
 Prickly Sow-thistle
Sonchus asper
 Common Sow-thistle
Sonchus oleraceus
 Common Tansy
Tanacetum vulgare
 Common Dandelion
Taraxacum officinale
 Meadow Salsify
Tragopogon pratensis
 Oyster Salsify
Tragopogon porrifolius
 Cocklebur
Xanthium strumarium
SALAMANDERS (Amphystomatae)
 Northwest Salamander
Ambystoma gracile
 Long-toed Salamander
Ambystoma macrodactylum
 Pacific Giant Salamander
Dicamptodon ensatus
 Olympic Salamander
Rhyacotriton olympicus
UNGLS SALAMANDERS (Plethodontidae)
 Clouded Salamander
Aneides ferreus
 Oregon Slender Salamander
Batrachoseps wrightii
 Dunn's Salamander
Plethodon dunnii
 Westm Red-backed Salamander
Plethodon vehiculum
 Ensatina
Ensatina eschscholtzi
NEWTs (Salamandridae)
 Rough-skinned Newt
Taricha granulosa
TOADS (Bufonidae)
 Western Toad
Bufo boreas
TREEFROGS (Hylidae)
 Pacific Treefrog
Hyla regilla
TRUE FROGS (Ranidae)
 Red-legged Frog
Rana aurora
 Spotted Frog
Rana pretiosa
 Bullfrog
Rana catesbeiana
TURTLES (Chelydridae)
 Western Pond Turtle
Chelydra mamoreta
 Painted Turtle
Chrysemys picta
 Pond Slider
Pseudemys scripta
IGUANIDS (Iguanidae)
 Western Fence Lizard
Sceloporus occidentalis
ALLIGATOR LIZARDS (Anguillidae)
 Northern Alligator Lizard
Gerrhonotus coarctatus
 Southern Alligator Lizard
Gerrhonotus multicarinatus
SKINKS (Scinidae)
 Western Skink
Eumeces skiltonianus
BOAS (Boidae)

Flax
Cokbor constrictor
 Ringneck Snake
Diadophis punctatus
 Common Garter Snake
Thamnophis sirtalis
 Northwest Garter Snake
Thamnophis ordinoides
 Pacific Gopher Snake
Pituophis melanoleucus
 Garter Snake
Thamnophis
LOONS (Gaviidae)
 Common Loon
Gavia immer
GREBES (Podicipedidae)
 Horned Grebe
Podiceps auritus
 Pied-billed Grebe
Podilymbus podiceps
 Western Grebe
Aechmophorus occidentalis
 Eared Grebe
Podiceps nigricollis
CORMORANTS (Phalacrocoracidae)
 Double-crested Cormorant
Phalacrocorax auritus
HERONS (Ardeidae)
 American Bittern
Botaurus lentiginosus
 Black-crowned Night Heron
Nycticorax nycticorax
 Green-backed Heron
Bulweria striata
 Great Blue Heron
Ardea herodias
 Great Egret
Casmerodius albus
 Sandhill Crane
Grus canadensis
SWANS-GEESE-DUCKS (Anatidae)
 Great White-fronted Goose
Anser albifrons
 Snow Goose
Chen caerulescens
 Canada Goose
Branta canadensis
 Mallard
Anas platyrhynchos
 Gadwall
Anas strepera
 Green-winged Teal
Anas crecca
 American Wigeon
Anas americana
 Eurasian Wigeon
Anas penelope
 Northern Pintail
Anas acuta
 Northern Shoveler
Anas clypeata
 Blue-winged Teal
Anas discors
 Cinnamon Teal
Anas cyanoptera
 Fuddy Duck
Oxyura jamaicensis
 Wood Duck
Aix sponsa
 Canvasback
Aythya valisineria
 Ring-necked Duck
Aythya collaris
 Lesser Scaup
Aythya affinis
 Barrow's Goldeneye
Bucephala islandica
 Common Goldeneye
Bucephala clangula
 Bullhead
Bucephala albeola
 Common Merganser
Mergus merganser
 Red-breasted Merganser
Mergus serrator
 Hooded Merganser
Lophodytes cucullatus
RAILS-COOTs (Rallidae)
 Virginia Rail
Rallus limicola
 Sora Rail
Coturnicops noveboracensis
 American Coot
Fulica americana
 Semipalmated Plover
Charadrius semipalmatus
 Killdeer
Charadrius vociferus
SANDPIPERs (Scolopacidae)
 Greater Yellowlegs
Tringa melanoleuca
 Solitary Sandpiper
Tringa solitaria
 Spotted Sandpiper
Actitis macularia

Long-billed Dowitcher
Limnodromus scolopaceus
 Common Snipe
Gallinago gallinago
 Lesser Yellowlegs
Tringa flavipes
 Dunlin
Calidris alpina
 Western Sandpiper
Calidris melanotos
 Least Sandpiper
Calidris maritima
JAEGERS-GULLS-TERNS (Laridae)
 Bonaparte's Gull
Larus philadelphia
 Ring-billed Gull
Larus delawarensis
 Herring Gull
Larus argentatus
 California Gull
Larus californicus
 Glaucous Gull
Larus hyperboreus
 Western Gull
Larus occidentalis
 Forster's Tern
Sterna forsteri
 Caspian Tern
Sterna caspia
AMERICAN VULTURE (Cathartidae)
 Turkey Vulture
Cathartes aura
HAWKS-EAGLES (Accipitridae)
 Bald Eagle
Haliaeetus leucocephalus
 Northern Harrier
Circus cyaneus
 Sharp-shinned Hawk
Accipiter striatus
 Cooper's Hawk
Accipiter cooperii
 Northern Goshawk
Accipiter gentilis
 Red-tailed Hawk
Buteo jamaicensis
 Swainson's Hawk
Buteo swainsoni
 Rough-legged Hawk
Buteo lagopus
 Osprey
Pandion haliaetus
 Buteo
Accipiter
FALCONS (Falconidae)
 American Kestrel
Falco sparverius
 Merlin
Falco columbarius
 Peregrine Falcon
Falco peregrinus
GROUSE-PTARMIGAN (Phasianidae)
 Ruffed Grouse
Bonasa umbellus
 California Quail
Callipepla californica
 Ring-necked Pheasant
Phasianus colchicus
PIGEONS-DOVES (Columbidae)
 Band-tailed Pigeon
Columba leucostriata
 Rock Dove
Columba livia
 Mourning Dove
Zenaidura macroura
PARROTS (Psittacidae)
 Monk Parakeet
Myiopsitta monachus
OWLS (Tytonidae)
 Barn Owl
Tyto alba
OWLS (Strigidae)
 Short-eared owl
Asio flammeus
 Long-eared Owl
Asio otus
 Great Horned Owl
Bubo virginianus
 Western Screech Owl
Otus kennicottii
 Burrowing Owl
Athene cunicularia
 Northern Pygmy Owl
Glaucidium gnoma
 Northern Saw-whet Owl
Aegolius acadicus
NIGHTJARS (Caprimulgidae)
 Common Nighthawk
Chordeiles minor
HUMMINGBIRDS (Trochilidae)
 Anna's Hummingbird
Calypte anna

HISTORICAL DATA

Historic Distribution of Natural Resources in Multnomah County, Oregon

Prepared by:
Maurita Smyth, Environmental Consultant

September 1991

This report summarizes initial research findings on the historic distribution of natural resources within Multnomah County. The underlying purpose behind this research was to gather basic information on the county's natural resource diversity beginning in the mid 19th century. Locations and extent of natural resource losses would thus be identified, and when compared to current conditions, the information obtained would allow identification of sites for field survey and for possible inclusion in the list of properties to be purchased under the Natural Areas Acquisition Fund.

Methodology: A literature search was conducted of historic documents -- maps, reports, magazine articles, etc. -- from various sources including the Oregon Historical Society (OHS), Bureau of Land Management (BLM), Multnomah County Planning Department, the Oregon Department of Fish and Wildlife (ODFW), and the Natural Heritage Data Base (NHDB). Historic information was not easily retrievable or available for certain time periods specified in the contract. Contract time limitations precluded more in depth research.

As it was gathered historic information was provided to Esther Lev, Environmental Consulting, to compare with current data and to identify sites for field inventory. Copies of significant photos, maps, and a report on the historic distribution of fish species within the county are appended to this report. In addition, other documentation of historic interest to the county was identified for possible future acquisition into county archives.

Findings: In the mid-1800s prior to intensive settlement of the Oregon territory promoted by the Land Donation Claims Act, Multnomah County was extensively timbered by cedar, fir, hemlock, and maple. On the more southerly slopes and along the banks of the Willamette River oak savannahs could be found. Numerous creeks fed the Willamette on the east and west banks. Creeks cut steep ravines through the "high mountainous country" (1868 survey map) meandering their way to the Willamette in the downtown area and sometimes emptying into small lakes. Three fairly large lakes lay at the base of the westhills -- Guilds, Kittredge, and Doanes. The east side of the Willamette lay flatter than the west forming extensive bottomlands perennially wet or inundated during the months of heavy rain. With the exception of the naturally high

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ground of the downtown core area and the steep cliff above Mocks Bottom (now Swan Island), the shorelines of the Willamette were dominated by vast stretches of marshes, sloughs, and creek mouths.

Between the Columbia River and the Columbia Slough, there were numerous lakes and sloughs, creeks and springs that drained to the west from the general area where Portland International Airport and surrounding commercial development are now located. Smith and Bybee lakes are mere remnants of the extensive water bodies and wetlands that dominated this section of the county. Mark Wilson, a consulting horticulturist, has done extensive research into various vegetative habitats in Oregon and especially in the Willamette Valley. His research indicates that Deschampsia wetlands were present in the Columbia bottomlands. This research has not been documented, however, and verification would be necessary prior to any proposed restoration project involving this habitat type.

At its eastern end, the county was described by the early surveyors as "high mountain land. Unfit for cultivation and unsurveyed." The soil was considered 3rd rate. The land was well timbered with fir, cedar, and hemlock with an understory of hazel, vine maple, and briars. This area, now the Mt. Hood National Forest, is partially located within the newly created Columbia Gorge National Scenic Area. The Bull Run watershed was generally described as possessing a quality above "common" with the bottomland along the North Sandy River rich and well adapted to cultivation. It too was well timbered with fir and cedar.

The Sandy River and especially its upper reaches showed many oxbows timbered to the waterline. Undergrowth was thick with vine maple and hazel. Surveyors described the Sandy drainage as follows:

" This fractional Township contains a large amount of fine farming lands and some excellent FIR (sic) and CEDAR (sic) timber. .. It has an abundant supply of fine water power and will support a large settlement."

Today the Sandy River area possesses one of the most natural suburban parks existing in the state -- Oxbow County Park. In addition to the mainstem, there were numerous smaller feeder streams scattered throughout this end of the county emptying into the Sandy and Columbia rivers.

Central county east of the Willamette was also dotted with small lakes and streams. One major drainage likely originating from Rocky Butte was called Sullivan's Gulch. We now refer to this ravine as the I-84 corridor. Further south the major drainage was formed by Johnson Creek which, in addition to Crystal Springs, is one of the last surface flowing streams within the city of Portland draining into the Willamette River. Streams and attendant wetlands

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that dominated most of the county's low elevation areas have been either filled or placed into culverts.

The west hills were logged during the intense settlement era between 1850 and 1900. Forest Park provides protection of the same vegetative species as before development -- dense stands of fir, cedar, hemlock, and maple. Creeks such as Doane and Saltzman, among others, still flow to the Willamette slough but either no longer support native fish populations or have severely reduced fish populations because of poor upstream passage through the large culverts under Highway 30 and the railroad tracks. In 1990 a few coho salmon were discovered above Highway 30 in Miller Creek which flows into the Willamette slough west of Linnton. Balch Creek still retains a small population of native cutthroat trout and flows for most of its length before disappearing down a huge pipe at Lower MacCleay Park. Creeks that ran south of Balch through downtown Portland -- Tanner, Johnson, Enois, and Markham -- were placed in pipes and filled over by the turn of the century.

Wildlife abounded in the county when white settlers came to work the land in exchange for free title. Bear, elk, deer, muskrat, beaver, otter, mink, cougar, bobcat, and gray wolf existed throughout the land. Fish species both anadromous and resident included salmon, steelhead, cutthroat trout, and lamprey. The extensive wetlands supported rich and varied invertebrate populations, including spotted frog, red-legged frog, pond turtle and painted turtle. These species provided food for fish and wildlife. Native amphibians and reptiles have been in decline for many decades. Birds, especially waterfowl, nested or migrated through this area by the millions. The Lewis and Clark journals state that the din produced by waterfowl was so loud people could not sleep. Yellow-billed cuckoos, which inhabited the Columbia River bottomlands, were observed sporadically after 1925. The last individual was seen on July 27, 1940. By 1905, the gray wolf was no longer extant in Multnomah County although it must have been here prior to that time. Records show that the gray wolf inhabited Clark County across the Columbia and all the counties south of Multnomah on the west side of the Cascades. An article from the Oregon Sportsman magazine of 1905 stated that the wolf would probably always be in the upper Clackamas drainage due to the remoteness of the land. Currently the gray wolf is federally and state listed as endangered and considered extirpated within Oregon.

Summary

When white settlement began in earnest in the late 1840s with the passage of the Land Donations Claims Act, Multnomah County was a land of timber, creeks, rivers, and marshes. West of the Willamette River the land was dominated by "high mountains" of fir, cedar, hemlock, and maple with a few stands of Oregon ash. East of the Willamette River, the terrain was generally flatter with rolling hills and buttes heavily timbered in fir, cedar, hemlock,

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and maple. The eastside eventually melds into the Cascade Range foothills with high steep mountainous terrain filled with creeks and rivers and heavily vegetated by the same conifers and deciduous trees as the rest of the county.

Along the Willamette and Columbia rivers, the land areas were dominated by extensive bottomlands and marshes. Creeks abounded along the Willamette and between the Columbia River and its slough, an extensive series of lakes and drainages covered the land. This system supported salmon in the early 1900s. In a few isolated places along the Willamette, near Dunsmuir on the west and Oaks Bottom on the east, stands of Oregon white oak could be found.

Survey maps from 1850, 1905-1913, and the 1930s clearly show the loss of natural diversity. Timber was cut to clear the land for farming and shipping. East of the Willamette creeks and marshes avoided by the early white settlers because they lacked the technology to drain them still were plentiful until the late teens. On the west side in the vicinity of downtown Portland, the creeks and their attendant steep ravines were culverted and covered with up to 100' of fill before late 19th century. The only remaining stretches of wetlands are located at Oaks Bottom along the mainstem Willamette River and at Burlington Bottoms along the Willamette Slough. It is estimated that we have lost more than 95% of the wetlands along the Willamette River in Multnomah County. In the Columbia region, the large number of lakes no longer exists and the many spring fed creeks were put underground as development progressed. Likely 80-85% of the wet areas along the Columbia have been lost. Of the estimated thirty or more large and small creek systems and their attendant marshes identified by the early surveyors, less than a dozen remain in a free flowing or partially free flowing state. These include Johnson Creek, Crystal Springs, the Sandy River and its tributaries, Fanno Creek, Tryon Creek, Balch Creek, and other smaller creeks that flow through city neighborhoods. While a hundred or so years ago these streams supported fish and amphibian populations, many today suffer from channelization and pollution. Still others only flow underground.

Upland habitats have also been lost. Few old growth stands remain. One 20 acre site was "discovered" in the westhills recently. The Sandy River drainage and Oxbow Park provide the most extensive county owned stands of old growth forest. Oak savannah habitat was likely not common along the Willamette. The surveyors did not make note of such stands on their maps, but a few residualized stands remain. It is not possible to determine the extent of loss of this habitat type. Prairies also were likely not common due to the predominantly wet nature of the county. However, two prairies are still noted on county maps, both lying within the boundaries of the Mt. Hood National Forest.

Multnomah County Historic Research

**REPORT ON HISTORIC AND CURRENT FISH POPULATIONS OF STREAMS WITHIN
THE GREATER PORTLAND METROPOLITAN AREA**

This report provides a list of all known fish species, both native and exotic, that inhabit streams within the outer boundaries of what is referred to as the greater Portland metropolitan area. The information contained in this report was gathered mostly through personal communication with various individuals both private and professional including staff biologists from the Oregon Department of Fish and Wildlife (ODFW). There is little or no formal documentation of non-game and non-commercial fish species. The information contained herein is as complete as possible given this situation.

There are currently 100 species of fish within the state of Oregon. Of these, only 32 species are native. Although it is likely that all watercourses in Oregon now contain exotic fish species, urban streams are especially vulnerable to the invasion or introduction of exotics. The sources of these introductions include deliberate planting by the former Fish Commission of Oregon and now by ODFW and the accidental or purposeful release by private parties. In addition, some exotic species have migrated through the Columbia River system from Washington state.

The material in this report is organized by drainage and by geographic location, west or east of the Willamette River which transects the city of Portland. Known and likely historic and current populations are listed for each drainage. In addition, where possible, comments are provided on the current condition of the habitat, noteworthy items on population changes, and the potential for restoration in areas of habitat depletion.

WESTSIDE DRAINAGES

Fanno Creek Drainage

Historic populations: cutthroat trout - Willamette race
(*Oncorhynchus clarki*)
sculpin species - Cottidae spp. likely
includes reticulate sculpin (*Cottus
perplexus*) and others
redside shiner (*Richardsonius balteatus*)
largescale sucker (*Catostomus
macrocheilus*)
western Brook lamprey (*L. richardsoni*)
northern squawfish
(*Ptychocheilus oregonensis*) - in
lower reaches

Fanno Creek contd.

Current populations: Add to the above the following species:

brown bullhead (*Ictalurus nebulosus*)
carp (*Cyprinus carpio*)
crappie (*Pomoxis sp.*),
bluegill (*Lepomus macrochirus*)
largemouth bass (*Micropterus salmoides*)
smallmouth bass (*Micropterus dolomieu*) - possible species
mosquito fish (*Gambusia affinis*)

Last year, 1989, a dead steelhead trout was discovered in the upper reaches of Fanno Creek. There are no official historic or current records that verify a population of steelhead trout in this creek system.

Fanno Creek is fed by many small tributaries that are spring fed. Summer flows are low due to a lack of sustained snow melt. The habitat is severely impacted in places primarily due to siltation from urban residential development. Other areas, mostly in the steeper canyons, are in relatively good shape. Electroshocking to determine current populations and their locations has been limited. ODFW plans to continue to assess fish populations of Fanno Creek.

Rock Creek

Historic populations:

cutthroat trout - Willamette race
resident cutthroat (*Oncorhynchus clarki*)
sculpin species - Cottidae spp. likely
includes reticulate sculpin (*Cottus perplexus*) and others
redside shiner (*Richardsonius balteatus*)
largescale sucker (*Catostomus macrocheilus*)
western brook lamprey (*L. richardsoni*)
northern squawfish
(*Ptychocheilus oregonensis*)

Current populations: add to the above list the following species;

brown bullhead (*Ictalurus nebulosus*)
mosquito fish (*Gambusia affinis*)
carp (*Cyprinus carpio*)
bluegill (*Lepomus macrochirus*)
largemouth bass (*Micropterus salmoides*)
rainbow trout (*Oncorhynchus mykiss*)

Dairy Creek mainstem: Data incomplete. Upper watershed (outside the urban boundary) maintains good habitat and is known to support the following species:

cutthroat trout - Willamette race
(*Oncorhynchus clarki*)
sculpin - Cottidae spp.
western brook lamprey (*Lampetra richardsoni*)
possible rainbow trout (*Oncorhynchus mykiss*)

In the lower end of the creek below Highway 26 it is likely that the following species occur:

northern squawfish (*Ptychocheilus oregonensis*)
largescale sucker (*Catostomus macrocheilus*)
redside shiner (*Richardsonius balteatus*)

All these species are native and were likely in this creek system historically. These species have been recently verified by ODFW staff.

Tualatin River Drainage

Historic populations would be the same as for Dairy Creek with the addition of the following for current populations:

brown bullhead (*Ictalurus nebulosus*)
carp (*Cyprinus carpio*)
crappie (*Pomoxis* sp.)
largemouth bass (*Micropterus salmoides*)
smallmouth bass (*Micropterus dolomieu*)
channel catfish (*Ictalurus punctatus*)
steelhead (*Oncorhynchus mykiss*)
bluegill (*Lepomis macrochirus*)
yellow perch (*Perca flavescens*)

Saltzman Creek: No historic data available. Currently no fish species have been located in the lower reaches. The upper watershed was not inventoried by ODFW when they sampled the lower end of the creek during the summer of 1990.

Miller Creek

Historic populations: Information not documented. Likely historic species would include:

Miller Creek contd.

coho salmon (*Oncorhynchus kisutch*)
steelhead (*Oncorhynchus mykiss*)
sculpin - Cottidae spp.

Current populations: Recent electroshocking by ODFW staff located the following species downstream of the railroad tracks approximately several hundred yards from the Willamette River.

coho salmon (*Oncorhynchus kisutch*)
steelhead (*Oncorhynchus mykiss*)

Although the creek above Route 30 (south of Rte.30) is in good shape and has an invertebrate population that could sustain various fish species, there are two barriers (culverts) at the railroad overpass and Route 30 which preclude anadromous fish movement upstream to potentially usable habitat. In addition, the flow from Miller Creek is intermittent which would also limit habitat availability.

Balch Creek

Historic populations: No documented data. Likely species would include:

cutthroat trout (*Oncorhynchus clarki*) - both resident and searun
coho salmon (*Oncorhynchus kisutch*)
winter steelhead (*Oncorhynchus mykiss*)

Current populations: resident cutthroat only due to the fact that much of the creek has been placed into sewers from the mouth at the Willamette River and upstream. In addition there is a barrier to fish movement just below MacCleay Park.

Tryon Creek

Historic populations: resident cutthroat (*Oncorhynchus clarki*)
searun cutthroat " "
coho salmon (*Oncorhynchus kisutch*)
winter steelhead (*Oncorhynchus mykiss*)
sculpin - Cottidae spp.

Possible species: largescale sucker (*Catostomus macrocheilus*)
redside shiner (*Richardsonius balteatus*)

Current populations: Data are limited, however, it is possible

that coho salmon still exist in this watershed along with a few steelhead. ODFW personnel report that they have been unable to locate juvenile steelhead in the stream.

Water quality in Tryon Creek is poor due to leaky sewers that run next to and through the creek at various points. In addition there may be coliform pollution from horse pastures in the upper reaches.

EASTSIDE DRAINAGES

Johnson Creek Drainage

Historic Populations: coho salmon (Oncorhynchus kisutch)
steelhead (Oncorhynchus mykiss)
cutthroat trout - both searun and resident
(Oncorhynchus clarki)
sculpin species - Cottidae spp. likely
includes reticulate sculpin (Cottus
perplexus) and others
dace
redside shiner (Richardsonius balteatus)
largescale sucker
(Catostomus macrocheilus)
pacific lamprey (Lampetra tridentata)
western Brook lamprey (L. richardsoni)
n. squawfish (Ptychocheilus oregonensis)
chinook salmon (Oncorhynchus tshawytscha)
an occasional fall chinook would be found
spawning in lower reaches of the creek.

Current populations: add to the above list the following species;

brown bullhead (Ictalurus nebulosus)
mosquito fish (Gambusia affinis)
rainbow trout, other than steelhead,
(Oncorhynchus mykiss)
carp (Cyprinus carpio)

There are possibly other warm water species within this drainage such as crappie (Pomoxis sp.), bluegill (Lepomis macrochirus), largemouth bass (Micropterus salmoides and smallmouth bass (Micropterus dolomieu).)

The Johnson Creek drainage is very much disturbed through channelization and silt impaction from agriculture areas in the upper reaches. Flows in summer are low. The habitat continues to degrade and the impact on fish populations of the currently proposed flood control plan is unknown.

Note: No data available on Kelley and Mitchell creeks, upper

tributaries to Johnson.

Fairview Creek No data. Likely this creek supported populations of searun cutthroats (*Oncorhynchus clarki*) and Cottidae species.

Sandy River Drainage

Historic populations: chinook salmon (*Oncorhynchus tshawytscha*)
 coho salmon (*Oncorhynchus kisutch*)
 steelhead trout (*Oncorhynchus mykiss*)
 winter and summer *
 searun cutthroat (*Oncorhynchus clarki*)
 resident " " "
 smelt (*Thaleichthys pacificus*)
 northern squawfish (*Ptychocheilus oregonensis*)
 chiselmouth chub (*Acrocheilus alutaceus*)
 largescale sucker (*Catostomus macrocheilus*)
 sculpin - Cottidae spp.
 pacific lamprey (*Lampetra tridentata*)
 western brook lamprey (*L. richardsoni*)

Current populations: Add the following to the above list.

 summer steelhead (*Oncorhynchus mykiss*)
 resident rainbow " "

 Note: resident rainbow may have been present historically, but there is no documentation to substantiate that fact.

 mosquito fish (*Gambusia affinis*) likely in agricultural ponds in upper watershed.

* Local residents of several generations claim there was an historic small run of summer steelhead into the Clear Fork. Some ODFW personnel claim there was not but they do not have data to disprove what was observed by residents over a forty year time span. There is no question as to the historic and current presence of a winter steelhead run.

The Sandy River drainage is the least disturbed of all the urban stream drainages covered by this report.

Kellogg Creek (including Mt. Scott Creek)

Historic populations: coho salmon (*Oncorhynchus kisutch*)
 not found above falls in Mt. Scott Creek

steelhead (Oncorhynchus mykiss)

Kellogg Creek contd.

cutthroat trout - both searun and resident (Oncorhynchus clarki)
sculpin species - Cottidae spp.
redside shiner (Richardsonius balteatus)
largescale suckers (Catostomus macrocheilus)
western brook lamprey (L. richardsoni)
northern squawfish (Ptychocheilus oregonensis)

Current populations: add to the above list the following species;

mosquito fish (Gambusia affinis)
carp (Cyprinus carpio)
Possible additional species would include: bluegill (Lepomis macrochirus)
brown bullhead (Ictalurus nebulosus.)

Clackamas River Drainage

Historic populations: coho salmon (Oncorhynchus kisutch)
chinook salmon (Oncorhynchus tshawytscha)
spring and fall runs
steelhead (Oncorhynchus mykiss)
cutthroat trout - both searun and resident (Oncorhynchus clarki)
sculpin species - Cottidae spp. likely includes reticulate sculpin (Cottus perplexus) and others
redside shiner (Richardsonius balteatus)
largescale suckers (Catostomus macrocheilus)
pacific lamprey (Lampetra tridentata)
western brook lamprey (L. richardsoni)
northern squawfish (Ptychocheilus oregonensis)
bull trout (Salvelinus malma)
chiselmouth sucker (Acrocheilus alutaceus)

Current populations: add the following to the above list:

shad (Alosa sapidissima)
carp (Cyprinus carpio)

Clackamas River contd.

walleye (*Stizostedion vitreum*) *
smallmouth bass (*Micropterus dolomieu*) *

white sturgeon (*Acipenser transmontanus*)
- this species is occasionally found
near the Clackamas River mouth.

summer steelhead (*Oncorhynchus mykiss*)
mosquito fish (*Gambusia affinis*) -likely
somewhere in system in agricultural
areas.

* These two species are possibly located near the Clackamas River mouth in the vicinity of Clackamet Park.

While stretches of the Clackamas River are pristine, the river also suffers under impacts from poor dam passage, logging and hydroelectric development in the mainstem and Oak Grove fork and from agricultural practices along the tributaries. Private logging in lower elevations increase sediment production and causes impaction of river substrate. Diversion of water to irrigate row crops depletes water availability causing low flows during critical times of the year.

Summary: The major changes from the historic to the present are the addition of exotic warm water species. With few exceptions, all drainages within the greater metro area have been negatively impacted by urban and rural development. Elevated water temperatures, sediment impaction of the substrate, and reduced flows all contribute to generalized habitat depletion and reduction of fish populations. While fish species have maintained a presence in the urban environment, their populations are greatly reduced from historic numbers. Restoration is possible in some streams but only with improved land management practices and rigorous enforcement of water quality standards.

Acknowledgements

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PLAN METHODOLOGY

(Not included, this section will detail how the plan evolved and what base information was used.)

1991 NATURAL AREA NOMINATIONS

<u>Location*</u>	<u>Natural Area System</u>
1. SE 159th Dr. & Jenne Rd. (SE of Powell Butte)	Johnson Creek
2. SE 45th & Springwater Line	Johnson Creek
3. SE Foster Road (East of Foster Drive-in)	Johnson Creek
4. Beaver Creek Canyon, et al	Sandy River and Tributaries
5. Westside of the Multnomah Channel	Multnomah Channel/Sauvie Island
6. Wetlands & Uplands Adjacent to Blue Lake Park	Columbia Slough/Fairview Lake Creek
7. McGuire Island	Columbia Slough/Fairview Lake Creek
8. Undeveloped land adjacent to Fairview Creek and Lake	Columbia Slough/Fairview Lake Creek
9. Company Lake	Sandy River
10. Teleford Rd and 252nd	Johnson Creek
11. Terwilliger Blvd.	Forest Park/West Hills Corridor
12. Undeveloped lots on Rocky Butte	
13. Undeveloped strip under the St. John's Bridge	Willamette River
14. Parcel between County Boat Ramp and Virginia Lake	Sauvie Island/Multnomah Channel
15. Undeveloped portion of Ross Island	Willamette River
16. Buck Creek Drainage	Sandy River
17. Gordon Creek Drainage	Sandy River
18. Property adjacent to Beggar's Tick Marsh	Johnson Creek
19. Wetland westside Hayden Island	Columbia River
20. Hampton property	Forest Park/West Hills Corridor

* More specific information on locations is available.

DEFINITIONS

Bank - The rising ground surrounding a lake, river, or other water body.

Channel - The bed where a stream of water runs.

Corridor - A narrow strip of land that differs from the matrix on either side.

Cover - Vegetation that serves to protect animals from excessive sunlight, drying, or predators.

Cultivated landscape - A landscape dominated by plowed land for crops, but usually with patches of natural and managed land present.

Dominant - The species controlling the environment.

Enhance - To raise to a higher degree; improve quality or available capacity; intensify; magnify.

Habitat - Place where a plant or animal species naturally lives and grows; its immediate surroundings.

Interspersion - The proximity and interaction of one natural area to other adjacent areas.

Land potential - The possible uses and values of a land area.

Landscape ecology - A study of the structure, function and change in heterogeneous land area composed of interacting ecosystems.

Landscape - A heterogeneous land area composed of a cluster of interacting ecosystems that are repeated in similar form throughout. Landscapes vary in size, down to few kilometers in diameter.

Managed landscape - A landscape, such as rangeland or forest, where native species are harvested.

Multi-aged stand - A naturally developed stand usually with trees of many ages.

Natural areas - Includes land and water that has substantially retained its natural character, which is an important habitat for plant, animal, or marine life. Such areas are not necessarily completely natural or undisturbed, but can be significant for the study of natural, historical, scientific, or paleontological features, or for the appreciation of natural features.

Natural landscape- An area where human effects, if present are not ecologically significant to the landscape as a whole.

Natural resource - Air, land and water and the elements thereof which are valued for their existing and potential usefulness to man.

Preserve - To save from change or loss and reserve for a special purpose.

Protect - Save or shield from loss, destruction or injury.

Riparian - Relating to, living, or located on the bank of a natural water course (stream, river, etc.).

Seral Stage - A characteristic association of plants and animals during succession and before climax.

Structural - Different habitat types within a Natural Area (i.e., Diversity; grasslands, forest, open water, etc.).

Wetlands - Lands transitional between terrestrial and aquatic where the water table is usually at or near the surface or the land is covered by shallow water. Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.