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APPENDIX TO

INVENTORY OF WETLANDS, WATER BODIES, AND WILDLIFE HABITAT AREAS

FOR THE

COLUMBIA CORRIDOR

INDUSTRIAL/ENVIRONMENTAL MAPPING PROJECT

Bureau of Planning
City of Portland, Oregon
January 1989

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January 1989

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APPENDIX A

GLOSSARY OF COMMON TERMS

GLOSSARY OF COMMON TERMS USED FOR THE CITY OF PORTLAND INVENTORY OF WETLANDS, WATER BODIES, AND WILDLIFE AREAS

BANK	The rising ground surrounding a lake, river, or other water body.
CHANNEL	The bed where a stream of water runs.
COVER	Vegetation that serves to protect animals from excessive sunlight, drying, or predators.
DOMINANT	The species controlling the environment.
DRAINAGEWAY*	Drainageway: An open linear depression, whether manmade or natural, for the collection and drainage of surface water. It may be permanently or temporarily inundated.
ECOLOGICALLY AND SCIENTIFICALLY SIGNIFICANT NATURAL AREAS*	Land and water that has substantially retained its natural character, but is not necessarily completely natural or undisturbed, which is significant for historical, scientific, paleontological, or natural features.
EDGE EFFECT	The opportunities afforded along the boundary (also ECOTONE) between two plant communities for animals that can feed in one and take shelter in the other.
ENHANCE	To raise to a higher degree; improve quality or available capacity; intensify; magnify.
EMERGENT VEGETATION	Various aquatic plants usually rooted in shallow water and having most of their vegetative growth above water, such as cattails and bullrushes.
EUTROPHICATION	The process by which a lake becomes rich in dissolved nutrients and deficient in oxygen.
FISH AND WILDLIFE HABITAT AREAS*	Lands which contain significant food, water, or cover for native terrestrial and aquatic species of animals. Lands included are forests, open fields, riparian areas, wetlands, and water bodies.

* These definitions have been adopted by the City as part of both the City Code Title 33 (Planning and Zoning) and the Comprehensive Plan.

FLOOD DESYNCHRONI-ZATION*	Modification of the timing of stormwater runoff from various parts of a watershed through water retention, detention, or other means which will result in a decrease in flood elevations.
GALLERY FOREST	A strip of forest bordering a river or lake where tree growth is supported by water flowing through the soil for a short distance.
GOAL 5	A portion of the Oregon Land Conservation and Development Commission land use goals, dealing with the protection and conservation of open spaces, scenic and historic areas, and natural resources.
HABITAT	Place where a plant or animal species naturally lives and grows; its immediate surroundings.
HYDRIC SOILS	Soil that is wet long enough to periodically produce anaerobic (oxygen poor) conditions, thereby influencing the type and growth of plants.
HYDROPHYTE	A vascular plant that grows in water with its buds below the water surface.
INTERSPERSION	The proximity and interaction of one wildlife habitat to other adjacent areas.
INUNDATE	To flood; overspread with water; overflow.
LACUSTRINE	Related to or within lakes.
LITTORAL	Relating to, situated in or near a shoreline.
LIMNIC	Relating to or inhabiting a marshy lake.
MESIC	Of or pertaining to, or adapted to an environment having a balanced supply of moisture; being neither extremely wet nor dry.
MITIGATE*	To rectify, repair, or compensate for impacts which result from other actions.
PALUSTRINE	Wetlands dominated by trees, shrubs, persistent emergent herbs, emergent mosses or lichens.

* These definitions have been adopted by the City as part of both the City Code Title 33 (Planning and Zoning) and the Comprehensive Plan.

PASSERINE	Birds of the Order Passeriformes, comprising more than half of all bird species, and typically having feet adapted for perching (sparrows, warblers, etc.). Also known as "songbirds."
RAPTORS	Birds of the families Accipitridae, Falconidae, Tytonidae, and Strigidae; birds of prey equipped with long hooked bills and strong talons (hawks, eagles, falcons, and owls).
RESOURCE ENHANCEMENT*	Modification of a natural resource or resources to improve the quality or quantity of the resource and resource values. It can include actions that result in increased animal and plant species, increased numbers of types of natural habitat, and/or increased amount of area devoted to natural habitat. It may also include improvements in scenic views and sites, increased capacity for stormwater detention, or other improvements to resource values.
RIPARIAN	Relating to, living, or located on the bank of a water course (stream, river, etc.).
RIPARIAN AREAS*	Lands which are adjacent to rivers, streams, lakes, ponds, and other water bodies. They are transitional between aquatic and upland zones, and as such contain elements of both aquatic and terrestrial ecosystems. They have high water tables because of their close proximity to aquatic systems, soils which are usually largely of water-carried sediments, and some vegetation that requires free (unbound) water or conditions that are more moist than normal.
RIVERINE	Related to, formed by, or resembling a river.
SATURATED	Soaked or impregnated thoroughly (soils).
SHOREBIRD	Birds of the Families Charadridae and Scolopacidae that generally feed in mud and inhabit shore environs.
SLOUGH	Usually a channel containing water which may or may not be moving, and often alluvial in nature.

* These definitions have been adopted by the City as part of both the City Code Title 33 (Planning and Zoning) and the Comprehensive Plan.

SMALL MAMMALS	Fur covered animals that bear their young alive and nurse; those of the Orders Rodentia and Insectivors (mice, voles, shrews, etc.).
STRUCTURAL DIVERSITY	The vertical layering of vegetation.
UPLANDS*	Lands not characterized by the presence of riparian areas, water bodies, or wetlands.
WATER BODIES*	Permanently or temporarily flooded lands which may lie below the deepwater boundary of wetlands. Water depth is such that water, and not the air, is the principal medium in which prevalent organisms live, whether or not they are attached to the bottom. The bottom may sometimes be considered nonsoil or the water may be too deep or otherwise unable to support emergent vegetation. Water bodies include rivers, streams, creeks, sloughs, drainageways, lakes, and ponds.
WATERFOWL	Birds of the Family Anatidae. Aquatic, web-footed, gregarious birds ranging from small ducks to large swans, including geese.
WETLAND*	An area that is inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands include swamps, marshes, bogs, and similar areas.
XERIC	Of, pertaining to, or adapted to a dry environment.

* These definitions have been adopted by the City as part of both the City Code Title 33 (Planning and Zoning) and the Comprehensive Plan.

APPENDIX B

CITY AND COUNTY
LAND USE ZONE SUMMARY
FOR THE COLUMBIA CORRIDOR

CITY AND COUNTY* LAND USE ZONES PRESENT IN THE COLUMBIA CORRIDOR

BASE ZONES

City of Portland		Multnomah County	
Symbol	General Use	Symbol	General Use
(OS)	Open Space (Comprehensive Plan designation differing from zoning)	UF-20	Urban Future
FF	Farm and Forest	F-2	Agricultural
R20	Limited Single-Family Residential	LR-40	Urban Low-Density Residential
R10	Low-Density Residential		
R5	High-Density Single-Family Residential		
R3	Townhouse Multi-Family Residential	MR-3	Urban Medium-Density Residential
C5	Limited Commercial	SC	Urban Strip Conversion
C2	General Commercial	GC	General Commercial
M3	Light Manufacturing		
M2	General Manufacturing	GM	Urban General Manufacturing
M1	Heavy Manufacturing	HM	Urban Heavy Manufacturing
GE-2	General Employment		
GI-2	General Industrial		
HI	Heavy Industrial		

* Multnomah County land use zones continue to be applied to recently-annexed properties until rezoned to City zones, and to unincorporated properties which lie within the City of Portland Urban Services Boundary.

OVERLAY ZONES

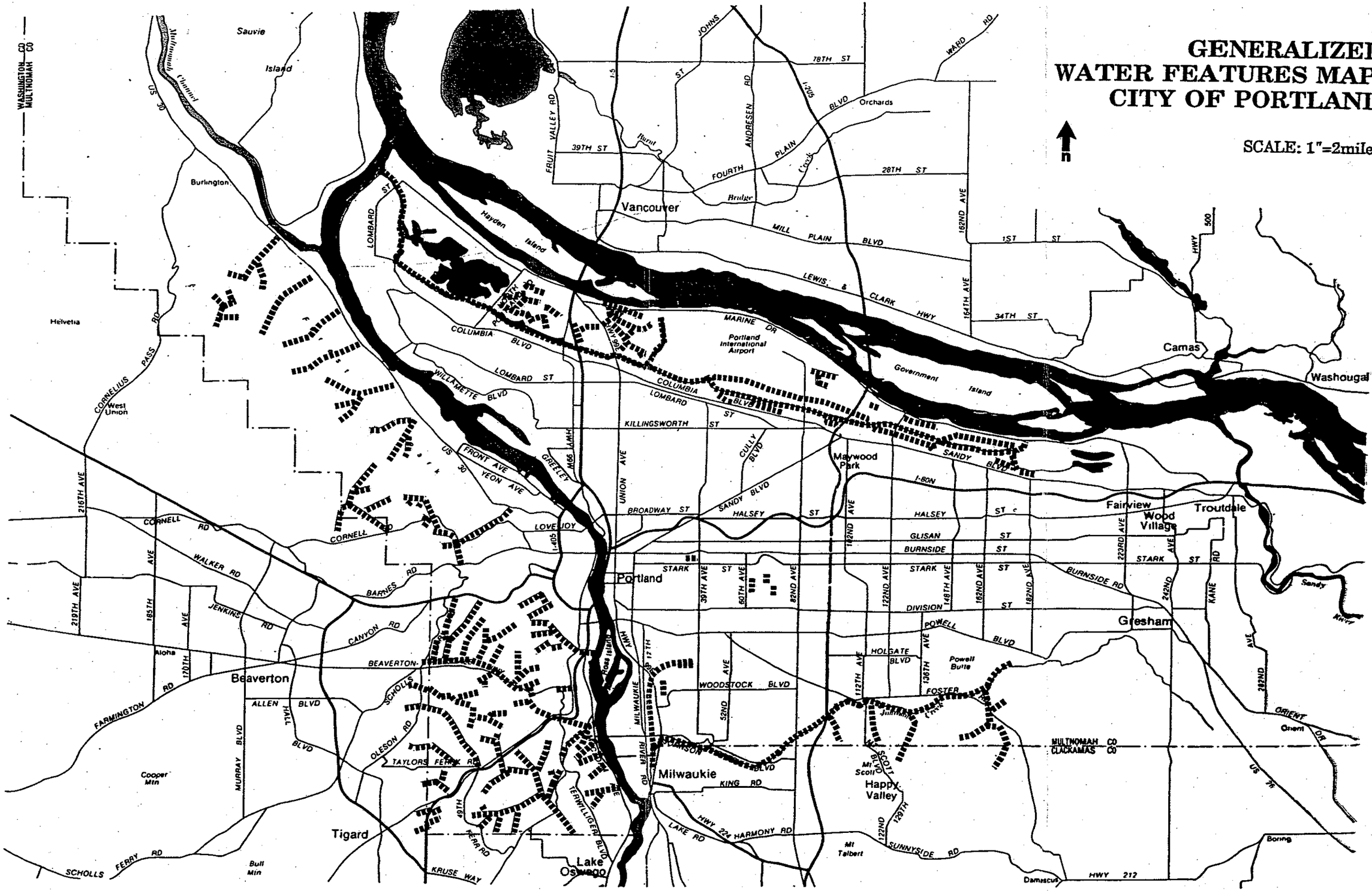
City of Portland		Multnomah County	
Symbol	General Use	Symbol	General Use
sr	Site Review		
b	Buffer		
l	Aircraft Landing		
n	Noise Impact	n	Noise Impact
sec	Significant Environmental Concern	sec	Significant Environmental Concern
ri	Willamette Greenway River Industrial		
rr	Willamette Greenway River Recreational		
rd	Willamette Greenway River Development		
rn	Willamette Greenway River Natural		
		cs	Community Service

APPENDIX C

CITY WATER FEATURES MAP

GENERALIZED WATER FEATURES MAP, CITY OF PORTLAND

SCALE: 1"=2miles



APPENDIX D

LCDC GOAL 5 AND ADMINISTRATIVE RULE

5 . OPEN SPACES, SCENIC AND HISTORIC AREAS, AND NATURAL RESOURCES

GOAL: To conserve open space and protect natural and scenic resources.

Programs shall be provided that will: (1) insure open space, (2) protect scenic and historic areas and natural resources for future generations, and (3) promote healthy and visually attractive environments in harmony with the natural landscape character. The location, quality and quantity of the following resources shall be inventoried:

a. **Land needed or desirable for open space;**
b. **Mineral and aggregate resources;**
c. **Energy sources;**
d. **Fish and wildlife areas and habitats;**
e. **Ecologically and scientifically significant natural areas, including desert areas;**
f. **Outstanding scenic views and sites;**
g. **Water areas, wetlands, watersheds and groundwater resources;**
h. **Wilderness areas;**
i. **Historic areas, sites, structures and objects;**
j. **Cultural areas;**
k. **Potential and approved Oregon recreation trails;**
l. **Potential and approved federal wild and scenic waterways and state scenic waterways.**

Where no conflicting uses for such resources have been identified, such resources shall be managed so as to preserve their original character. Where conflicting uses have been identified the economic, social, environmental and energy consequences of the conflicting uses shall be determined and programs developed to achieve the goal.

Cultural Area — refers to an area characterized by evidence of an ethnic, religious or social group with distinctive traits, belief and social forms.

Historic Areas — are lands with sites, structures and objects that have local, regional, statewide or national historical significance.

Natural Area — includes land and water that has substantially retained its natural character and land and water that, although altered in character, is important as habitats for plant, animal or marine life, for the study of its natural historical, scentific or paleontological features, or for the appreciation of its natural features.

Open Space — consists of lands used for agricultural or forest uses, and any land area that would, if preserved and continued in its present use:

(a) Conserve and enhance natural or scenic resources;
(b) Protect air or streams or water supply;
(c) Promote conservation of soils, wetlands, beaches or tidal marshes;
(d) Conserve landscaped areas, such as public or private golf courses, that reduce air pollution and enhance the value of abutting or neighboring property;
(e) Enhance the value to the public of abutting or neighboring parks, forests, wildlife preserves, nature reservations or sanctuaries or other open space;
(f) Promote orderly urban development.

Scenic Areas — are lands that are valued for their aesthetic appearance.

Wilderness Areas — are areas where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain. It is an area of undeveloped land retaining its primeval character and influence, without permanent improvement or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) may also contain ecological, geological, or other features of scientific, educational, scenic or historic value.

GUIDELINES:

A. **Planning:**

1. The need for open space in the planning area should be determined, and standards developed for the amount, distribution, and type of open space.
2. Criteria should be developed and utilized to determine what uses are consistent with open space values and to evaluate the effect of converting open space lands to inconsistent uses. The maintenance and development of open space in urban areas should be encouraged.
3. Natural resources and required sites for the generation of energy (i.e. natural gas, oil, coal, hydro, geothermal, uranium, solar and others) should be conserved and protected; reservoir sites should be identified and protected against irreversible loss.
4. Plans providing for open space, scenic and historic areas and natural resources should consider as a major determinant the carrying capacity of the air, land and water resources of the planning area. The land conservation and development actions provided for by such plans should not exceed the carrying capacity of such resources.
5. The National Register of Historic Places and the recommendations of the State Advisory Committee on Historic Preservation should be utilized in designating historic sites.
utilized in designating historic sites.
6. In conjunction with the inventory of mineral and aggregate resources, sites for removal and processing of such resources should be identified and protected.
7. As a general rule, plans should prohibit outdoor advertising signs except in commercial or industrial zones. Plans should not provide for the reclassification of land for the purpose of accommodating an outdoor advertising sign. The term "outdoor advertising sign" has the meaning set forth in ORS 377.710(23).

B. **Implementation:**

1. Development should be planned and directed so as to conserve the needed amount of open space.
2. The conservation of both renewable and nonrenewable natural resources and physical limitations of the land should be used as the basis for determining the quantity, quality, location, rate and type of growth in the planning area.
3. The efficient consumption of energy should be considered when utilizing natural resources.
4. Fish and wildlife areas and habitats should be protected and managed in accordance with the Oregon Wildlife Commission's fish and wildlife management plans.
5. Stream flow and water levels should be protected and managed at a level adequate for fish, wildlife, pollution abatement, recreation, aesthetics and agriculture.
6. Significant natural areas that are historically, ecologically or scientifically unique, outstanding or important, including those identified by the State Natural Area Preserves Advisory Committee, should be inventoried and evaluated. Plans should provide for the preservation of natural areas consistent with an inventory of scientific, educational, ecological and recreational needs for significant natural areas.
7. Local, regional and state governments should be encouraged to investigate and utilize fee acquisition, easements, cluster developments, preferential assessment, development rights acquisition and similar techniques to implement this goal.
8. State and federal agencies should develop statewide natural resource, open space, scenic and historic area plans and provide technical assistance to local and regional agencies. State and federal plans should be reviewed and coordinated with local and regional plans.
9. Areas identified as having nonrenewable mineral and aggregate resources should be planned for interim, transitional and "second use" utilization as well as for the primary use.

DIVISION 16

REQUIREMENTS AND APPLICATION PROCEDURES FOR COMPLYING WITH STATEWIDE GOAL 5

Inventory Goal 5 Resources

660-16-000 (1) The inventory process for Statewide Planning Goal 5 begins with the collection of available data from as many sources as possible including experts in the field, local citizens and landowners. The local government then analyzes and refines the data and determines whether there is sufficient information on the location, quality and quantity of each resource site to properly complete the Goal 5 process. This analysis also includes whether a particular natural area is "ecologically and scientifically significant", or an open space area is "needed", or a scenic area is "outstanding", as outlined in the Goal. Based on the evidence and local government's analysis of those data, the local government then determines which resource sites are of significance and includes those sites on the final plan inventory.

(2) A "valid" inventory of a Goal 5 resource under subsection (5)(c) of this rule must include a determination of the location, quality, and quantity of each of the resource sites. Some Goal 5 resources (e.g., natural areas, historic sites, mineral and aggregate sites, scenic waterways) are more site-specific than others (e.g., groundwater, energy sources). For site-specific resources, determination of *location* must include a description or map of the boundaries of the resource site and of the impact area to be affected, if different. For non-site-specific resources, determination must be as specific as possible.

(3) The determination of *quality* requires some consideration of the resource site's relative value, as compared to other examples of the same resource in at least the jurisdiction itself. A determination of *quantity* requires consideration of the relative abundance of the resource (of any given quality). The level of detail that is provided will depend on how much information is available or "obtainable".

(4) The inventory completed at the local level, including options (5)(a), (b), and (c) of this rule, will be adequate for Goal compliance unless it can be shown to be based on inaccurate data, or does not adequately address location, quality or quantity. The issue of adequacy may be raised by the Department or objectors, but final determination is made by the Commission.

(5) Based on data collected, analyzed and refined by the local government, as outlined above, a jurisdiction has three basic options:

(a) Do Not Include on Inventory: Based on information that is available on location, quality and quantity, the local government might determine that a particular resource site is not important enough to warrant inclusion on the plan inventory, or is not required to be included in the inventory based on the specific Goal standards. No further action need be taken with regard to these sites. The local government is not required to justify in its comprehensive plan a decision not to include a particular site in the plan inventory unless challenged by the Department, objectors or the Commission based upon contradictory information.

(b) Delay Goal 5 Process: When some information is available, indicating the possible existence of a resource site, but that information is not adequate to identify with particularity the location, quality and quantity of the resource site, the local government should only include the site on the comprehensive plan inventory as a special category. The local government must express its intent relative to the resource site through a plan policy to address that resource site and proceed through the Goal 5 process in the future. The plan should include a time-frame for this review. Special implementing measures are not appropriate or required for Goal 5 compliance purposes until adequate information is available to enable further review and adoption of such measures. The statement in the plan commits the local government to address the resource site through the Goal 5 process in the post-acknowledgment period. Such future actions could require a plan amendment.

(c) Include on Plan Inventory: When information is available on location, quality and quantity, and the local government has determined a site to be significant or important as a result of the data collection and analysis process, the local government must include the site on its plan inventory and indicate the location, quality and quantity of the resource site (see above). Items included on this inventory must proceed through the remainder of the Goal 5 process.

Stat. Auth.: ORS Ch. 183 & 197
Hist: LCD 5-1981(Temp), f. & ef. 5-8-81; LCD 7-1981, f. & ef. 6-29-81

[ED. NOTE: The text of Temporary Rules is not printed in the Oregon Administrative Rules Compilation. Copies may be obtained from the adopting agency or the Secretary of State.]

Identify Conflicting Uses

660-16-005 It is the responsibility of local government to identify conflicts with inventoried Goal 5 resource sites. This is done primarily by examining the uses allowed in broad zoning districts established by the jurisdiction (e.g., forest and agricultural zones). A conflicting use is one which, if allowed, could negatively impact a Goal 5 resource site. Where conflicting uses have been identified, Goal 5 resource sites may impact those uses. These impacts must be considered in analyzing the economic, social, environmental and energy (ESEE) consequences:

(1) Preserve the Resource Site: If there are no conflicting uses for an identified resource site, the jurisdiction must adopt policies and ordinance provisions, as appropriate, which insure preservation of the resource site.

(2) Determine the Economic, Social, Environmental, and Energy Consequences: If conflicting uses are identified, the economic, social, environmental and energy consequences of the conflicting uses must be determined. Both the impacts on the resource site and on the conflicting use must be considered in analyzing the ESEE consequences. The applicability and requirements of other Statewide Planning Goals must also be considered, where appropriate, at this stage of the process. A determination of the ESEE consequences of identified conflicting uses is adequate if it enables a jurisdiction to provide reasons to explain why decisions are made for specific sites.

Stat. Auth.: ORS Ch. 183 & 197
Hist: LCD 5-1981(Temp), f. & ef. 5-8-81; LCD 7-1981, f. & ef. 6-29-81

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Develop Program to Achieve the Goal

660-16-010 Based on the determination of the economic, social, environmental and energy consequences, a jurisdiction must "develop a program to achieve the Goal". Assuming there is adequate information on the location, quality, and quantity of the resource site as well as on the nature of the conflicting use and ESEE consequences, a jurisdiction is expected to "resolve" conflicts with specific sites in any of the following three ways listed below. Compliance with Goal 5 shall also be based on the plan's overall ability to protect and

conserve each Goal 5 resource. The issue of adequacy of the overall program adopted or of decisions made under sections (1), (2) and (3) of this rule may be raised by the Department or objectors, but final determination is made by the Commission, pursuant to usual procedures:

(1) Protect the Resource Site: Based on the analysis of the ESEE consequences, a jurisdiction may determine that the resource site is of such importance, relative to the conflicting uses, and the ESEE consequences of allowing conflicting uses are so great that the resource site should be protected and all conflicting uses prohibited on the site and possibly within the impact area identified in OAR 660-16-000(5)(c). Reasons which support this decision must be presented in the comprehensive plan, and plan and zone designations must be consistent with this decision.

(2) Allow Conflicting Uses Fully: Based on the analysis of ESEE consequences and other Statewide Goals, a jurisdiction may determine that the conflicting use should be allowed fully, not withstanding the possible impacts on the resource site. This approach may be used when the conflicting use for a particular site is of sufficient importance, relative to the resource site. Reasons which support this decision must be presented in the comprehensive plan, and plan and zone designations must be consistent with this decision.

(3) Limit Conflicting Uses: Based on the analysis of ESEE consequences, a jurisdiction may determine that both the resource site and the conflicting use are important relative to each other, and that the ESEE consequences should be balanced so as to allow the conflicting use but in a limited way so as to protect the resource site to some desired extent. To implement this decision, the jurisdiction must designate with certainty what uses and activities are allowed fully, what uses and activities are not allowed at all and which uses are allowed conditionally, and what specific standards or limitations are placed on the permitted and conditional uses and activities for each resource site. Whatever mechanisms are used, they must be specific enough so that affected property owners are able to determine what uses and activities are allowed, not allowed, or allowed conditionally and under what clear and objective conditions or standards. Reasons which support this decision must be presented in the comprehensive plan, and plan and zone designations must be consistent with this decision.

Stat. Auth.: ORS Ch. 183 & 197
Hist: LCD 5-1981(Temp), f. & ef. 5-8-81; LCD 7-1981, f. & ef. 6-29-81

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Post-Acknowledgment Period

660-16-015 All data, findings, and decisions made by a local government prior to acknowledgment may be reviewed by that local government in its periodic update process. This includes decisions made as a result of OAR 660-16-000(5)(a), 660-16-005(1), and 660-16-010. Any changes, additions, or deletions would be made as a plan amendment, again following all Goal 5 steps.

If the local government has included in its plan items under OAR 660-16-000(5)(b), the local government has committed itself to take certain actions within a certain time frame in the post-aknowledgment period. Within those stated time frames, the local government must address the issue as stated in its plan, and treat the action as a plan amendment.

Stat. Auth.: ORS Ch. 183 & 197
Hist: LCD 5-1981(Temp), f. & ef. 5-8-81; LCD 7-1981, f. & ef. 6-29-81

[ED. NOTE: The text of Temporary Rules is not printed in the Oregon Administrative Rules Compilation. Copies may be obtained from the adopting agency or the Secretary of State.]

Landowner Involvement

660-16-020 (1) The development of inventory data, identification of conflicting uses and adoption of implementing measures must, under Statewide Planning Goals 1 and 2, provide opportunities for citizen involvement and agency coordination. In addition, the adoption of regulations or plan provisions carries with it basic legal notice requirements. (County or city legal counsel can advise the planning department and governing body of these requirements.) Depending upon the type of action involved, the form and method of landowner notification will vary. State statutes and local charter provisions contain basic notice requirements. Because of the nature of the Goal 5 process as outlined in this paper it is important to provide for notification and involvement of landowners, including public agencies, at the earliest possible opportunity. This will likely avoid problems or disagreements later in the process and improve the local decision-making process in the development of the plan and implementing measures.

(2) As the Goal 5 process progresses and more specificity about the nature of resources, identified conflicting uses, ESEE consequences and implementing measures is known, notice and involvement of affected parties will become more meaningful. Such notice and landowner involvement, although not identified as a Goal 5 requirement is in the opinion of the Commission, imperative.

Stat. Auth.: ORS Ch. 183 & 197
Hist: LCD 5-1981(Temp), f. & ef. 5-8-81; LCD 7-1981, f. & ef. 6-29-81

[ED. NOTE: The text of Temporary Rules is not printed in the Oregon Administrative Rules Compilation. Copies may be obtained from the adopting agency or the Secretary of State.]

Policy Application

660-16-025 OAR 660-16-000 through 660-16-025 are applicable to jurisdictions as specified below:

(1) Category 1: Compliance with OAR 660-16-000 through 660-16-025 is required prior to granting acknowledgment of compliance under ORS 197.251 and OAR 660-03-000 through 660-03-040 for those jurisdictions which:

(a) Have not submitted their comprehensive plan for acknowledgment as of the date of adoption of this rule;

(b) Are under denial orders as of the date of adoption of this rule;

(c) Are not scheduled for review prior to or at the June 1981 Commission meeting.

(2) Category 2:

(a) Compliance with OAR 660-16-000 through 660-16-025 is required as outlined below for those jurisdictions which:

(A) Are under continuance orders adopted pursuant to OAR 660-03-040;

(B) Are scheduled for review at the April 30/May 1, May 29 or June 1981 Commission meetings.

(b) For these jurisdictions a notice will be given to all parties on the original notice list providing a 45-day period to object to the plan based on OAR 660-16-000 through 660-16-025.

(c) OAR 660-16-000 will be applied based on objections alleging violations of specific provisions of the rule on specific resource sites. Objections must be filed following requirements outlined in OAR 660-03-000 through 660-03-040 (Acknowledgment of Compliance Rule). Where no objections are filed or objections are not specific as to which elements of OAR 660-16-000 through 660-16-025 have been violated, and on what resource sites, the plan will be reviewed against Goal 5

standards as they existed prior to adoption of OAR 660-16-000 through 660-16-025.

(3) Jurisdictions which receive acknowledgment of compliance (as outlined in ORS 197.251) at the April 30/May 1, 1981 Commission meeting will not be subject to review procedures outlined above, but will be treated as other previously acknowledged jurisdictions.

Stat. Auth.: ORS Ch. 183 & 197
Hist: LCD 5-1981(Temp), f. & ef. 5-8-81; LCD 7-1981, f. & ef. 6-29-81

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APPENDIX E

WILDLIFE ANALYSIS FORM

by
Esther Lev, Biologist
and
Michael Houck, Urban Naturalist and
Technical Advisory Committee Member

WILDLIFE ANALYSIS FORM

SELECTION OF THE WILDLIFE HABITAT RATING SYSTEM

After reviewing various methods of rating habitat areas, it was decided to use the Wildlife Habitat Assessment (WHA) rating system, developed for the City of Beaverton in 1983 as part of their Goal 5 update for sites containing wetlands or water bodies. This rating system provides the appropriate level of detail needed for the Portland Goal 5 inventory, and has been tested in the Portland area by not only Beaverton, but also by Portland as part of the recent Willamette River Greenway and Columbia South Shore studies. Subsequent to this inventory, versions have been accepted and used by a number of Portland area and Lane County jurisdictions. This rating system, in conjunction with other aspects of the Goal 5 study, has been accepted by LCDC as adequate for Goal 5 compliance.

Success of the WHA rating system was due to the participation by biologists from a number of agencies, who developed the system and determined the criteria to be included under each component. The rating system was originally designed by a technical advisory team consisting of staff from the following agencies:

U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Army Corps of Engineers
Oregon Department of Fish and Wildlife
Audubon Society of Portland
The Wetlands Conservancy
Beaverton Planning Bureau

Prior to use by the City of Portland for both the Willamette River Greenway and Goal 5 studies, the rating system was reviewed for applicability by technical advisory committees of similar makeup. A second rating form was developed for the Goal 5 study to assess upland areas (sites containing no wetlands or water bodies). It eliminated the bias toward the presence of water for high quality habitat, recognizing that certain wildlife species do not need large water bodies to thrive. This form was then reviewed by the Portland Goal 5 Technical Advisory Committee prior to its application

The WHA rating system reviews each identified habitat site in terms of its potential for wildlife. The rating system is based on the fact that all wildlife have three basic requirements for survival: food, water, and cover. These form the three major components of the assessment. Each site is evaluated in terms of quantity, quality, diversity, and seasonality of food, water, and cover offered on the site. Also considered is the degree and permanence of physical and human disturbance on the site, whether there are other useable habitats nearby, and the unique features on the site, including wildlife, flora, scenic qualities, rarity of habitat, and educational potential.

Each of these is discussed in the section, "Discussion of the Rating Sheets." The rating system is not intended to provide a comprehensive analysis of each site, but to allow relative values between habitat areas to be determined and compared. Should an in-depth study of specific sites be required, a more detailed biological analysis would be appropriate.

CONDUCTING THE FIELD INVENTORY

Biologists from the City of Portland, and occasionally Planning Bureau staff and members of the Goal 5 technical advisory committee, inventoried all identified sites within the Portland Urban Services Boundary. The field observations were conducted largely in the spring, summer, and fall of 1986. Field observation and WHA rating sheets for each site were completed and are on file at the Planning Bureau. To provide continuity throughout the process, only the scores of the biologists were used in the inventory; those of staff and the TAC were for validation of the process.

DISCUSSION OF THE RATING SHEETS

This section is a summary discussion of the Wildlife Habitat Assessment rating sheets. Examples of both the wetland (sites containing some wetlands) and upland (sites with no wetlands in their boundaries) sheets are included in this appendix. All subject areas, except for water, apply to both rating forms. The water aspects apply only to wetland sites. It needs to be emphasized that this discussion is a summary and not a textbook approach which would allow the reader to duplicate the City's inventory information. For more detailed information on specific procedures, the reader is encouraged to contact the City of Portland.

The WHA rating form is divided into three parts. The first presents general information about the site, to facilitate identification. Included here are the unit number, location, size, score, and comments.

Unit No. A space is provided for the observer to label each site with an individual identification number.

Location This space is to briefly describe the site location.

Sq. Ft. The approximate size of the site can be noted.

Score The cumulative score after the rating sheet has been filled out can be noted here. The scoring is done while in the field.

Comments This space is used for additional remarks on the reasoning behind specific numeric ratings or for potential of the site for rehabilitation, enhancement, etc.

The second section consists of the water (for the wetland rating form only), food, and covers values (referred to as components). Each of these components is further divided into a number of aspects.

Water

Four aspects of the water regime on a site were included on the rating form: quantity and seasonality, quality, proximity to cover, and diversity. All of these factors play an important role in the site's significance to wildlife.

It is important to note that the relative value of these aspects compared to the other components (food and cover) are higher. The total number of possible points from the water component is 30 points, while the highest totals for food and cover are 24 and 28 points, respectively. The reason for this weighting of the relative value of the water component is that it is of critical importance to the function of wetlands and riparian zones and the wildlife species that inhabit them.

Quantity and Seasonality: This aspect refers to the amount of water available on site, and its seasonal variability. Seasonal water sources were given a value of four points, and perennial water sources (available year-round) a value of eight, as year-round water supply is significantly more important to wildlife.

Quality: Stagnant water sources were given a value of zero, seasonally flushed a value of three, and continually flushed a value of six. Although desirable to have some value included reflecting the quality of the water on site, actual water quality analysis was not feasible. Therefore, an indirect measure of quality, "flushing," was selected. In actuality, even stagnant water has some wildlife habitat value, but it was decided to assign it a value of zero, as seasonally or continually-flushed water has a higher value for wildlife, and because the presence of stagnant water indicates the probability of other factors which result in lower wildlife values.

Proximity to Cover: Wildlife will use water more readily if it is close to vegetative cover. This allows escape from predators and protection from weather extremes. The closer and more dense the cover, the more important the water source to many species. Dense cover immediately adjacent to a water source yielded a site value of eight, nearby cover a value of four, and no cover a value of zero.

Diversity: A site with a mixture of wetland, stream, and open pond or lake has higher wildlife value than a site with only one of these features. The ranking ranges from a low of two (one water source only) to eight (three or more water sources present).

Food

Food is a basic requirement for any organism. Wildlife cannot survive in one area for any appreciable period of time without food. The greater the variety and quantity of food, the greater the potential for serving the needs of more wildlife species. The three aspects included under food are variety, quantity and seasonality, and proximity to cover.

Variety: The variety of food on a site was rated from a high of eight to a low of zero.

Quantity and Seasonality: This aspect measures the amount of food and its availability on an annual basis. Sites having large quantities of food available year-round received a value of eight, and sites with little or no food available, or food available only on a seasonal basis, receiving a value of zero.

Proximity to Cover: As with water, the presence of adjacent cover from which to forage for food and escape predation by other native wildlife or domestic animals is important. Proximity to cover also ranked from zero to eight points.

Cover

The aspects of cover included here (structure, variety, nesting, escape, and seasonality) attempt to describe the physical environment of the site from a number of perspectives that are important to wildlife.

Structural Diversity: What is looked for in this category is the vertical stratification of vegetation on a site, i.e., is there only one layer of vegetative cover (lawn, or one layer of shrub such as Himalayan blackberry), or are there more? The most diverse structural system expected to be encountered would be multi-layered, with a ground layer of herbaceous vegetation (grasses, wildflowers, etc.), a second layer consisting of shrubs (Himalayam blackberry, snowberry, Oregon grape, sword fern, etc.), perhaps another layer of taller plants (red and blue elderberry, Indian plum, red osier dogwood), a short tree layer (flowering dogwood, hazelnut, saplings of taller species), and finally a tall canopy layer (Douglas fir, western hemlock, big-leaf maple, black cottonwood, Oregon white ash, Oregon white oak, etc.). The more layers present, the greater the surface area for more feeding, travelling, and

breeding available to a wider number of wildlife species. Values range from eight points for high structural diversity, to zero for low or no diversity.

Variety: Within any one layer or when considering all layers, if structural diversity is high, there may be a number of plant species which provide a variety of vegetation characteristics. This is important from the standpoints of cover, feeding, and reproduction. The greater the variety of vegetation, the more important the habitat. For example, a forested wetland with a mixture of rushes, sedges, smartweed, spirea, and willow will be a much more valuable wildlife habitat than an area with a monoculture of reed canarygrass. Values range from eight points for high variety, to zero for little or none.

Nesting: While there may be both good variety and diversity of vegetative cover, the overall nesting potential may vary from site to site. This aspect was added to address the overall nesting potential of the site for a variety of bird species. Nesting values range from a high of four points, to zero for low or no potential.

Escape: This aspect is primarily a function of density of cover and its ability to afford escape from predation. A value of four points was assigned to sites which offer a high possibility of escape, and zero for those with no or low potential.

Seasonality: As with food and water, a habitat site will be less important to wildlife if cover is not present year-round. Regarding cover, this relates primarily to whether all of the vegetation is deciduous or evergreen. If there is some evergreen vegetation, or the deciduous vegetation retains some of its canopy year-round, the site is more valuable. Vegetative cover available year-round received a value of four, limited cover a value of two, and seasonal cover a value of zero.

The third part of the form includes values in addition to food, water, and cover. The components examined include disturbance, interspersion, and unique features.

Disturbance Disturbance is examined from two perspectives: physical and human.

Physical: This category was used to assign a higher value to those sites with little disturbance, to reflect the fact that the removal or disturbance of physical components (food,

water, cover) is detrimental to wildlife. However, it is also recognized that such a disturbance could be relatively short-lived (such as placement of a sewer line down a creek channel), while others are long-term or permanent. A relatively undisturbed site received a maximum value of four points, sites with temporary physical disturbance a value of two, and those with permanent or long-term disturbance a value of zero.

Human: Human and human-related (domestic animals) disturbances can be very detrimental to wildlife. On the other hand, an area that is highly disturbed from a physical perspective may receive little human use. The values range from four points for low human disturbance, to zero for high impact.

Interspersion Habitats are important to one another in the sense that a number of different habitats adjacent to one another can provide an overall diversity of vegetative cover, food, and often water. Therefore, an isolated site surrounded by pavement, buildings, and human activity would receive a lower interspersion value than a similar site surrounded by other habitat sites, such as wetlands, upland forests, shrubby areas, or meadows. If the surrounding sites were similar in makeup or represented only one habitat type, the site would receive a lower interspersion value than one surrounded by a variety of habitat types. The interspersion score ranges from a high of six points, to a low of zero.

Unique Features This component is intended to take into account other factors which might make the site unique to plants, animals, or humans. Aspects included are wildlife, flora, scenic quality, rarity of habitat, and educational potential.

Wildlife and Flora: If there is a particular species of plant or wildlife which is sensitive or unique in some way, then the site would receive a value ranging from one to four points.

Scenic Quality: This aspect is a subjective evaluation of the visual impact of the site. A site considered as having significant aesthetic qualities, generally from a natural resource perspective, or offering views of other sites which have aesthetic qualities, would receive a value of up to four points.

Rarity of Habitat: This refers to whether the site has any plant or animal species considered rare from a regional or national perspective, or in terms of scarcity within the City, or within a particular Management Unit. The highest value which can be received is four points.

Educational Potential: This relates to the site's potential for educational uses, whether by school groups or individuals. If the site has good visual or physical access by the public, it might receive a rating of from one to four points, depending upon the overall significance of the site.

Wetlands
Wildlife Habitat Assessment

UNIT NO. _____ LOCATION _____ SQ. FT. _____ SCORE * _____ ** _____

COMMENTS _____

COMPONENT		DEGREE	SCORE *	SCORE **	COMMENTS
WATER	Quantity & Seasonality	NONE 0 SEASONAL 4 PERENNIAL 8			
	Quality	STAGNENT 0 SEASONALLY FLUSHED 3 CONTINUALLY FLUSHED 6			
	Proximity To Cover	NONE 0 NEARBY 4 IMMEDIATELY ADJACENT 8			
	Diversity (Streams, Ponds, Wetlands)	ONE PRESENT 2 TWO PRESENT 4 THREE PRESENT 8			
FOOD	Variety	LOW 0 MEDIUM 4 HIGH 8			
	Quantity & Seasonality	NONE 0 LIMITED 4 YEAR AROUND 8			
	Proximity to Cover	NONE 0 NEARBY 4 IMMEDIATELY ADJACENT 8			
COVER	Structural Diversity	LOW 0 MEDIUM 4 HIGH 8			
	Variety	LOW 0 MEDIUM 4 HIGH 8			
	Nesting	LOW 0 MEDIUM 2 HIGH 4			
	Escape	LOW 0 MEDIUM 2 HIGH 4			
	Seasonality	NONE 0 LIMITED 2 YEAR AROUND 4			

* Existing ** Enhancement Potential

ADDITIONAL VALUE					
DISTURBANCE	PHYSICAL	PERMANENT 0 TEMPORARY 2 UNDISTURBED 4			
	HUMAN	HIGH 0 MEDIUM 2 LOW 4			
INTERSPERSION		LOW 0 MEDIUM 1 HIGH 6			
UNIQUE FEATURES 0 - 4		WILDLIFE FLORA SCENIC RARITY OF HABITAT TYPE EDUCATIONAL POTENTIAL			

CITY OF PORTLAND, OREGON
BUREAU OF PLANNING

Developed With the Assistance of

Mike Houck-Audubon Society
Ralph Rogers-U.S. Army Corps of Engineers
Dennis Peters-U.S. Fish & Wildlife Service
Diana Hwang-U.S. Fish & Wildlife Service
Gene Herb-Oregon Dept. of Fish & Game
Jack Broome-Wetlands Conservancy

Uplands

Wildlife Habitat Assessment

UNIT NO. _____ LOCATION _____ SQ. FT. _____ SCORE * _____ ** _____

COMMENTS _____

COMPONENT		DEGREE	SCORE *	SCORE **	COMMENTS
FOOD	Variety	LOW 0 — MEDIUM 5 — HIGH 11			
	Quantity & Seasonality	NONE 0 — LIMITED 5 — YEAR AROUND 11			
	Proximity to Cover	NONE 0 — NEARBY 5 — IMMEDIATELY ADJACENT 11			
COVER	Structural Diversity	LOW 0 — MEDIUM 5 — HIGH 11			
	Variety	LOW 0 — MEDIUM 5 — HIGH 11			
	Nesting	LOW 0 — MEDIUM 4 — HIGH 8			
	Escape	LOW 0 — MEDIUM 4 — HIGH 8			
	Seasonality	NONE 0 — LIMITED 4 — YEAR AROUND 8			

* Existing ** Enhancement Potential

ADDITIONAL VALUE						
DISTURBANCE	PHYSICAL	PERMANENT 0	TEMPORARY 7	UNDISTURBED 4		
	HUMAN	HIGH 0	MEDIUM 7	LOW 4		
INTERSPERSION		LOW 0	MEDIUM 4	HIGH 9		
UNIQUE FEATURES 0 - 4		WILDLIFE FLORA SCENIC	RARITY OF HABITAT TYPE _____ EDUCATIONAL POTENTIAL _____			

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City Of Portland

Goal 5 Study

Natural Areas Inventory Field Notes

LOCATION: OBSERVER: DATE:

WEATHER:

Precipitation (yes, no, type) -
Wind -
Percent Cloud Cover -
Temperature -

PHYSICAL PARAMETERS:

General Topography -
Degree and orientation of slope -
Water Features (pond, lake, stream stagnant, etc...) -
Percent Of Site Inundated By Water -
Major Structures, Roads -

VEGETATION:

Description of vegetation types including species list, communities, percent canopy closure (tree, shrub, herb), number and size of snags, seral stage, general health and vitality, percent open water/percent emergent vegetation at inundated areas.

WILDLIFE:

Species Observed (herps, fish, birds, mammals) -

Species not observed but known to be present, and source of information. -

General description of habitat function (food sources, roosting, perching, nesting, etc...). -

HUMAN USE:

List human uses, and use by domestic animals; proximity to residential area. Discuss compatibility and conflicts with natural resources. Interspersion with other natural areas.

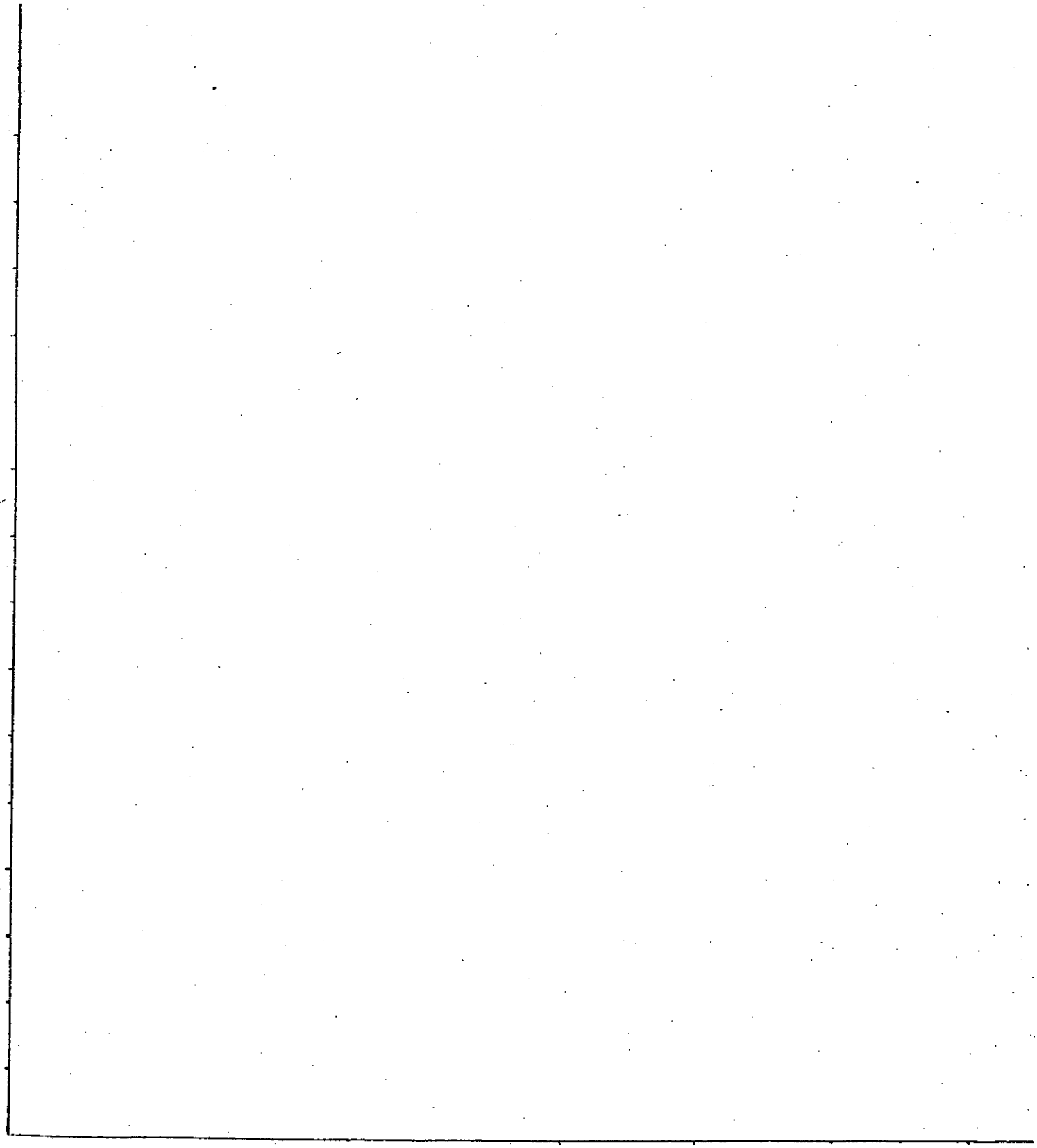
MANAGEMENT/POTENTIAL:

A brief statement on enhancement, maintenance or compatible uses and development

ADDITIONAL COMMENTS:

Unique Features, Rare, Threatened Species -

SKETCH OF SITE:
Observation points, different vegetation types, and water. -

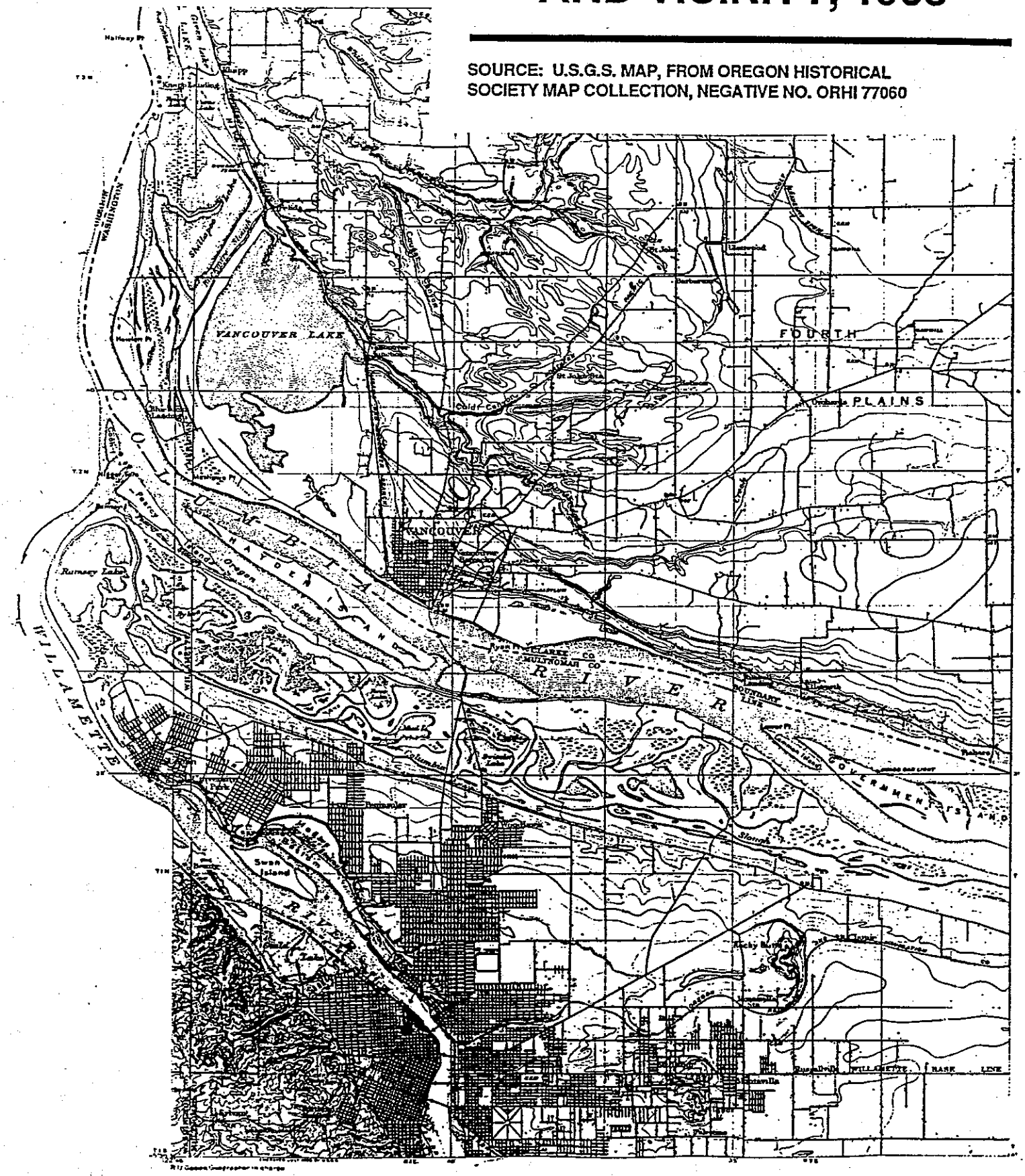


APPENDIX F

HISTORIC WETLANDS

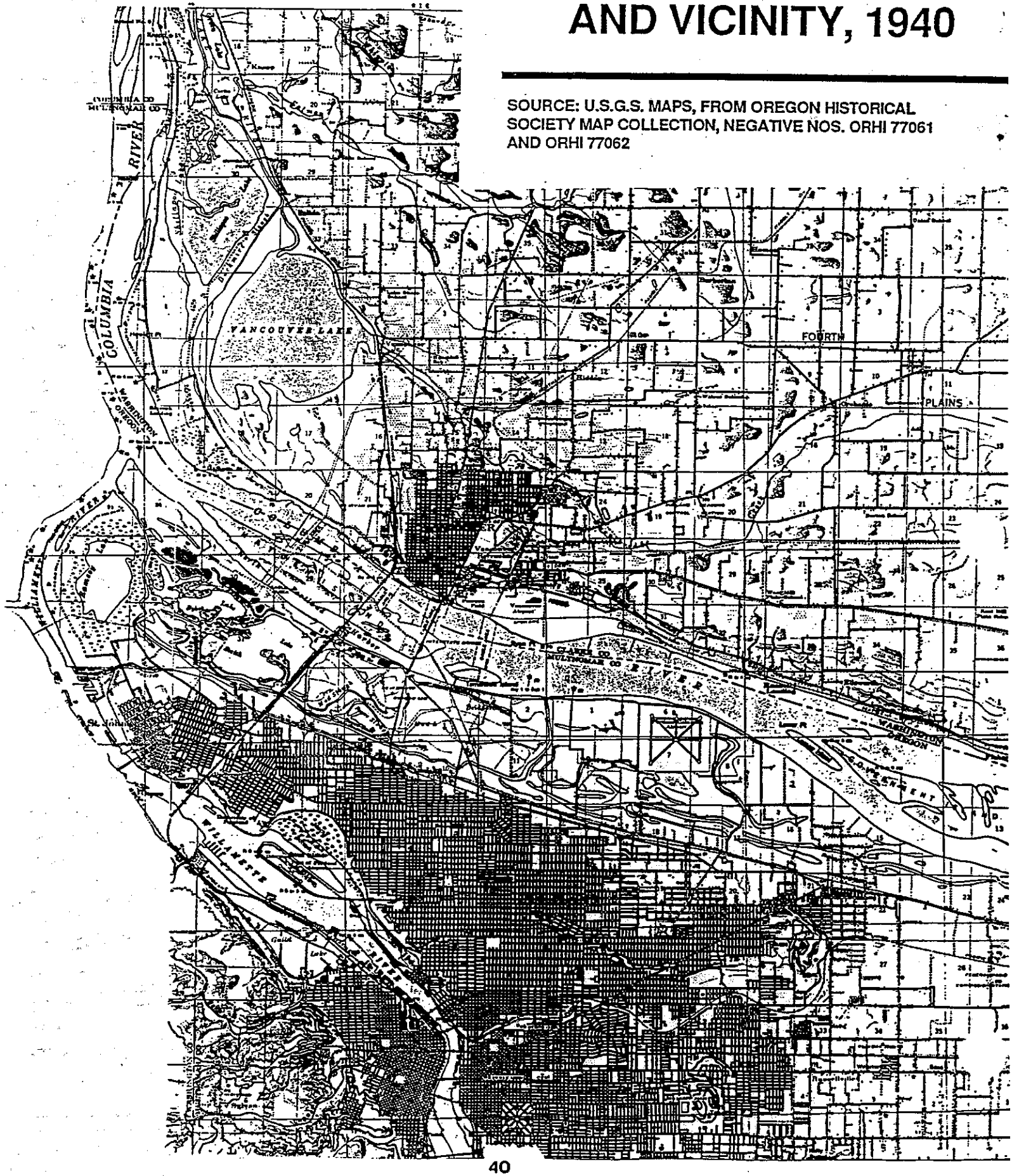
WETLANDS IN THE COLUMBIA CORRIDOR AND VICINITY, 1905

SOURCE: U.S.G.S. MAP, FROM OREGON HISTORICAL SOCIETY MAP COLLECTION, NEGATIVE NO. ORHI 77060



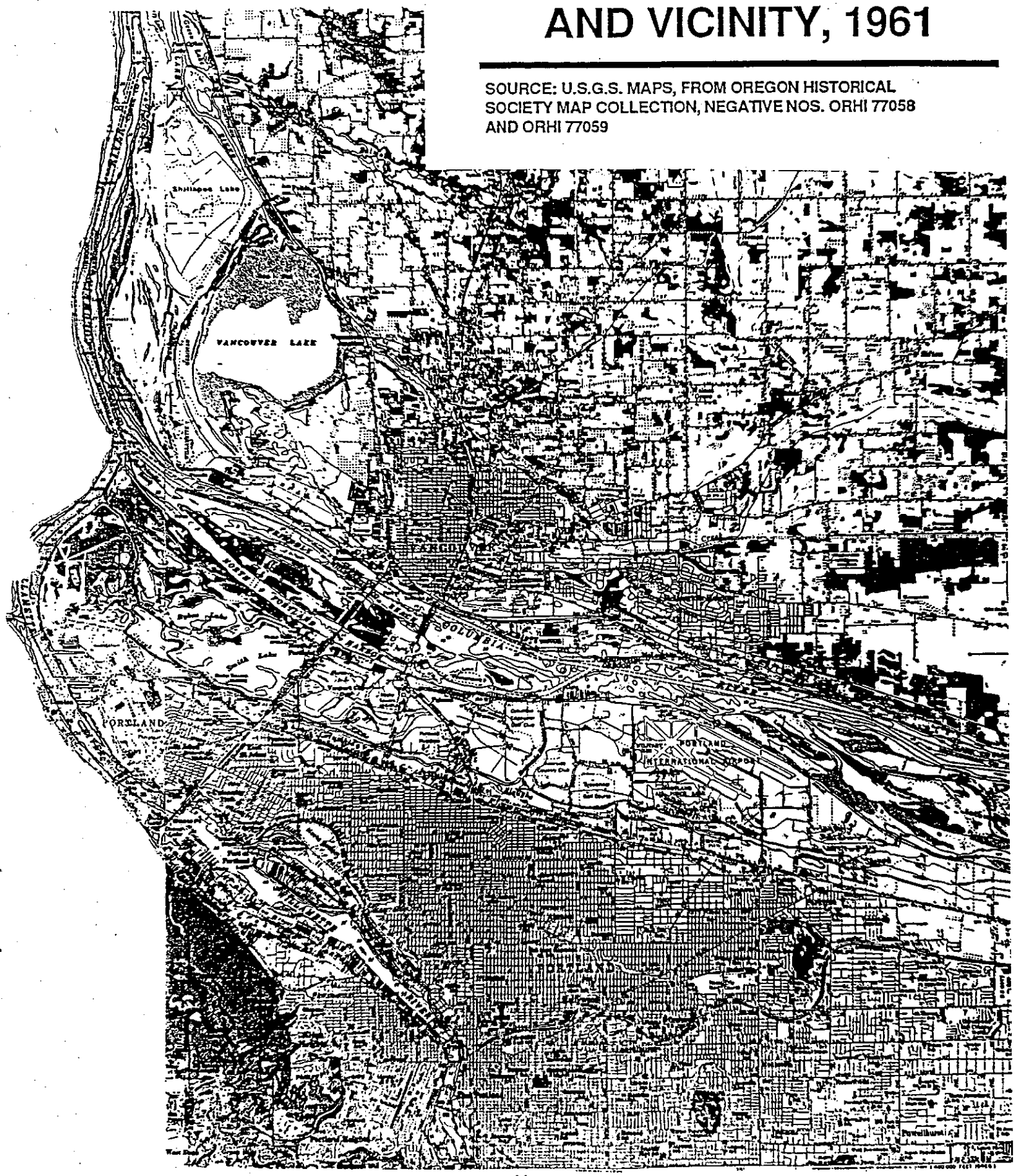
WETLANDS IN THE COLUMBIA CORRIDOR AND VICINITY, 1940

SOURCE: U.S.G.S. MAPS, FROM OREGON HISTORICAL SOCIETY MAP COLLECTION, NEGATIVE NOS. ORHI 77061 AND ORHI 77062



WETLANDS IN THE COLUMBIA CORRIDOR AND VICINITY, 1961

SOURCE: U.S.G.S. MAPS, FROM OREGON HISTORICAL SOCIETY MAP COLLECTION, NEGATIVE NOS. ORHI 77058 AND ORHI 77059



APPENDIX G

HISTORIC GRASSLANDS AND OAK SAVANNAH

compiled by
Esther Lev and Michael Jennings
Biologists

HISTORIC GRASSLANDS AND OAK SAVANNAH

Grasslands and Oak Savannah may have occupied much of the nonriparian areas of the Columbia Corridor prior to European settlement. Franklin and Dyrness (1973) show large tracts of prairie and grassland vegetation present in 1853. The nature of these original grassland communities remains conjectural, since all have been greatly altered. Franklin and Dyrness hypothesize that Indians were probably responsible for most fires which created and maintained prairies and oak savannahs. Thilenius' (1968) analysis of Garry Oak stands indicates that most closed canopy stands in the Willamette Valley originated since 1850, although scattered older, large, open-growth forms of the tree can be found. The average age of these large oaks was found to be 237 years.

It is felt that Oak Savannahs were maintained by fire, and that in many places forest succession began with fire control instituted by European settlers. Several large open-growth forms of oak exist within Portland. Core samples were taken of some of these trees and the average age was found to be approximately 200 years. The core ages and scattered occurrence of open-growth-form oaks correlate with the findings of Thilenius and the hypothesis of Franklin and Dyrness. These oaks are probably remnants of the Oak Savannah which occurred prior to European settlement. Natural Area Site No. 30 is an example of a remaining population of these oaks.

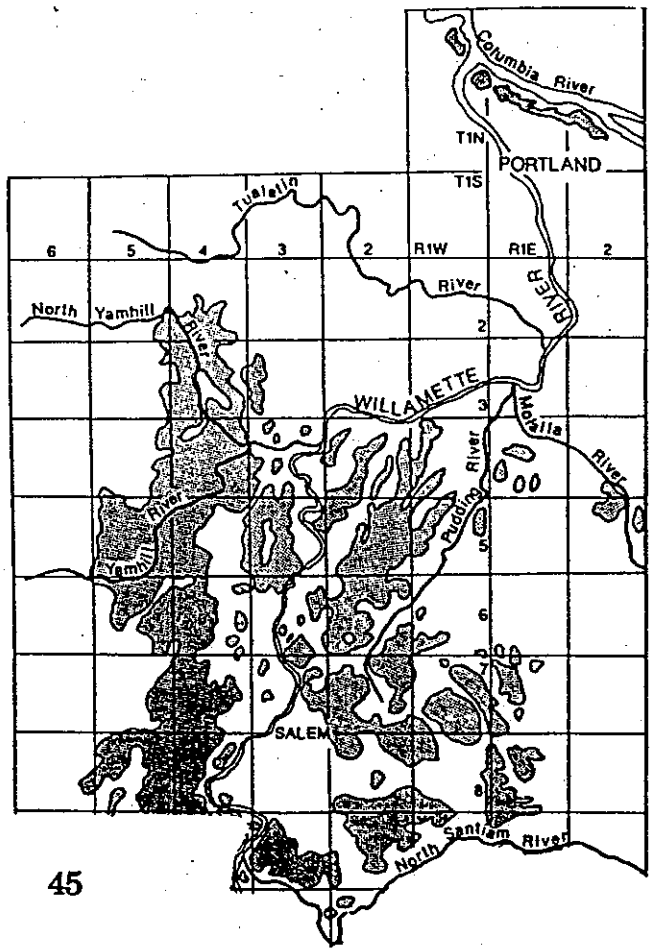


FIGURE-EXTENT OF PRAIRIE IN THE NORTHERN WILLAMETTE VALLEY IN 1853,
from Franklin and Dyrness, 1973

APPENDIX H

RARE, THREATENED, AND ENDANGERED SPECIES
IN THE PORTLAND AREA

compiled by
Esther Lev and Michael Jennings
Biologists

RARE, THREATENED, OR ENDANGERED PLANTS AND ANIMALS IN THE PORTLAND AREA

COMMON NAME	SCIENTIFIC NAME
Plants	
Anderson's Swordfern*	Polystichum andersonii
Wapato*	Sagittaria latifolia
Slim-leafed Onion*	Allium amplectens
Branching Montia*	Montia diffusa
Pale Larkspur*	Delphinium leucophaeum
Nuttall's Larkspur*	Delphinium nuttallii
Macoun's Buttercup*	Ranunculus macounii, var. oreganus
Columbia Cress*	Rorippa columbiae
Bolandra*	Bolandra oregana
Sullivantia*	Sullivantia oregana
Meadow Sidalcea*	Sidalcea campestris
Bergia*	Bergia texana
Howellia*	Howellia aquatilis
Columbia River Mugwort*	Artemisia lindleyana
White-topped Aster*	Aster curtus
Willamette Daisy*	Erigeron decumbens, var. decumbens
Yellowcress	Rorippa columbiae
Animals	
Spotted Frog*	Rana pretisoa
Western Pond Turtle*	Clemmys marmorata
Bald Eagle* **	Haliaeetus leucocephalus
Peregrine Falcon* **	Falco peregrinus
Lewis' Woodpecker*	Melanerpes lewis
Purple Martin* **	Progne subis
Tri-colored Blackbird* **	Agelaius tricolor
Western Big Eared Bat*	Plecotus townsendii, subspecies townsendii

*Source: Oregon Native Plant Society, and Oregon Natural Heritage Program.
**Known localities of these species are in or near Portland, according to the Audubon Society of Portland.

APPENDIX I

PLANTS IN THE PORTLAND AREA

compiled by
Esther Lev and Michael Jennings
Biologists

PARTIAL LIST OF VASCULAR PLANTS OCCURRING WITHIN PORTLAND'S URBAN SERVICES BOUNDARY

Listed by taxonomic family
(Generally exclusive of urban landscape plants.)

COMMON NAME	SCIENTIFIC NAME
Selaginella	Selaginellaceae
Compact Selaginella	Selaginella densa
Horsetail	Equistaceae
Common Horsetail	Equisetum hyemale
Marsh Horsetail	Equisetum palustre
Giant Horsetail	Equisetum telemateia
Common Fern	Polypodiaceae
Northern Maidenhair Fern	Adiantum pedatum
Maidenhair Spleenwort	Asplenium trichomanes
Lady Fern	Athyrium filix-femina
Deer Fern	Blechnum spicant
Brittle Bladder Fern	Cystopteris fragilis
Spreading Wood Fern	Dryopteris austriaca
Licorice Fern	Polypodium glycyrrhiza
Licorice Fern	Polypodium hesperium
Anderson's Sword Fern*	Polystichum andersonii
Sword Fern	Polystichum munitum
Bracken Fern	Pteridium aquilinum
Wood Fern	Thelypteris nevadensis
Water-Fern	Salviniaceae
Duckweed Fern	Azolla filiculoides
Yew	Taxaceae
Yew	Taxus brevifolia
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	Alismataceae
American Water-plantain	Alisma plantago-aquatica
Wapato*	Sagittaria latifolia

COMMON NAME	SCIENTIFIC NAME
Frog's-bit	Hydrocharitaceae
American Waterweed	Elodea densa
Rush	Juncaceae
Short-leaved Rush	Juncus brachyphyllus
Field Woodrush	Luzula campestris
Smallflowered Woodrush	Luzula parviflora
Baltic Rush	Juncus balticus
Toad Rush	Juncus bufonius
Common Rush	Juncus effusus
Sedge	Cyperaceae
Slenderbeaked Sedge	Carex athrostachys
Columbia Sedge	Carex aperta
Dewey's Sedge	Carex deweyana
Henderson's Wood Sedge	Carex hendersonii
Pale Sedge	Carex livida
Slough Sedge	Carex obnupta
Meadow Sedge	Carex praticola
Sawbeak Sedge	Carex stipata
Inflated Sedge	Carex vesicaria
Creeping Spikesedge	Eleocharis palustris
Small-fruited Bullrush	Scirpus microcarpus
Grass	Gramineae
Silver Hairgrass	Aira caryophyllea
Water Foxtail	Alopecurus geniculatus
Sweet Vernalgrass	Anthoxanthum odoratum
Tall Oatgrass	Arrhenatherum elatius
Common Oat	Avena sativa
Ripgut Brome	Bromus rigidus
Alaska Brome	Bromus sitchensis
Cheatgrass	Bromus tectorum
Orchard-grass	Dactylis glomerata
Hairy Crabgrass	Digitaria sanguinalis
Large Barnyard-grass	Echinochloa grusgalli
Alta 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

COMMON NAME	SCIENTIFIC NAME
Cattail	Typhacea
Common Cattail	Typha latifolia
Calla-lily	Araceae
Skunk Cabbage	Lysichitum americanum
Duckweed	Lemnaceae
Water Lentil	Lemna minor
Lily	Liliaceae
Wild Onion	Allium sp.
Slim-leafed Onion*	Allium amplectens
Howell's Brodiaea	Brodiaea howellii
Leichtlin'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
Starry False Solomon's Seal	Smilacina stellata
Oregon Fetid Adder's-tongue	Scoliopus hallii
Clasping-leaved Twisted-stalk	Streptopus amplexifolius
Western Trillium	Trillium ovatum
Giant Trillium	Trillium chloropetalum
False Hellebore	Veratrum californicum
Iris	Iridacea
Oregon Iris	Iris tenax
Yellow Flag	Iris pseudacorus
Blue-eyed grass	Sisyrinchium angustifolium
Orchid	Orchidacea
Fairy Slipper	Calypso bulbosa
Pacific Coral-root	Corallorhiza maculata
Hooded Coral-root	Corallorhiza striata
Snow-orchid	Eburophyton austiniae
Giant Rattlesnake-plantain	Goodyera oblongifolia
Heart-leafed Listera	Listera cordata

COMMON NAME	SCIENTIFIC NAME
Willow	Salicaceae
Cottonwood	Populus trichocarpa
Columbia River Willow	Salix fluviatilis
Pacific Willow	Salix lasiandra
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 caudatum
Buckwheat	Polygonaceae
Doorweed	Polygonum aviculare
Water Smartweed	Polygonum coccineum
Common Waterpepper	Polygonum hydropiperoides
Buckwheat	Polygonaceae
Climbing Bindweed	Polygonum convolvulus
Red Sorrel	Rumex acetosella
Curly Dock	Rumex crispus
Western Dock	Rumex occidentalis
Goosefoot	Chenopodiaceae
Lambsquarters	Chenopodium album
Amaranth	Amaranthaceae
Green Amaranth	Amaranthus retroflexus

COMMON NAME	SCIENTIFIC NAME
Purslane	Portulacaceae
Branching Montia*	Montia diffusa
Narrow-leaved Montia	Montia linearis
Streambank Springbeauty	Montia parvifolia
Siberian Montia	Montia sibirica
Common Purslane	Portulaca oleracea
Pink	Caryophyllaceae
Bigleaf Sandwart	Arenaria macrophylla
Common Chickweed	Cerastium vulgatum
Grass Pink	Dianthus armeria
Western Pearlwort	Sagina occidentalis
Starwort	Spergula arvensis
Crisped Starwort	Stellaria crispa
Chickweed	Stellaria media
Water-lily	Nymphaeaceae
Water-shield	Brasenia schreberi
Yellow Water-lily	Nuphar polysepalum
American Water-lily	Nymphaea odorata
Hornwort	Ceratophyllacea
Coontail	Ceratophyllum demersum
Buttercup	Ranunculaceae
Baneberry	Actaea rubra
Western White Anemone	Anemone deltoidea
Lyall's Anemone	Anemone lyallii
Oregon Anemone	Anemone oregana
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*	Ranunculus macounii, var. oreganus
Western Buttercup	Ranunculus occidentalis
Creeping Buttercup	Ranunculus repens
Little Buttercup	Ranunculus uncinatus
Western Meadowrue	Thalictrum occidentale
Barberry	Berberidaceae
Vanillaleaf	Achlys triphylla
Tall Oregongrape	Berberis aquifolium
Dull Oregongrape	Berberis nervosa
White Inside-out Flower	Vancouveria hexandra

COMMON NAME	SCIENTIFIC NAME
Poppy	Papaveracea
Gold Poppy	Eschscholzia californica
Fumitory	Fumariaceae
Pacific Bleedingheart	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 Bittercress	Cardamine angulata
Little Western Bittercress	Cardamine oligosperma
Pennsylvania Bittercress	Cardamine pensylvanica
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 columbiae
Stonecrop	Crassulacea
Lanceleaved Stonecrop	Sedum lanceolatum
Spatula-leaf Stonecrop	Sedum spathulifolium
Saxifrage	Saxifragaceae
Bolandra*	Bolandra oregana
Greater Boykinia	Boykinia major
Pacific Water-carpet	Chrysosplenium glechomaefolium
Smallflowered Alumroot	Heuchera micrantha
Smooth Alumroot	Heuchera glabra
Leafy Mitrewort	Mitella caulescens
Five-stamened Mitrewort	Mitella pentandra
Rusty Saxifrage	Saxifraga ferruginea
Swamp Saxifrage	Saxifraga integrifolia
Western Saxifrage	Saxifraga occidentalis
Sullivantia*	Sullivantia oregana
Fringecup	Tellima grandiflorum
Laceflower	Tiarella trifoliata
Thousand Mothers	Tolmiea menzziesii

COMMON NAME	SCIENTIFIC NAME
Currant	Grossulariaceae
Western Black Currant	Ribes laxiflorum
Blue Currant	Ribes bracteosum
Red Currant	Ribes sanguineum
Sticky Currant	Ribes viscosissimum
Hydrangea	Hydrangeaceae
Mockorange	Philadelphus lewisii
Rose	Rosaceae
Western Serviceberry	Amelanchier alnifolia
Goatsbeard	Aruncus sylvester
Black Hawthorn (wetland form)	Crataegus douglasii, var. douglasii
Black Hawthorn (upland form)	Crataegus douglasii, var. suksdorfii
Wood Strawberry	Fragaria vesca
Broadpetal Strawberry	Fragaria virginiana
Oregon Avens	Geum macrophyllum
Ocean-spray	Holodiscus discolor
Indian Plum	Osmaronia cerasiformis
Pacific Ninebark	Physocarpus capitatus
Sticky Cinquefoil	Potentilla glandulosa
Norwegian Cinquefoil	Potentilla norvegica
Marsh Cinquefoil	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
Baldhip Rose	Rosa gymnocarpa
Nootka Rose	Rosa nutkana
Evergreen Blackberry	Rubus laciniatus
Trailing Blackberry	Rubus lasiococcus
Blackcap	Rubus leucodermis
Thimbleberry	Rubus parviflorus
Fiveleaved Bramble	Rubus pedatus
Salmonberry	Rubus spetabilis
Pacific Blackberry	Rubus ursinus
Himalayan Blackberry	Rubus discolor
Annual Burnet	Sanguisorba occidentalis
Sitka Mountain-ash	Sorbus sitchensis
Douglas's Spirea	Spirea douglasii

COMMON NAME	SCIENTIFIC NAME
Pea	Leguminosae
Scotch Broom	Cytisus scoparius
Everlasting Pea-vine	Lathyrus latifolius
Hairy vetchling	Lathyrus hirsutus
Grass Pea-vine	Lathyrus sphaericus
Small-flowered Deervetch	Lotus micranthus
Meadow Lotus	Lotus denticulatus
Field Lupine	Lupinus micranthus
Two-color Lupine	Lupinus bicolor
Spurred Lupine	Lupinus laxiflorus
Sulfur Lupine	Lupinus sulphureus
Broadleaf Lupine	Lupinus latifolius
Large-leaved Lupine	Lupinus polyphyllus
Alfalfa	Medicago sativa
White Sweet-clover	Melilotus alba
Hare's Foot	Trifolium arvense
Suckling Clover	Trifolium dubium
Red Clover	Trifloium pratense
Hop Clover	Trifloium procumbens
Dutch Clover	Trifloium repens
Tinegrass	Vicia cracca
American Vetch	Vicia americana
Hairy Vetch	Vicia hirsuta
Winter Vetch	Vicia villosa
Slender Vetch	Vicia tetrasperma
Common Vetch	Vicia sativa
Geranium	Geraniaceae
Stork's-bill	Erodium cicutarium
Carolina Geranium	Geranium carolinianum
Cut-leaf Geranium	Geranium dissectum
Dovefoot Geranium	Geranium molle
Small-flowered Crane's-bill	Geranium pusillum
Wood-sorrel	Oxalidaceaea
Creeping Yellow Wood-sorrel	Oxalis corniculata
Western Yellow Oxalis	Oxalis suksdorfii
Oregon Oxalis	Oxalis oregana
Trillium-leaved Wood-sorrel	Oxalis trilliifolia
Spurge	Euphorbiaceae
Petty Spurge	Euphorbia peplus
Water-starwort	Callitrichaceae
Different-leaf Water-starwort	Callitriche hetrophylla

COMMON NAME	SCIENTIFIC NAME
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	Circeae alpina
Fireweed	Epilobium angustifolium
Watson's Willow-weed	Epilobium watsonii
Common Willow-weed	Epilobium glandulosum
Red-sepaled Evening-primrose	Oenothera erythrosepala
Water-milfoil	Haloragaceae
Water-milfoil	Myriophyllum sp.
Mare's-tail	Hippuridaceae
Common Mare's-tail	Hippurius vulgaris

COMMON NAME	SCIENTIFIC NAME
Ginseng	Araliaceae
English Ivy	Hedera helix
Parsley	Umbelliferae
Sharptooth Angelica	Angelica arguta
Poison-hemlock	Conium maculatum
Queen Ann's Lace	Daucus carota
Cow-parsnip	Heracleum lanatum
Parsley-leaved Lovage	Ligusticum apiifolium
Gray's Lovage	Ligustucum grayii
Common Lomatium	Lomatium utriculatum
Pacific Water-parsley	Oenanthe sarmentosa
Mountain Sweet-root	Osmorhiza chilensis
Pacific Sanicle	Sanicula crassicaulis
Dogwood	Cornaceae
Western Flowering Dogwood	Cornus nuttallii
Red-osier Dogwood	Cornus stolenif
Heath	Ericaceae
Madrone	Arbutus menziesii
Salal	Gaultheria shallon
Indian-pipe	Monotropa uniflora
Western Rhododendron	Rhododendron macrophyllum
Western Azalea	Rhododendron occidentale
Red Huckleberry	Vaccinium parvifolium
Evergreen Huckleberry	Vaccinium ovatum
Primrose	Primulaceae
Pimpernel	Anagallis arvensis
Fringed Loosestrife	Lysimachia ciliata
Tufted Loosestrife	Lysimachia thyrsiflora
Western Starflower	Trientalis latifolia
Ash	Oleacea
Oregon Ash	Fraxinus latifolia
Gentian	Gentianacea
Common Centaury	Centaurium umbellatum
Staff Gentian	Gentiana sceptrum
Northern Gentian	Gentiana amarella
Buck-bean	Menyanthaceae
Buckbean	Menyanthes trifoliata

COMMON NAME	SCIENTIFIC NAME
Dogbane	Apocynaceae
Spreading Dogbane	Apocynum androsaemifolium
Periwinkle	Vinca major
Morning-glory	Convolvulaceae
Field Morning-glory	Convolvulus arvensis
Night-blooming Morning-glory	Convolvulus nyctagineus
Lady's-nightcap	Convolvulus seppium
Dodder	Cuscutaceae
Common Dodder	Cuscuta epithymum
Phlox	Polemoniaceae
Varied-leaf Collomia	Collomia heterophylla
Large-flowered Collomia	Collomia grandiflora
Bicolored Linanthus	Linanthus bicolor
Phlox	Polemoniaceae
Microsteris	Microsteris gracilis
Skunkweed	Navarretia squarrosa
Waterleaf	Hydrophyllacea
Pacific Waterleaf	Hydrophyllum tenuipes
Small-flowered Nemophila	Nemophila parviflora
Shade Phacelia	Phacelia nemoralis
Borage	Boraginaceae
Borage	Borago officinalis
Common Forget-me-not	Cryptantha intermedia
Pacific Hound's-tongue	Cynoglossum grande
Western Bluebells	Mertensia platyphylla
Common Forget-me-not	Myosotis scorpiodes
Blue Scorpion-grass	Myosotis micrantha
Yellow and Blue Forget-me-not	Myosotis discolor
Fragrant Plagiobothrys	Plagiobothrys figuratus
Common Comfrey	Symphytum officinale
Rough Comfrey	Symphytum asperum
Verbena	Verbenaceae
Wild Hyssop	Verbena hastata

COMMON NAME	SCIENTIFIC NAME
Mint	Labiatae
Hemp Nettle	Galeopsis tetrahit
Ground Ivy	Glecoma hederacea
Red Henbit	Lamium purpureum
Horehound	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
Self-heal	Prunella vulgaris
Savory	Satureja 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 Snapdragon	Antirrhinum orontium
Golden Indian-paintbrush	Castilleja levisecta
Small-flowered Blue-eyed Mary	Collinsia parviflora
Large-flowered Blue-eyed Mary	Collinsia grandiflora
Foxglove	Digitalis purpurea
Mudwort	Limosella aquatica
Butter And Eggs	Linaria vulgaris
Yellow Monkey-flower	Mimulus guttatus
Musk-flower	Mimulus moschatus
Chickweed Monkey-flower	Mimulus alsinoides
Hairy Owl-Clover	Orthocarpus hispidus
Broad-leaved Penstemon	Penstemon ovatus
California Figwort	Scrophalaria californica
Snow Queen	Synthyris reniformis
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

COMMON NAME	SCIENTIFIC NAME
Bladderwort	Lentibulariaceae
Common Bladderwort	Utricularia vulgaris
Plantain	Plantaginageae
English Plantain	Plantago lanceolata
Common Plantain	Plantago major
Madder	Rubiaceae
Sweet Woodruff	Asperula odorata
Cleavers	Galium aparine
Rough Bedstraw	Galium asperrimum
Sweetscented Bedstraw	Galium triflorum
Small Bedstraw	Galium trifidum
Blue Field-madder	Sherardia arvensis
Honeysuckle	Caprifoliaceae
Twinflower	Linnaea borealis
Trumpet Vine	Lonicera ciliosa
Black Twinberry	Lonicera involucrata
Blue Elderberry	Sambucus cerulea
Red Elderberry	Sambucus racemosa
Common Snowberry	Symphoricarpos albus
Valerian	Valerianaceae
Lamb's Lettuce	Valerianella locusta
Teasel	Dipsacaceae
Teasel	Dipsacus sylvestris
Cucumber	Cucurbitaceae
Manroot	Marah oreganus
Harebell	Campanulaceae
Scouler's Bellflower	Campanula scouleri
Canterbury Bell	Campanula medium
Howellia*	Howellia aquatilis

COMMON NAME	SCIENTIFIC NAME
Aster	Compositae
Yarrow	Achillea millefolium
Pathfinder	Adenocaulon bicolor
Large-flowered Agoseris	Agoseris grandiflora
Pearly-everlasting	Anaphalis margaritacea
Mayweed Chamomile	Anthemis cotula
Common Burdock	Arctium minus
Douglas's Sagewort	Artemisia douglasiana
Columbia River Mugwort*	Artemisia lindleyana
Common California Aster	Aster chilensis
White-topped Aster*	Aster curtus
Douglas's Aster	Aster subspicatus
English Daisy	Bellis perennis
Water Marigold	Bidens beckii
Nodding Beggars-tick	Bidens cernua
Three-lobed Beggars-tick	Bidens tripartia
Leafy Beggars-tick	Bidens frondosa
Western Beggars-tick	Bidens vulgata
Bachelor's Button	Centaurea cyanus
Brown Knapweed	Centaurea jacea
Marguerite	Chrysanthemum leucanthemum
Chicory	Cichorium intybus
Canada Thistle	Cirsium arvense
Common Thistle	Cirsium vulgare
Horseweed	Conyza canadensis
Rough Hawksbeard	Crepis setosaq
Smooth Hawksbeard	Crepis capillaris
Annual Fleabane	Erigeron annuus
Willamette Daisy*	Erigeron decumbens, var. decumbens
Philadelphia Fleabane	Erigeron Philadelphicus
Quickweed	Galinsoga ciliata
Marsh Cudweed	Gnaphalium palustre
Sneezweed	Helenium autumnale
Jerusalem Artichoke	Helianthus tuberosus
White-flowered Hawkweed	Hieracium albiflorum
Common Hawkweed	Hieracium vulgatum
Spotted Cats-ear	Hypochaeris radicata
Smooth Cats-ear	Hypochaeris glabra
Prickly Lettuce	Lactuca seriola
Nipplewort	Lapsana communis
Fall Dandelion	Leontodon autumnalis
Cluster Tarweed	Madia glomerata
Chile Tarweed	Madia sativa
Pineapple Weed	Matricaria matricarioides

COMMON NAME	SCIENTIFIC NAME
Aster (continued)	Compositae
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

* Considered rare, threatened, or endangered by the Oregon Native Plant Society, or the Oregon Natural Heritage Program.

APPENDIX J

ANIMALS IN THE PORTLAND AREA

compiled by
Esther Lev and Michael Jennings
Biologists

PARTIAL LIST OF AMPHIBIANS AND REPTILES OCCURRING WITHIN PORTLAND'S URBAN SERVICES BOUNDARY

Listed by taxonomic family

COMMON NAME	SCIENTIFIC NAME
Salamanders	Ambystomatidae
Northwestern Salamander	Ambystoma gracile
Long-toed Salamander	Ambystoma macrodactylum
Pacific Giant Salamander	Dicamptodon ensatus
Olympic Salamander	Rhyacotriton olympicus
Lungless Salamanders	Plethodontidae
Clouded Salamander	Aneides ferreus
Dunn's Salamander	Plethodon dunni
Western 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 pretisoa
Bullfrog	Rana catesbeiana
Turtles	Chelydridae
Western Pond Turtle*	Clemmys marmorata
Painted Turtle	Chrysemys picta
Iguanids	Iguanidae
Western Fence Lizard	Sceloporus occidentalis
Alligator Lizards	Anguidae
Northern Alligator Lizard	Gerrhonotus coeruleus
Southern Alligator Lizard	Gerrhonotus multicarinatus

COMMON NAME	SCIENTIFIC NAME
Skinks	Scincidae
Western Skink	Eumeces skiltonianus
Boas	Boidae
Rubber Boa	Charina bottae
Colubrids	Colubridae
Racer	Coluber constrictor
Ringneck Snake	Diadophis punctatus
Common Garter Snake	Thamnophis sirtalia
Northwestern Garter Snake	Thamnophis ordinoides

* Considered rare, threatened, or endangered by the Oregon Native Plant Society, or the Oregon Natural Heritage Program.

PARTIAL LIST OF BIRDS
OCCURRING WITHIN PORTLAND'S URBAN SERVICES BOUNDARY

Listed by taxonomic family

COMMON NAME	SCIENTIFIC NAME
Loons	Gaviidae
Common Loon	Gavia immer
Grebes	Podicipedidae
Horned Grebe	Podiceps auritus
Pied-billed Grebe	Podilymbus podiceps
Western Grebe	Aechmophorus occidentalis
Cormorants	Phalacrocoracidae
Double-crested Cormorant	Phalacrocorax auritus
Herons	Ardeidae
American Bittern	Botaurus lentiginosus
Black-crowned Night Heron	Nycticorax nycticorax
Green-backed Heron	Butorides striatus
Great Blue Heron	Ardea herodias
Swans, Geese, Ducks	Anatidae
Snow Goose	Chen caerulescens
White-fronted Goose	Anser albifrons
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
Ruddy 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
Bufflehead	Bucephala albeola
Common Merganser	Mergus merganser
Hooded Merganser	Lophodytes cucullatus

COMMON NAME	SCIENTIFIC NAME
Rails, Gallinules, Coots	Rallidae
Virginia Rail	Rallus limicola
Sora Rail	Coturnicops noveboracensis
American Coot	Fulica americana
Plovers	Charadriidae
Semipalmated Plover	Charadrius semipalmatus
Killdeer	Charadrius vociferus
Sandpipers	Scolopacidae
Greater Yellowlegs	Tringa melanoleuca
Lesser Yellowlegs	Tringa flavipes
Solitary Sandpiper	Tringa solitaria
Spotted Sandpiper	Actitis macularia
Long-billed Dowitcher	Limnodromus scolopaceus
Common Snipe	Gallinaga gallinago
Dunlin	Calidris alpina
Western Sandpiper	Calidris mauri
Least Sandpiper	Calidris minutilla
Jaegers, Gulls, Terns	Laridae
Bonaparte's Gull	Larus philadelphia
Ring-billed Gull	Larus delawarensis
Mew Gull	Larus argentatus
Herring Gull	Larus californicus
California Gull	Larus glaucescens
Glaucous-winged Gull	Sterna forsteri
Forster's Tern	Sterna caspia
Caspian Tern	
American Vulture	Catharidae
Turkey Vulture	Cathartes aura
Kites, Hawks, Eagles	Accipitridae
Bald Eagle*	Haliaeetus leucocephalus
Northern Harrier	Circus cyaneus
Sharp-shinned Hawk	Accipiter striatus
Cooper's Hawk	Accipiter cooperii
Red-tailed Hawk	Buteo jamaicensis
Rough-legged Hawk	Buteo lagopus
Osprey	Pandion haliaetus
Falcons, Caracara	Falconidae
American Kestrel	Falco sparverius
Merlin	Falco columbarius
Peregrine Falcon*	Falco peregrinus

COMMON NAME	SCIENTIFIC NAME
Grouse, Ptarmigan	Phasianidae
Ruffed Grouse	Bonasa umbellus
California Quail	Callipepla
Ring-necked Pheasant	Phasianus colchicus
Pigeons, Doves	Columbidae
Band-tailed Pigeon	Columba fasciata
Rock Dove	Columba livia
Mourning Dove	Zenaida macroura
Parrots	Psittacidae
Monk Parakeet	Myiopsitta monachus
Owls	Tytonidae
Barn Owl	Tyto alba
Owls	Strigidae
Short-eared owl	Asio flammeus
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
Rufous Hummingbird	Selasphorus rufus
Kingfishers	Alcedinidae
Belted Kingfisher	Ceryle alcyon
Woodpeckers	Picidae
Northern Flicker	Colaptes auratus
Lewis' Woodpecker*	Melanerpes lewis
Red-breasted Sapsucker	Sphyrapicus ruber
Downy Woodpecker	Picoides pubescens
Hairy Woodpecker	Picoides villosus
Pileated Woodpecker	Dryocopus pileatus
Tyrant Flycatchers	Tyrannidae
Olive-sided Flycatcher	Contopus borealis
Western Wood-Peewee	Contopus sordidulus
Willow Flycatcher	Empidonax traillii
Western Flycatcher	Empidonax difficilis

COMMON NAME	SCIENTIFIC NAME
Larks	Alaudidae
Horned Lark	Ermophila alpestris
Swallows	Hirundinidae
Tree Swallow	Tachycineta bicolor
Violet-green Swallow	Tachycineta thalassina
Purple Martin*	Progne subis
Bank Swallow	Riparia riparia
Northern Rough-winged Swallow	Stelgidopteryx serripennis
Cliff Swallow	Hirundo pyrrhonota
Barn Swallow	Hirundo rustica
Jays, Crows, Magpies	Corvidae
Scrub Jay	Aphelocoma coerulescens
Stellar's Jay	Cyanocitta stelleri
American Crow	Corvus brachyrhynchos
Common Raven	Corvus corax
Chickadees	Paridae
Black-capped Chickadee	Parus atricapillus
Chestnut-backed Chickadee	Parus rufescens
Bushtit	Aegithalidae
Bushtit	Psaltriparus minimus
Creepers	Certhiidae
Brown Creeper	Certhia americana
Nuthatches	Sittidae
White-breasted Nuthatch	Sitta carolinensis
Red-breasted Nuthatch	Sitta canadensis
Wrens	Troglodytidae
House Wren	Troglodytes aedon
Winter Wren	Troglodytes troglodytes
Bewick's Wren	Thryomanes bewickii
Marsh Wren	Cistothorus palustris
Thrushes	Muscicapidae
Golden-crowned Kinglet	Regulus satrapa
Ruby-crowned Kinglet	Regulus calendula
Western Bluebird	Sialia mexicana
Swainson's Thrush	Catharus ustulatus
Varied Thrush	Ixoreus naevius
American Robin	Turdus migratorius

COMMON NAME	SCIENTIFIC NAME
Shrikes	Laniidae
Northern Shrike	Lanius excubitor
Pipits, Wagtails	Cinclidae
Water Pipit	Anthus spinoletta
Dippers	Cinclidae
American Dipper	Cinclus mexicanus
Waxwings	Bombycillidae
Cedar Waxwing	Bombycilla cedrorum
Starlings	Sturnidae
European Starling	Sturnus vulgaris
Vireos	Vireoni
Hutton's Vireo	Vireo huttoni
Solitary Vireo	Vireo solitarius
Warbling Vireo	Vireo gilvus
Warblers, Sparrows	Emberizidae
Orange-crowned Warbler	Vermivora celata
Yellow-rumped Warbler	Dendroica coronata
Townsend's Warbler	Dendroica townsendi
Yellow Warbler	Dendroica petechia
MacGillivray's Warbler	Oporornis tolmiei
Wilson's Warbler	Wilsonia pusilla
Common Yellowthroat	Geothlypis trichas
Yellow-breasted Chat	Icteria virens
Black-headed Grosbeak	Pheucticus melanocephalus
Lazuli Bunting	Passerina amoena
Rufous-sided Towhee	Pipilo erthrophthalmus
Savannah Sparrow	Passerculus sandwichensis
Song Sparrow	Melospiza melodia
Chipping Sparrow	Spizella passerina
Dark-eyed Junco	Junco hyemalis
White-crowned Sparrow	Zonotrichia leucophrys
Golden-crowned Sparrow	Zonotrichia atricapilla
Fox Sparrow	Passerella iliaca
Western Meadowlark	Sturnella neglecta
Yellow-headed Blackbird	Xanthocephalus xanthocephalus
Red-winged Blackbird	Agelaius phoeniceus
Tricolored Blackbird*	Agelaius tricolor
Brewer's Blackbird	Euphagus carolinus

COMMON NAME	SCIENTIFIC NAME
Warblers, Sparrows (continued)	Emberizidae
Brown-headed Cowbird	Molothrus ater
Northern Oriole	Icterus galbula
Western Tanager	Piranga ludoviciana
House Sparrow	Passer domesticus
Finches	Fringillidae
Pine Siskin	Carduelis pinus
American Goldfinch	Carduelis tristis
Purple Finch	Carpodacus purpureus
House Finch	Carpodacus mexicanus
Evening Grosbeak	Coccothraustes vespertinus

* Considered rare, threatened, or endangered by the Oregon Native Plant Society, or the Oregon Natural Heritage Program.

PARTIAL LIST OF MAMMALS OCCURRING WITHIN PORTLAND'S URBAN SERVICES BOUNDARY

Listed by taxonomic family

COMMON NAME	SCIENTIFIC NAME
Oppossum	Didelphidae
Virginia Oppossum	Didelphis virginiana
Shrew	Soricidae
Vagrant Shrew	Sorex vagrans
Dusky Shrew	Sorex monticolus
Marsh Shrew	Sorex bendirii
Trowbridge Shrew	Sorex trowbridgii
Moles	Talpidae
American Shrew Mole	Neurotrichus gibbsii
Townsend's Mole	Scapanus townsendii
Coast Mole	Scapanus orarius
Common Bats	Vespertilionidae
Yuma Bat	Myotis yumanensis
Little Brown Bat	Myotis lucifugus
California Bat	Myotis californicus
Long-eared Bat	Myotis evotis
Fringed Bat	Myotis thysanodes
Long-legged Brown Bat	Myotis volans
Silver-haired Bat	Lasionycteris noctivagans
Big Brown Bat	Eptesicus fuscus
Hoary Bat	Lasiurus cinereus
Western Big-eared Bat*	Plecotus townsendii, subspecies townsendii
Rabbits, Hares, Pikas	Ochotonidae
Brush Rabbit	Sylvilagus bachmani
Eastern Cottontail	Sylvilagus floridanus
Mountain Beavers	Aplodontidae
Mountain Beaver	Aplondontia rufa
Squirrels, Chipmunks, Pikas	Sciuridae
Townsend's Chipmunk	Eutamias townsendii
California Ground Squirrel	Spermophilus beecheyi
Western Ground Squirrel	Sciurus griseus
Chickaree	Tamiasciurus douglasii
Northern Flying Squirrel	Glaucomys sabrinus

COMMON NAME	SCIENTIFIC NAME
Pocket Gophers	Geomyidae
Western Pocket Gopher	Thomomys mazama
Camas Pocket Gopher	Thomomys bulbivorus
Beavers	Castoridae
Beaver	Castor canadensis
Rats, Mice	Cricetidae
Deer Mouse	Peromyscus maniculatus
Dusky-footed Woodrat	Neotoma fuscipes
Bushy-tailed Woodrat	Neotoma cinerea
Western Red-backed Vole	Clethrionomys californicus
Townsend's Vole	Microtus townsendii
Long-tailed Vole	Microtus longicaudus
Gray-tailed Vole	Microtus Canicaudus
Creeping Vole	Microtus oregoni
Muskrat	Ondatra zibethica
Black Rat	Rattus rattus
Norway Rat	Rattus norvegicus
House Mouse	Mus musculus
Pacific Jumping Mouse	Zapus trinatatus
Nutria	Capromyidae
Nutria	Myocastor coypus
Dogs	Canidae
Coyote	Canis latrans
Red Fox	Vulpes vulpes
Gray Fox	Urocyon cinereoargenteus
Bears	Ursidae
Black Bear	Ursus americanus
Raccoons	Procyonidae
Raccoon	Procyon lator
Marten	Martes americana
Short-tailed Weasel	Mustela erminea
Long-tailed Weasel	Mustela frenata
Mink	Mustela vison
Spotted Skunk	Spilogale putorius
Striped Skunk	Mephitis mephitis
River Otter	Lutra canadensis

COMMON NAME	SCIENTIFIC NAME
Cats	Felidae
Bobcat	Lynx rufus
Deer	Cervidae
Black-tailed Deer	Odocoileus hemionus

* Considered rare, threatened, or endangered by the Oregon Native Plant Society, or the Oregon Natural Heritage Program.

APPENDIX K

HISTORY OF
THE LOWER COLUMBIA SLOUGH
AND SMITH AND BYBEE LAKES

adapted from
The Planning Development of Smith and Bybee Lakes-
A Historic Perspective
Tamara DeRidder
March 3, 1988

HISTORY OF THE LOWER COLUMBIA SLOUGH AND SMITH AND BYBEE LAKES

Prior to 1965, development and activities around Smith and Bybee Lakes were largely influenced by constraints of its location on the southerly floodplain of the Columbia River, east of the Willamette River. Located on Portland's northern peninsula, these lakes are just two of a series of seasonal lakes which historically interlaced the floodplain north of the Columbia Slough and stretched from the Sandy River delta to the Willamette River. As land acquisition and technology allowed, economic and residential development began the long process of sculpting this floodplain area into what is now predominantly a man-made environment.

The Columbia Slough, which feeds the Smith and Bybee Lakes, runs parallel to the Columbia River and is theorized to once have connected the Sandy, Columbia and Willamette Rivers. The slough and adjacent lakes provided sheltered passageway and rich foraging ground of plants and game for the Indian tribes who lived along the slough. Yearly floods constantly changed the shape of the land and provided flushing of the water bodies, creating a healthy wetlands environment.

The Donation Land Claim Act of 1850 drew homesteaders westward to Portland. People began settling on the higher ground south of the slough, with the development focused around James Johns' new town of St. Johns. When the Union Pacific rail line laid near water level along the Columbia Gorge and into East Portland along the south bank of the Columbia Slough was completed in 1883, Portland became the terminus for a transcontinental railway. With this rail link in place, restructuring of the adjacent floodplain began in earnest. By 1900, Portland increased its original plat to a 12-mile radius which included the Willamette River delta.

Development at this time was speculative. Tracts along the Columbia Slough and around Smith and Bybee Lakes were being bought by the railroad for future freightyards and support industries. The SP&S Railroad in 1907 received permission from Multnomah County to excavate a deep cut across North Portland and for an elevated fill extending into the eastern edge of Smith Lake for a rail linking Portland with Spokane and Seattle. In 1912, this track was completed, bridging the Columbia River for the first time. The next year, St. Johns annexed to the City of Portland.

In the late 1900's, legislative empowerment to build dikes and levees, in addition to the Corps of Engineers' construction of the Peninsula Drainage Canal, further supported the north peninsula as a prime development area. The new canal access, including a direct opening to the Columbia River at about N.E. 13th Avenue, allowed water to flush from the Columbia

River westward through the slough to the Willamette. Lumber mills, meatpacking plants and barrel manufacturing are a few of the industries that began to take advantage of the slough as a transport canal, as well as a waste repository.

In the 1930's, the Bonneville Power Administration placed power lines accross the western corner of Bybee Lake. In 1932, the City purchased a tract including Simmons and Bybee Lakes, the western end of Smith Lake and a leg of property reaching southwest accross the access road. A garbage incinerator site was then located across Swift (Columbia) Boulevard from Smith and Bybee Lakes. Ash from this burner, as well as unburned garbage, was used to fill Simmons Lake, now known as the St. Johns Landfill. This location is directly adjacent to both Smith and Bybee Lakes. In 1938, an inceptor sewage system was approved by Portland voters. A series of sewer outfalls emptied effluent directly into the Columbia Slough, as well as into the Columbia River.

In the forties, Portland was thriving from the wartime economy. The Port of Portland had a drydock and several terminals available for seagoing vessels. In 1942-43, Vanport was built to accommodate 72,000 workers who came to work in the Portland area shipyards. Vanport was located directly east of the Smith and Bybee Lakes. In May of 1948, a flood destroyed Vanport. The Corps of Engineers plugged the Peninsula Drainage Canal in two locations as a precaution from further flood damage. This action significantly reduced the flushing action. Continuing industrial and residential pollution dumped into the slough had no place to go. By the end of the 1940's, workers at the lumber mills along the slough struck, refusing to handle the filth-coated logs that were towed through the water. Because of this and the emergence of transportation alternatives, many lumber and shingle mills moved away, leaving the slough and lake areas with very few industries along their banks.

Concern for the slough's condition spawned clean-up efforts by citizens and businesses. In 1951, rallying cries from the public endorsed the opening of Portland's primary sewage treatment plant through authorization of a $12-million bond issue. By redesigning the inceptor system, which deposited sewage directly into the Willamette River and the slough through a series of outfalls, the new facility provided treatment and then discharged the effluent into the Columbia River via a single outfall. This provided new hope for Smith and Bybee Lakes, which were fighting contamination from leachate from the St. Johns Landfill and other sources.

In the next thirty years, the Smith and Bybee Lakes were addressed as part of the larger north Portland peninsula. Planning for the entire peninsula proceeded from the late 50's through the early 80's, providing a comprehensive vision and policy direction for this larger area.

In 1950, congress declared the slough a navigable waterway. It was recommended that it be dredged, straightened, widened and unplugged. This action would have affected the southern perimeters of both Smith and Bybee Lakes. However, the plan was never enacted due to the lack of local sponsorship and $200,000 in matching funds.

The Port of Portland by this time had become an established industrial developer in the area. Created as a municipal corporation by the Oregon Legislature to enhance trade opportunities, its powers not only included river and harbor improvements, but also the ability to acquire upland areas for related uses and activities. World War II spurred the growth of the Port of Portland's Swan Island shipyards in the early 1940's. By 1941, the Port began the acquisition of land known as Rivergate, the area which now covers over 3,000 acres. In 1957, the Port of Portland commissioned Cornell, Howland, Hayes and Merryfield (later CH2M-Hill) to do the Ramsey Lake Study, which produced the first comprehensive planning for the area. The Port projected its future land acquisitions through sponsoring this planning effort which looked at all of what is now Rivergate, Smith and Bybee Lakes, and Hayden Island, and designated some broad land use patterns. In 1959, the Port made a bid to the City of Portland to acquire the City's "reserve" refuse disposal land north of St. Johns for immediate dredge fill needs. This area, an estimated 196 acres, is reflected in the current Port of Portland's property lines . South Rivergate was the initial area developed under this plan. In 1961, the Port was using its existing holdings of about 750 acres at the west end of the delta to deposit dredge spoils. They soon expressed interest in 2,013 acres of adjacent wetland which Fredrick W. Leadbetter had deeded to Willamette University under the conditions that it not to be sold until 1998.

Land acquisition and development policies have transformed through governmental projections of the public need of the times. Gradually, independent acquisition of the north peninsula property was superseded by government and corporate intervention, often for the good of the war efforts. Development reflected available transportation options. By 1965, the Columbia Corridor between the Sandy and Willamette Rivers supported two rail lines, two airports, a drydock, terminal docking and the I-5 Interstate freeway as well as extensive industrial development. In addition, the property was fairly cheap and had little conflict with residential development. This allowed establishment of many land uses and activities normally considered obnoxious or in conflict with traditional urban development form.

Prior to 1965, the general community was provided little opportunity for input in the decision-making processes that affected the area. F. H. Ramsey and James Bybee, for whom the lakes were named, were members of the original twelve families which helped to establish the town of St. Johns. In the early 1900's, the Smith family established holdings of the majority of what is now known as Smith Lake. Some of this holding was kept in the family; approximately one-eighth of the lake is still deeded to

Smiths. This lake property, as is all of the north peninsula area, was influenced by the rapid development that took place after the installation of the Union Pacific rail line at the turn of the century. Even as the century began, however, some Portlanders envisioned the delta as a 'meadow park' to be incorporated into the City park system. In 1904, the Olmsted Brothers were brought to Portland from Boston to propose a park system as part of the planning for the Lewis and Clark Exposition. The idea for a comprehensive park development and the 40-Mile Loop Trail began from this effort. The first commercial recreational use for the Columbia Corridor was a swimming park where Jantzen Beach Shopping Center is now located on Hayden Island, constructed in 1915. When logging on the Slough became popular in the 1930's, recreational boating and social clubs (fishing, hunting) began to take an interest in the slough and lake areas as recreational waterways.

When the City located both the garbage dump and the interceptor stations near Smith and Bybee Lakes, little public review of the plans occurred. The only public opposition to the incinerator and dump was public outcry in 1929 against its location at the other sites.

The period between 1965 and 1985 marks the first time that community interest was aroused for Smith and Bybee Lakes and the surrounding north peninsula. Economic development occurred through largely unhindered expansion, until community involvement and local, state and federal regulations began to demand considerations in the land-use planning processes. Key factors in the continuing existence of Smith and Bybee Lakes have been the inaccessibility of their location, the environmental awareness of the 70's, and increasingly-effective community action. Through the actions of the latter group several regulations and laws developed to protect the area.

Economic development and land acquisition of the area in and around Smith and Bybee Lakes was spearheaded by the Port of Portland in 1965. Realizing the potential for industrial expansion during the post-war boom, the Port of Portland began gathering data to justify expansion of its land holdings. In 1964 they employed Batelle Memorial Institute to prepare a Rivergate Industrial Marketing Study. This was followed by a land demand study from the same firm in 1965. Following detailed studies of the potential use of the peninsula, including consultation with the Urban Land Institute, the Port acquired from the Leadbetter estate more than 2,000 additional acres in Rivergate. The Leadbetter estate had been deeded to Willamette University at his death in 1948 on the condition that it not be sold before 1998. The Port of Portland was able to break the deed restriction through condemnation of the land on the grounds of industrial need. A counter-suit was filed and finally resolved in 1968, allowing the Port to begin development. The acquisition area boundary skirted the northern perimeter of Smith Lake, included the northern half of Bybee Lake, and followed the western edge of Bybee Lake south, splitting the slough next to the St. Johns Landfill.

In 1966, the North Portland Peninsula General Plan was prepared by Daniel, Mann, Johnson and Mendenhall (DMJM) as the Port of Portland's future twenty-year plan. As recommended in an intensive study by the Urban Land Institute Industrial Council, the Port prepared a comprehensive general plan for the entire peninsula and a more precise plan for industrial development. They suggested that the total effort could be coordinated by a planning consultant in cooperation with all the public agencies in the area concerned. The Rivergate and the North Portland Peninsula Technical Report was produced in 1967.

According to the plan, 138 acres within the Rivergate Industrial District, principally located around the junction of Smith and Bybee Lakes, were planned for commercial/recreation and resort-oriented facilities. The plan proposed intensive dredging, redesigning and banking of Smith and Bybee Lakes to provide convenient boat access and adequate support for buildings which were to line the perimeters. Bybee Lake was proposed for active water sports where boat moorings and water-skiing would be permitted, while Smith Lake was proposed as a passive water area, with one potential exception. The plan included the possibility of an annual hydroplane race on Smith Lake, assuming certain dredgings and other improvements were completed. The plan included a recommendation for the construction of a drainage district encompassing the area from North Portland Road to the Willamette River. The drainage district would control the water level of Smith and Bybee Lakes, permitting their development for recreational uses. The Corps of Engineers provided an analytical study of water capacity in the slough which was applied to the Smith and Bybee Lakes recommendations. The consultants preparing the study found that the greatest public benefits resulted from this option out of the various alternatives studied. Over the next five years, this plan represented the vision of development for the North Portland Peninsula.

Landfilling and vegetation removal transformed all of the peninsula west of the rail line except for Kelley Point, which was given to the City as a park, and the area around Smith and Bybee Lakes. As Phase II of the five-phase DMJM Plan began in 1969, most of Ramsey Lake was filled. To accomplish this, the Port had the Columbia/Willamette channel dredged to a depth of 90 feet.

In 1969, state and federal regulations started having an impact on the development activities of both the City of Portland and the Port of Portland, reflecting the Solid Waste Disposal Act of 1965. In 1971, the consulting firm Black and Veatch recommended upgrading the landfill process to reduce litter and leachate runoff into the Columbia Slough and Smith and Bybee Lakes. In 1970, Oregon was the first state to adopt a comprehensive solid-waste management plan. The Clean Air Act of 1970 forced the City to close its waste incinerator because it did not comply with air quality standards. In 1971, the Department of Environmental Quality required that industries stop discharging untreated organic waste into the Columbia Slough. Still,

the slough was heavily polluted by domestic sewage, inorganic industrial waste, leachates from the St. Johns Landfill, and overflow from the City sewer system. However, by 1972, permits were required by DEQ for organic, inorganic and warm wastes discharged into the slough.

The Port of Portland began a reassessment of their plans for Rivergate because of increased environmental awareness and concerns by citizens and public agencies, coupled with objections to implementing portions of the DMJM Plan. The Columbia Slough Environmental Task Force which was initiated by the Port in 1970 produced The North Portland Peninsula Study in 1972. This land-use program was subjected to extensive input and review by individuals, private groups and public agencies. The plan promoted dredging, filling, boat launching and private concessions of food and recreational equipment around the lakes. Although some consideration for the natural environment was allowed around Bybee Lake through passive recreation, Smith Lake was promoted to support seasonal powerboat racing and similar uses that conflicted with existing natural resources. The standards proposed by the plan included designating areas for industrial, commercial and recreational development to best utilize the few remaining features of the environment. No analytical studies were included in this plan. Some elements of the plan have been synthesized into current plans but, overall, the plan failed to recognize the concerns of the local citizens and the environmental impacts of development on wetlands.

In the 1970's, there was increased concern for input from nearby citizens into the planning process. The League of Women Voters and North Portland Citizens Committee sponsored a conference focused on the future development of the North Portland Peninsula. During this 1974 "Lakes-Land-Livability Conference," community citizens heard from, addressed and synthesized ideas with state, federal, and business representatives that had a stake in the peninsula. The conference was designed to find out agency plans and needs for that area and to allow local citizens to ask questions about community and environmental considerations. The final land-use analysis was developed through a collaborative workshop session of all the conference participants. The criteria recommended for Smith and Bybee Lakes include: limiting motor vehicles; creating a wildlife conservatory; reclamation of sand (fill) from Port operations; public access to both lakes for recreation; allowing fresh water in lakes and maintaining water level; passive non-motor recreation around lakes; bicycle and hiking trails; encouraging public ownership; allowing maximum area and depths of lakes; and buffering lakes from industry. The recommendations developed through this conference provided criteria out of which later planning processes have grown.

Although the final plan had no enforcement mechanisms, the mutual awareness of the issues at stake provided a new air of respect. The collaborative effort by citizens and other concerned parties provided a model for future planning processes.

Due to citizen initiative, backed by the North Portland Citizens Committee, the State passed a law in 1975 against filling basins below twelve feet mean sea level (MSL). This effectively stopped all filling done by the Port, in hopes of saving Smith and Bybee Lakes from further fill damage.

The City of Portland expanded the St. Johns Landfill by 55 acres in 1976. Despite citizen efforts to close the fill, the City appealed to the State Land Use Board of Appeals (LUBA) and was granted the right to expand into Smith Lake. This reduced the lake's shoreline from 8.2 to 6.2 miles. The City had to compensate for the loss through added enhancement of north Portland recreational areas. The City's expansion of the landfill brought into question whether the City could be controlled by the State laws. Because no other site option was available, however, public need dictated the expansion.

In an effort to gain back community support, the Parks Bureau encouraged the Columbia Slough Task Force to propose a Greenway Hiking Trail 40-Mile Loop Trail to cross the Smith and Bybee Lakes reclaimed landfill site. Thirteen local jurisdictions sponsored the 40-Mile Loop Trail, which gave credibility to the City's proposal to reclaim the site and develop opportunities for passive recreation.

The Port of Portland began the Rivergate North Portland Flood Control Study in 1973 to investigate flooding and related resource problems. In 1976, the Port proposed "Plan 1" for the Columbia Slough and Smith and Bybee Lakes. This plan was never put into effect, primarily because the community could not reach consensus on closing the Slough to navigation, which was a major feature of the plan. The plan was to invest $10,000,000 of U.S. Army Corps of Engineers-sponsored funds in various enhancement projects. These were to reflect the range of development proposed in The North Portland Peninsula Plan. Heated citizen debate surrounding this issue lasted for nearly ten years and still has not been fully resolved. The Corps of Engineers proposed complete closure of the mouth of the Columbia Slough by surrounding Rivergate with levies. Pump stations were to be placed at the mouth of the slough and in Smith and Bybee Lakes to regulate water circulation and drainage. The controversy was two-fold. Citizens were concerned with the effect on Smith and Bybee Lakes and the existing and obtainable (navigable) waterfront access on the slough. Controversial statements from the Corps of Engineers included flood control that could be accomplished without plugging the slough, and that existing dike reinforcement was inevitable. These complications and a pending suit of $100,000 (proposed by citizen and business committees) to pay for maintenance damage scared away any local municipal sponsorship needed to enact the plan. Opposition to the plan included: Oregon State Marine Board; Marines Trade Association; Associated Oregon Yacht Clubs; North Portland Citizens Committee; and St. Johns Boosters. Their coordinated efforts, backed by the money of industries who wanted to navigate the slough, produced fliers and publications to ensure public participation.

In the early 1980's, Senator Packwood obtained an exception to the Act of Congress of 1950 which declared the slough a navigable waterway, and made it possible for the Port of Portland to connect the north and south segments of Rivergate with a bridge over the west end of the slough. The height of the bridge permits only small boats to enter the slough, thus making its use unsuitable for industrial navigation. The end result was less impact on both the Columbia Slough and Smith and Bybee Lakes.

In the early 1980's, no real management plan existed for Smith and Bybee Lakes. Soon after the St. Johns Landfill was transferred by the City to the Metropolitan Service District, an outbreak of botulism occurred on Smith Lake, killing numerous waterfowl. In 1982, the North Slough, located between the St. Johns Landfill and Bybee Lake, was blocked to prevent the spread of the bacteria, and the Smith and Bybee Lakes outlet was dammed. The result of the closure has stabilized Smith and Bybee's water levels and induced the growth of "smart weed," which is now taking over the lakes.

In 1985, the State Legislature adopted SB-662, dictating the siting authority of a new landfill to be transferred to the Oregon Department of Environmental Quality. In addition, it created a $0.50-per-ton surcharge on all waste that continued to be deposited, as a fund for neighborhood revitalization. During this same period, the Port of Portland began to take measures to mitigate possible environmental impacts which were likely to occur with continued fill of Ramsey Lake. The Port took the initiative to develop a process that would establish a management plan for Smith and Bybee Lakes.

In 1986, an additional $0.40-per-ton charge was attached to the tonnage rate at St. Johns Landfill, to be dedicated to reclamation of the area after landfill activity ceased. This same year, the City of Portland began the St. Johns Landfill Policy Committee in order to devise an end-use plan for the St. Johns Landfill. The reclamation process is mandated by federal, state and local regulations. Study objectives were:

1. Use the landfill site as access and leverage to develop Smith and Bybee Lakes as a natural resource (wildlife habitat area, opening ready access to the community);

2. Provide a passive recreation resource (few people or structures, unprogrammed), attracting visitors from throughout the region, as well as serving nearby community residents, thereby changing the community's image;

3. Generate revenues to be earmarked for future landfill site uses and other projects and priorities.

After meeting for half a year, the Committee produced a draft report satisfying the objectives, which was then distributed for public review. Over the next four months, this document was discussed before all of the interested citizen and business committees in the area. By the spring of 1987, the proposal was endorsed by the Portland Planning Commission and the City Council.

In the planning process, over sixty-five alternative uses for the site were explored. However, many of them would have conflicted with the objectives stated by the committee. Some of these included a junkyard or an RV park to be located on the newly-capped landfill. Analytical data which assisted this proposal was a financial analysis by CCA, Inc., which outlined the various costs and revenues obtainable with each alternative. The Soil Conservation Service analyzed the environmental and technical feasibility of each option. They addressed issues such as settlement and gas collection systems, as well as factors to specific end uses, such as utilities, soils and loading and mitigation of environmental impact. The final end-use options were classified as (1) active recreation; (2) passive recreation; and (3) active development. Considering the fragility of the newly-covered site and its direct access to a struggling wetlands area, the passive recreation option won approval with little opposition. This choice readily correlated with the criteria also being developed in the Smith and Bybee Lakes Management Plan.

Closure of the landfill is scheduled for 1991, when the site will be transferred to the City Parks Department. Metro will continue caretaking of landfill impacts until 2011, when the site will be fully settled. Funding for the current end-use study comes from Metro and the City of Portland's Bureau of Environmental Services. In 1995, end-use procedures will begin being coordinated by the Parks Department. Through use of the projected $1.5-million collected from surcharges and regular park allocation funds, development of the site will begin. The park should be open for public use by the end of 1996.

Conflicts which occurred during the end-use planning process ranged from political to environmental. Through consolidated efforts by the members of the St. Johns Landfill Policy Committee, conflicts were resolved. Representatives of the citizen and business communities opposed the siting of a new landfill at the Ramsey Lake site. This choice of location would have increased traffic and affected the environment through noise, dust, smell and possibly water quality standards on and around the Smith and Bybee Lakes site. The consensus of the committee was that a new landfill at Ramsey Lake would jeopardize the delicate wetland habitat, thus conflicting with the goals of the end-use plan. The Port was successful in defending alternative uses for Ramsey Lake.

Additional conflicts included concern for possible damage to the Columbia Slough banks by boat mooraging and site-use conflicts with the proposed inclusion of the 40-Mile Loop Trail. The proposed drydock moorage with a special forklift used on a ramp for launching purposes provided resolution. The option of an archery range on the site was dropped due to locational conflict with the proposed 40-Mile Loop Trail access. Passive recreational use was found to be compatible with the site if collaboration with Metro's End-Use Management Committee could ensure consistent maintenance. When this enforceable agreement was developed, re-use of the landfill as a park obtained overwhelming public support.

The collaborative coordination of the St. Johns Landfill End-Use Plan with the Smith and Bybee Lakes Management Plan reflected a successful planning process. Both planning committees have broad-based representation, and collaborated on concerns, goals and objectives, and developed strategies through consensus-based agreements. The St. Johns Landfill Policy Committee integrated social, political, analytical and environmental factors into the design and proposed development of the end-use site. These policies and procedural activities reflect the planning activities that were attempted at the Lakes-Lands-Livability Conference in 1974. The current process supersedes that formative analysis through expanding scientific and analytical data, consolidating allies to enforce proposed activities, and procuring a municipal agency to sponsor the committee activity.

The Smith and Bybee Lakes Advisory Committee was initiated by the Port of Portland in 1986. Through strong backing by the Bureau of Parks and Recreation, a team of representatives was developed to reflect the concerns and interests of the neighborhood, both residential and industrial, environmental resource organizations and separate property ownerships of the area. Overlapping between this committee and the St. Johns Landfill Policy Committee ensured communication and coordination between the two plans. The knowledge and experience of the consultant team played a major role in the development of the overall plan. The analytical and environmental research provided facts with which a resource management plan could be developed. The goal of the committee was to produce a management plan to guide the development and management of the Smith and Bybee Lakes area as an environmental and recreational resource for the Portland region. The objectives of the plan included stabilizing the lakes environmentally, diversifying habitat, and ensuring good water quality. The Smith and Bybee Lakes Management Plan will integrate the St. Johns Landfill End-Use Plan, which is a site-specific proposal, allowing development of alternative uses for the St. Johns Landfill site and upland areas if compatible with wetlands preservation and recreational use.

To aid in plan implementation, the 1987 legislature amended ORS 541.622, making it possible to fill below the eleven-foot contour for habitat enhancement purposes only. This opportunity, coupled with newly-proposed federal and state mitigation requirements, may provide a financial and maintenance source for Smith and Bybee Lakes. These requirements would provide developers with a way to compensate for damage done to a wetland area. This could be done either by providing replacement wetlands or otherwise compensating for the loss. An evaluation procedure, such as Habitat Evaluation Procedure (HEP), needs to be developed in such a way as to measure wetland loss so that adequate actions can be taken in the mitigation process. The combination of these processes could create financial stability for wetland enhancement while meeting the needs of developers.

As natural resource areas, Smith and Bybee Lakes have suffered historically through the lack of consistent and meaningful management. Ideas evoked by the Olmsted Brothers from their visit close to a century ago will finally include Smith and Bybee Lakes. Much of the progressive criteria developed by the 1974 "Lakes-Lands-Livability Conference" is reflected in the current Smith and Bybee Lakes Management Plan. Much of the reason for failure of previous planning efforts was the lack of general consensus on proposed actions. The latest plan, coordinated by the Port of Portland, has overcome this obstacle, and in doing so holds promise of success where the others have failed.

APPENDIX L

SMITH AND BYBEE LAKES,
AN OVERVIEW

by
Esther Lev and Michael Jennings,
Biologists

SMITH AND BYBEE LAKES, AN OVERVIEW

INTRODUCTION

The Smith and Bybee Lakes area is the most complex and unique natural resource area within Portland's Urban Services Boundary, modified by human interaction. It is located one mile east of the Columbia-Willamette confluence, about 1,500 feet south of the Columbia River and west of North Portland Boulevard. Most of it is located within the 100-year flood boundary. The site is approximately 2,000 acres in size and represents an ecosystem that was once extensive along the lower Columbia River. Today, very few examples of this system still exist, and other remnants in Portland are very fragmented.

Habitat degradation is present throughout the site. Point source pollution such as storm drainage has resulted in the death of vegetation. Emergent marshes, such as cattail stands, are absent, although they would be expected in certain areas. Smartweed is also a problem in Smith Lake, having expanded rapidly in recent years, it now covers much of the water surface.

In spite of these problems, the Smith and Bybee Lakes site is a very high quality habitat area, and scored the highest of all sites inventoried within the City. It also has potential for further enhancement, particularly regarding water quality.

This report will provide a basic profile of natural resources at Smith and Bybee Lakes. More detailed research of the ecosystem has been conducted by Fishman Environmental Services for the Port of Portland (Draft Smith and Bybee Lakes Management Plan, August 1987, and supporting documents).

SOILS

The lakes rest on alluvial soils deposited by the Columbia and Willamette Rivers. Historic flooding of the rivers has been the primary influence in shaping the geology and biology of the lakes. Adjacent lands have been filled for industrial uses. The St. Johns Landfill (immediately adjacent to the south and west), a water control structure placed at the lakes' inlet/outlet at the North Slough, and various dikes and fill material are the three most significant human influences on the lake complex.

The site contains two soil types, Rafton and Sauvie silt loam. The two soils are very similar. Both are poorly drained and occur along Columbia River floodplains. They are both recently formed geologically and mixed with some volcanic ash. Permeability is moderate to slow and rooting depth is 60

inches or more. Water runoff is slow, with significant hazard of erosion from overflow. These soils are subject to frequent flooding from December to June. The water table is within one foot of the surface from December through July. These soils commonally support farming, although they are poorly suited for tilling because of water inundation from flooding and long periods of exposure to a high water table. The soils support wildlife habitat, and where adjacent to large bodies of water, they provide habitat for many aquatic mammals, such as beaver and otter. Rafton and Sauvie soils are both listed as Hydric Soils by the U.S. Soil Conservation Service.

HYDROLOGY

Water volume of the main body of water at this site is now determined by the recently-installed (1982) water control structure. Water exchange between the North Slough and lakes occurs when either body of water is above the control structure sill elevation, now approximately 10.5 feet m.s.l. There are three major factors influencing water levels of Columbia Slough: Columbia/Willamette dam operations; tidal fluctuations; and pumping schedules of the Columbia South Shore drainage districts. Other sources of water at Smith and Bybee Lakes include stormwater runoff from the greater Smith and Bybee drainage basin, as well as possible groundwater inflow. Groundwater movement in the area is not well understood. Stormwater runoff originates from the newly filled and partially developed (hard surfaced) Rivergate industrial area, and other previously-developed industrial areas north of the lakes. Other than seasonal discharge of high water over or through the water control structure, evapotransportation and groundwater outflow are the only ways that water may exit this system.

WETLAND COMMUNITIES

The entire Smith and Bybee Lakes complex is a wetland and is classified here according to the U.S. Fish and Wildlife Service, Classification of Wetlands and Deepwater Habitats of the United States. Twelve different types of wetlands occur here within the three general systems of Riverine (river-related), Lacustrine (lake-related), and Palustrine (swamp or marsh-related). It is not only the occurrence of diverse kinds of wetlands which constitute the considerable habitat values found here, but also the phenomenal mosaic pattern within which these many wetland types exist. Of great importance is the extensive amount of edge (ecotone) found between the distinct wetland types. The edge commonly contains many of the organisms of each of the overlapping communities and, in addition, organisms which are characteristic and often restricted to the ecotone. Often, both the number of species and the population density of some of the species are greater in the ecotone than in the communities flanking it (Odum, 1971). The edge effect at Smith and Bybee is one of the site's most significant natural resources for wildlife.

COLUMBIA RIVER

SUTTLE RD.

BURLINGTON NORTHERN R.R.

KELLY POINT PARK RD.

MARINE DRIVE

BYBEE LAKE

SMITH LAKE

ST. JOHNS LANDFILL

SIMONDS RD.

NORTH ROAD

COLUMBIA SLOUGH

LOMBARD ST.

UNION PACIFIC R.R.

UPLAND DR.

COLUMBIA BLVD.

LEGEND

- Forested
- Scrub-Shrub
- Emergent
- Other Vegetation
- No Vegetation
- Water Control Structure
- Dike

0 500 1000

SCALE IN FEET

NORTH

SITE 55
Smith & Bybee Lakes
VEGETATION

BUREAU OF PLANNING
CITY OF PORTLAND

COLUMBIA RIVER

SUTTLE RD.

BURLINGTON NORTHERN R.R.

KELLY POINT PARK RD.

MARINE DRIVE

BYBEE LAKE

SMITH LAKE

SIMONS RD.

ST. JOHNS LANDFILL

COLUMBIA SLOUGH

NORTH ROAD

LOMBARD ST.

UNION PACIFIC R.R.

UPLAND DR.

COLUMBIA BLVD.

LEGEND

- Riverine, Permanently/ Frequently Flooded
- Lacustrine, Permanently Flooded
- Palustrine, Permanently/ Frequently Flooded
- Palustrine, Intermittent Seasonally Flooded
- Palustrine, Seasonally Flooded
- Palustrine, Permanently/ Frequently/Intermittently Flooded
- Water Control Structure
- Dike

0 500 1000
SCALE IN FEET

NORTH

SITE 55
Smith & Bybee Lakes
WETLAND CLASSIFICATION

BUREAU OF PLANNING
CITY OF PORTLAND

The riverine systems at Smith and Bybee are found at three locations: the main Columbia Slough channel; the north slough between St. Johns Landfill and Bybee Lake; and the channel connecting Smith Lake to Bybee Lake. These places are open conduits which periodically or continuously contain moving water, or which form a connecting link between two bodies of standing water. There are three kinds of riverine systems here:

Tidal, Unconsolidated Bottom, Mud, Permanently Flooded- This includes that part of the Columbia Slough channel adjacent to the site along its southwest side, and the north slough channel. Although identified and inventoried as part of the Columbia Slough water feature, this reach is also functionally an important part of the Smith and Bybee site. The slough here is under tidal influence and falls into the tidal subsystem. Flow through both channels is variable according to a combination of parameters presented in the previous hydrology section. The riverine system includes only that portion which is permanently flooded and seems to lack vascular plants. The difference between the main Columbia Slough channel and the north channel (north of St. Johns Landfill) is that the north channel is only flushed when discharging water into, or from, the lakes. This is important in light of runoff and leachate water quality from the landfill.

Tidal,Unconsolidated Bottom, Mud, Semipermanently Flooded- This is adjacent to the areas described above, and extends up to the edge of persistent emergent vegetation (primarily reed canary grass). It is that area where surface water persists throughout the growing season in most years, and where moving water is the dominant influence. This area is exposed periodically, but not regularly, due to the three major hydrologic influences. Although the two systems described above are under tidal influence, nontidal water regime modifiers are used because nontidal influences (river and drainage operations) may be more significant.

Lower Perennial, Unconsolidated Bottom, Mud/Organic, Permanently Flooded- This system occurs within the channel which connects the two lakes. It is hydrologically isolated from the slough by the water control structure, and is not under tidal influence. Water flowing into the lakes of this system have not been documented. Water probably flows in either direction occasionally, but may be frequently stagnant. The channel bottom is unconsolidated mud and organic material. It is defined by that portion which is permanently flooded and supporting less than a 30 percent cover of floating and emergent vegetation. It is bound mostly by palustrine shrub and forest wetlands, consisting of willow (Salix lasiandra var. lasiandra, and S. fluviatilis) and ash (Fraxinus latifolia) dominated associations.

The Lacustrine system is found entirely within Bybee Lake. Historically, both lakes were reported to be more like true lakes, with more deep, open water and less floating and emergent vegetation. The Bybee lacustrine system is defined as that area which is lacking trees, shrubs, and persistent emergents with greater than a 30 percent aerial coverage, and which is greater than 20 acres in size. The entire lacustrine system is

included within the littoral subsystem (as opposed to a limnetic subsystem) due to a maximum low water depth which generally does not exceed two meters. There are two classes of the littoral subsystem here, Unconsolidated Bottom, and Emergent Wetland.

Littoral, Unconsolidated Bottom, Mud/Organic, Permanently Flooded- This is the large area of open water in Bybee Lake. It is bounded by emergent vegetation such as smartweed (Polygonum coccineum), reed canarygrass (Phalaris arundinacea) and willow shrubs (Salix fluviatilis). Coontail (Ceratophyllom demursum), and water-milfoil (Myriophyllum sp.) are common, but open water is the dominant feature.

Littoral, Emergent Wetland, Nonpersistent (plants), Permanently Flooded- These are clumps of smartweed and waterpepper (Polygonum hydropiperoides var. hydropiperoides) found occasionally within the larger open water area of Bybee Lake.

Due to the general nature of this inventory, other ongoing research, and factors limiting observations through the growing season, floating and emergent vegetation within the lacustrine system was not quantified. The system is permanently flooded and is bounded by palustrine persistent and nonpersistent emergent vegetation on all sides.

The palustrine (swamp or marsh) portions of Smith and Bybee Lakes are the most extensive systems within the study area. They are the nontidal wetlands dominated (more than 30 percent) by trees, shrubs, or emergent herbaceous vegetation, and nonvegetated wetlands less than 20 acres in size and less than two meters in depth at low water. These communities are bounded by dikes and fill material which surround the Smith and Bybee Lakes Natural Area.

There are four classes of palustrine wetlands here: Aquatic Bed; Emergent Wetland; Scrub-Shrub Wetland; and Forested Wetland. Among these there are eight subclasses and five different descriptions of water regimes which are discussed below.

Aquatic Bed, Algal, Rooted and Floating Vascular (plants), Permanent and Semipermanently Flooded- This wetland type is dominant within several isolated water bodies at the northern and western edges of the site. Two of these water bodies are large ponds, and one is a slough remnant. These water bodies are immediately adjacent to the lakes, but are perched eight to ten feet above the surface of the lakes. Emergent aquatic vegetation such as waterpepper and yellow water-lily (Nuphar polysepalum) is common; however, the dominant life forms here are green filamentous algae (Ulothrix sp.), water-milfoil, and coontail. Exact sources and seasonal fluctuations of water in this system are unknown. Given the unique topographic difference between this system and that of the lakes, it is assumed that hydrologic dynamics of these water bodies is distinct from the lakes.

Emergent Wetland, Nonpersistent (plants), Permanent and Semipermanently Flooded- This wetland type comprises almost all of Smith Lake and large areas of Bybee Lake. While there are small patches of open water within Smith Lake, when examined as one unit the lake is dominated by this wetland type. It is bounded on the shoreward edge by Persistent Emergent, Shrub, and Forest Wetlands. Major areas of Bybee Lake dominated by this type constitute an irregular pattern, generally following the shoreline, and most embayments. The single most important species here is Smartweed, which is by far the dominant plant. Waterpepper, coontail, water-milfoil, and algae are also present.

Emergent Wetland, Persistent (plants), Seasonally and Intermittently Flooded- These areas of the site are dominated by grassland vegetation and are not permanently inundated by water. Two major plant communities dominate this wetland: reed canarygrass and Columbia sedge (Carex aperta). Other plants which were found include spirea (spiraea douglasii var. douglasii), buttercup Ranunculus sp.), false loosestrife (ludwigia palustris), elderberry (Sambucus sp.), water foxtail (Alopecurus geniculatus), red osier dogwood (Cornus stolonifera), and rush (Juncus sp.).

Scrub-Shrub Wetland, Broad-leaved Deciduous, Permanently and Semipermanently Flooded- This community is dominated by Columbia River willow (Salix fluviatilis). It is clearly seen as the small shrubby willows in standing water which tend to border on open water and smartweed types. Young Pacific willow (S. lasiandra) may be mixed in with Columbia River willow in places. This community is hydrologically sensitive, and installation of the water control structure has converted lakeward portions of this wetland to the following type.

Scrub-Shrub Wetland, Dead, Permanently and Semipermanently Flooded- This is a remnant from lakeside margins of the Columbia River willow stand, which died back because summertime water levels do not recede as they did before installation of the water control structure. This is a fringe of standing dead shrubs (one to three inches diameter), in about one meter of water.

Forested Wetland, Broad-leaved Deciduous, Permanently, Semipermanently, and Intermittently Flooded- This is the true "swamp" part of the Smith and Bybee Natural Area. It occurs around the lake margins and is surprisingly large. It consists of two major plant communities, Pacific willow, and Oregon ash, which seem to grade into one another in places, and which occur within three different water regimes. The ash forest here is the only sizable one found within Portland's Urban Growth Boundary. Cottonwood (Populus trichocarpa) occurs occasionally at topographic high spots, but is not dominant. The understory, where present, is mostly dominated by reed canarygrass, although young snowberry (Symphoricarpos albus) is common, and may eventually become the dominant understory plant at the intermittently

flooded places. Most trees are eight to sixteen inches in diameter and exceed six meters in height; canopy closure is about 60 to 95 percent. Snags are generally absent, though a few occur.

Forested Wetland, Broad-leaved Deciduous, Seasonally Flooded and Saturated- This wetland type occurs along Columbia Slough (within the Smith and Bybee system) at two major locations, and is comprised of two forest communities. An example of good quality cottonwood-ash riparian forest exists along both sides of Columbia Slough, from the east side of St. Johns Landfill east to near North Portland Boulevard. A cottonwood forest occurs west of St. Johns Landfill, and on the west side of Columbia Slough. Smaller gallery forests of cottonwood grading into a cottonwood-ash mix occur along the outer fringes of Smith and Bybee Natural Area.

FAUNA

While some Smith and Bybee Lake wildlife species exist in association with particular vegetative communities, most animals use a variety of habitat types. All fauna are dependent upon vegetation, either as primary or secondary consumers. Insects, small mammals, aquatic mammals, bats, song birds, shorebirds, waterfowl and deer all feed directly on vegetation. Some of the animals are prey for each other as well as for other predator species including hawks, falcons, owls, bald eagles, coyote, fox, otters, and mink. Waters of the lakes and slough support aquatic invertebrate populations that are a major food source for fish, shorebirds, and waterfowl.

All fauna species are a part of a food web that relies on the sustained integrity of Smith and Bybee Lake habitats for survival.

Wildlife data were collected by random observations on five field visits between February and June, 1986. Animals or animal signs observed were documented. Data collected were descriptive rather than quantitative.

Freshwater Invertebrates

The lakes support populations of benthic invertebrates which provide food for fish and migrating, wintering and resident populations of waterfowl and shorebirds.

Insects play a substantial role in the natural food chain in and around Portland. Both larval and adult stage insects provide food for birds and bats. Summering warbler, swallow and flycatcher populations depend on these insects as a food source. Larval and adult stage beetles and moths provide food for songbirds inhabiting the scrub/shrub community. Aquatic insects provide food for fish and waterfowl, while those with terrestrial adult stages are important in the diets of many bird species.

Amphibians and Reptiles

Little is known about the amphibians and reptiles of Smith and Bybee Lakes. Garter snakes (Thamnophis sp.), Racers (Coluber constrictor) and bullfrogs (Rana catesbeiana) were the only animals observed. It is probable that the lakes could support populations of pacific treefrogs (Hyla regilla), northwestern salamanders (Ambystoma gracile), rough-skinned newts (Taricha granulosa), and western pond turtles (Clemmys marmorata).

Fish

On April 14, 1986, Esther Lev and Duncan Brown (Portland Bureau of Planning) assisted Paul Fishman, ecologist under contract with the Port of Portland, in sampling one wetland area for fish. A beach seine was set at a small inundated area between the two lakes. The following species were recovered from the sample:

large mouth bass	1
carp	7
bluegill	36
black crappie	9
goldfish	4
tadpole	3
mosquito fish	9

Subsequent sampling by Paul Fishman in the lakes themselves, indicates that juvenile chinook salmon are seasonally very common. It seems likely that the lakes are used by the salmon for rearing. Effects of the water control structure on salmonid rearing remains unknown.

On May 15, 1986, the population of carp spawning along the south shore of Smith Lake was extremely dense. Observations of water flowing into the lakes from the slough on June 5 revealed another dense concentration of carp swimming against the incoming current, and congregated around the inflow. An in-depth study on the ichthyology of Smith and Bybee Lakes is being conducted by Fishman Environmental Services.

Small Mammals

Small mammals are primarily herbivorous, though some will take grubs and worms. All vegetative matter is subject to grazing, browsing and gnawing. Small mammals were not specifically inventoried. However, any sitings or sign of their presence was noted. These rodents are a primary food source for many predators, particularly coyotes, red-tailed hawks, northern harriers, great horned owls, and short-eared owls.

Eastern cottontails (Sylvilagus floridanus) are present. They appear to inhabit the shrub and grassland communities feeding on graminoids, herbs, and willows. They are an important food source for coyote and possibly mink, weasel and bald eagles (observed over Smith Lake on March 20, 1987).

Beaver (Castor canadensis) feed on cottonwood, willow, ash, and herbs along the lakes and the slough. Beaver populations at Smith and Bybee appear to be high. Work is presently being done by Fishman Environmental Services to document through observational data the beaver population at Smith and Bybee Lakes.

Nutria (Myocaster soypus bonariensis) are beaver size semi-aquatic mammals that occupy a similar habitat as the beaver at Smith and Bybee Lakes. Nutria were observed on field visits to the lakes, but numbers and habitat requirements are not known.

Muskrats (Ondatra zibethica) inhabit marshy borders of Smith and Bybee Lakes and the slough, where they eat sedges, reed canarygrass, and other plants growing in or adjacent to the water. Occasionally they may eat dead fish.

Raccoons (Procyon lotor) inhabit the palustrine forested and scrub/shrub communities of Smith and Bybee Lakes. They are omnivorous and will eat fish, snakes, frogs, birds, and herbs.

Coyote (Canis latrans) have adapted to living with man. Coyote scats and tracks were frequently observed throughout the Columbia Slough and Smith and Bybee Lakes area. Coyotes inhabit the palustrine grassland and open areas around the lakes area. Their diet consists primarily of small rodents and birds, and is occasionally supplemented by insects and fruits.

Large Mammals

Black-tailed Deer (Odocoileus hemionus) tracks, scats, and bedding areas were observed at Smith and Bybee Lakes. Deer are primarily browsers feeding on the cottonwood, willow, blackberry, and other plants of the palustrine scrub/shrub. Deer using Smith and Bybee Lakes may travel between the lakes and Hayden Island via Kelly Point Park and the Columbia Slough, or through the undeveloped portions of Rivergate to the north. One possibility is that these deer use Hayden Island as a fawning ground.

Although not observed during field visits, otter (Lutra canadensis), weasel (Mustela sp.), mink (Mustela vision), possum and raccoon have been reported, as well as fox. Several different bat species may inhabit this site. River otters generally eat fish and on rare occasions small mammals or birds. Small mammals and birds are the primary prey for mink and weasel. Bats are dependent upon insect populations.

Birds

The diversity of birds present at Smith and Bybee Lakes varies seasonally. The lakes support wintering and resident populations of waterfowl and shorebirds. Mallard (Anas platyrhynchos) and northern pintail (Anas acuta) were observed in small numbers during the winter. In addition to mallards and pintails, cinnamon teal (Anas cyanoptera), northern shoveler (Anas clypeata), blue-winged teal (Anas discors), and American coot (Fulica americana) were observed frequently during the winter and spring months. Evidence of substantial goose grazing on sedge and reed canarygrass was noted. On three different occasions, dead pied-billed grebes (Podilymbus podiceps) were found floating in the lakes. No live grebes were observed. Cause of death is unknown. Little is known about water quality and contaminants in the varying trophic levels of the lakes.

Great blue herons (Ardea herodias) were frequently seen February through June. Adult herons from the West Delta rookery probably use Smith and Bybee Lakes for feeding grounds. No great blue heron nests were found at Smith and Bybee Lakes. However, the proper habitat to support a rookery may exist.

Dowitcher (Limnodromus sp.), killdeer (Charadrius vociferus), Virginia rail (Rallus limicola), and American bittern (Botaurus lentiginosus) were observed or heard on field visits to the lakes. It is probable that there are other shorebirds, especially during fall migration, that use Smith and Bybee Lakes but were not observed during random field visitations.

Data collected from U.S. Fish and Wildlife Service (USFWS) aerial waterfowl surveys in December 1985 and January 1986, reported no waterfowl observed on either lake while 185,000 waterfowl were sighted at other nearby areas along the Lower Columbia River (USFWS 1986). It is unclear why waterfowl populations at Smith and Bybee Lakes are so low. Waterfowl populations in the entire Columbia Basin are lower now than in the past. A botulism outbreak affecting the waterfowl populations (pers. comm. Pesek 1986) in Smith Lake may be partial cause. As a result of the botulism outbreak, USFWS and Oregon Department of Fish and Wildlife (ODFW) decided to maintain increased water levels in the lakes. Smith and Bybee Lakes are used as a resting area for large numbers of gulls from the adjacent St. Johns Landfill. Duck and geese use of the lakes may be influenced by this large population of gulls.

Other wetland associated birds found nesting and feeding along the littoral of the lakes and slough are red-winged blackbirds (Agelaius phoeniceus), Bewick's wren (Thryomanes bewickii), marsh wren (Cistothorus palustris), and green-backed heron (Butorides striatus). A colony of tricolored blackbirds (Agelaius tricolor) has been observed along a degraded slough remnant within the St. Johns Landfill. This is the only known tri-colored blackbird colony in the Willamette River Valley. The closest known colony is 250 miles away (Houck, 1986).

Willow scrub/shrub areas provide food, nesting and cover for summer populations of northern rough-winged, barn, violet-green, and tree swallows, yellow-rumped warbler (Dendroica coronata), yellow warbler (Dendroica petechia), MacGillivray's warbler (Oporornis tolmiei), Wilson's warbler (Wilsonia pusilla), common yellowthroat (Geothlypis trichas), flycatcher species (Empidonax sp.), finch sp. (Carpodacus sp.). Oregon ash (Fraxinus latifolia), and black cottonwood (Populus trichocarpa) forests provide perch, nesting, and vantage points for hunting raptors such as red-tailed hawks (Buteo jamaicensis), Cooper's hawk (Accipiter cooperii), sharp-shinned hawk (Accipiter striatus), northern harrier (Circus cyaneus), American kestrel (Falco sparverious), great horned owls (Bubo virginianus), and short-eared owls (Asio flammeus). Snags within the forest provide cavities and food sources for woodpecker species.

FURTHER RESEARCH

The above description of the different kinds of wetlands occurring at Smith and Bybee Lakes was conducted by visual observation. As a result of these observations, many questions concerning the ecology of the area and future human uses have become apparent.

Most of the Smith and Bybee system is hydrologically contiguous. Changes in the water regime probably affects the entire system, yet information on the hydrology of the site is incomplete. Are the lakes a recipient of, or a source for, groundwater? How could groundwater resources be affected by water quality of the lakes?

How do manipulations of water levels within the system affect vegetative communities? Could Portland's only Oregon ash forest community be eliminated by this lack of information? Literature suggests that ash may only endure one year of complete inundation (Walters, 1980). What are the long-term effects of a seasonally stable and higher volume water regime on aquatic, shrub and forest vegetation? What effects could this have on the insects, reptiles, amphibians, fish, birds, and mammals that they support? Will the Smith and Bybee Natural Area be a different kind of wetland in fifty or one-hundred years, as a result of recent hydrologic changes? If so, are these changes desirable? Can the periodicity of water fluctuation in Columbia Slough be established?

What is the profile of present and past water quality? In light of the current interest in recreational uses of the site, it seems critical that an exhaustive study be done on all possible synthetic contaminants to which the public may be exposed. A complete study of contaminant levels in sediments and living tissues of the Smith and Bybee system is strongly recommended. Most water in the Smith and Bybee system seems to be derived from the Columbia Slough. The slough has a long history of adjacent industrial uses, and discharges of effluent. The adjacent St. Johns Landfill, and its history of effluent discharge into the lakes system, has major implications

for contamination. In recent times, a significant oil spill was found at the north shore of Smith Lake. The oil was discharged into the lake through a stormwater culvert adjacent to an oil refinery. The oil refinery refines used oil from many different sources. It is entirely possible that oil spilled into the lake contained heavy metals and/or chlorinated organic compounds, yet this information seems to be lacking. This situation is presented as one example of the many possible scenarios which could have occurred since the vicinity became industrialized, and which may contribute to serious potential environmental problems; problems with public health implications which should be examined in detail.

A basic difference exists in the character of the two lakes. Important knowledge of the hydrologic/ecologic dynamics of the Natural Area may be gained from attempts to answer the question of why these two adjacent and connected lakes are different. Could Portland's sewage settling ponds which are located immediately east of North Portland Boulevard, and adjacent to Columbia Slough on the north, be influencing the water quality of Smith Lake (which is adjacent to North Portland Boulevard on the west)? Again, groundwater hydrology may be an important factor here.

A startling difference noted by biologists when the site was first visited in February 1986, was the absence of wintering waterfowl. Structurally, this seems to be very high quality waterfowl habitat, and there are historic accounts of considerable waterfowl use of the site. What is the carrying capacity of this area for wintering and nesting waterfowl? What are the limiting factors?

A profile of benthic, pelagic, and terrestrial invertebrate populations should be constructed, including distribution, diversity, densities, and reproductive successes. This animal group often functions as the first trophic level in a natural food chain, is fundamentally important to all other wildlife, and human use of wildlife resources.

Aquatic mammals are a very significant life force within the Smith and Bybee system, and have been studied very little. Apparently, beaver are responsible for maintaining a "light canyon" along the shore of the lakes. They burrow into the shore, and fell trees which are both within the lake (e.g. willows in standing water), and on the land (cottonwood and ash), thus creating and maintaining a margin of primarily reed canarygrass along the shore, bounded by a different forest type on each side. In addition, as old burrows cave in and erode, small ditches and channels appear perpendicular to the shoreline, eventually creating a scalloped shoreline structure. This beaver created habitat seems ideal for spawning carp. What is the carrying capacity of the greater lakes system for beaver, nutria, muskrat, and mink? Do river otters use this habitat? If not, could they be reintroduced?

Gulls which use the St. Johns Landfill also occupy the site during their non-nesting seasons. It has been suggested that their excrement could contribute detrimentally to the energy budget and water quality of the lakes. Do they exclude other wildlife uses of the lakes, such as waterfowl?

It may be important to know if this site could support a great blue heron rookery. Does it now meet known criteria for such a colony? How extensively do local herons depend on the Smith and Bybee system?

Recent sampling has shown that juvenile chinook salmon are very common to the lakes and Columbia Slough (pers. comm. Fishman, 1986). Were the lakes a significant rearing ground for these anadromous fish? Now that the lakes are hydrologically isolated from the slough and the Columbia River system, are they still a viable rearing ground for the salmon? Considering the extensive loss of Columbia River salmon and their habitat since 1932, this could be of importance.

If the Smith and Bybee area is developed for human recreation, how could the pressure of human presence least impact nesting and denning wildlife? Which areas would be most sensitive?

Bats are virtually the only natural control for night flying insects (such as moths), and their effect on the insects of Portland is profound. Very little is known about these "invisible" mammals (many of which are migratory). It is probable that Smith and Bybee Lakes are important to bat foraging, roosting, and reproduction. It is also quite possible that rare, threatened, or endangered bat species utilize the site. Further information on bat use of the area could be of value to Portland.

It is known that the yellow-billed cuckoo (Coccyzus americanus), once inhabited the Columbia/Willamette willow riparian habitats, generally acknowledged as being the northern limits of its range. Yet today it is known from only a handful of locations in eastern Oregon, and is considered endangered in the state. Surveys are now being undertaken to determine if it should be placed on the national endangered species list. Does sufficient habitat exist at Smith and Bybee Lakes to support a viable cuckoo population? Could the bird be reintroduced, or would its range limits prohibit it?

It is clear that the educational and scientific opportunities which the Smith and Bybee Natural Area hold for Portland are very great. The site could well be the greatest outdoor wetland laboratory the City could hope to have. The questions posed above are not meant for academic purposes, but to demonstrate that more information is needed to make responsible land use decisions about the future of the area, especially with respect to human health. Extensive research is now being conducted by Fishman Environmental Services, sponsored by the Port of Portland and the Portland Bureau of Environmental Services. It is hoped that many of these questions are answered by this work.

APPENDIX M

WEST HAYDEN ISLAND,
AN OVERVIEW

by
Esther Lev and Michael Jennings,
Biologists

WEST HAYDEN ISLAND, AN OVERVIEW

INTRODUCTION

Largely due to its geography, size, geology, and vegetation, West Hayden Island is a significant natural area within Portland's Urban Services Boundary. This inventory site is the western portion of a major island located in the Columbia River immediately upstream from its confluence with the Willamette, between the cities of Portland, Oregon and Vancouver, Washington. Much of the river near this site serves as part of the harbor for the ports of Portland and Vancouver, and represents the furthest distance upstream that ocean-going ships can easily navigate. West Hayden Island is roughly 760 acres in size, second only to the Smith and Bybee Lakes Natural Area for sites in the Columbia Corridor. Surface soils are a variety of silt loams and sands, occurring either naturally or as a result of dredge spoils deposition. The groundwater table is seasonally high and areas are subject to periodic flooding. Natural vegetation patterns are generally characteristic of the lower Columbia River islands, with a variety of wetlands, meadows, and ash/cottonwood forests. Overall, West Hayden Island is an area of great structural diversity and provides both present and potential wildlife habitat of high quality within an urban center.

In addition to its wildlife value in and of itself, it is near West Delta Park and the Smith and Bybee Lakes area, both of which scored very high in the habitat inventory (ranking sixth and first out of 34 inventory sites in the Columbia Corridor area, compared to second for West Hayden Island). Although data are presently not available, it is possible that interspersion between these sites is high, particularly for larger mammals and a number of birds seeking protected areas for breeding or foraging.

West Hayden Island was visited twice; once during the spring, and a second time in the fall. At the time of the first observation, a few barges were tied off to dolphins along the north shore. Cattle were grazing in some areas. Fill operations were in progress in a wetland area west of the power transmission lines. No other human uses were observed. During the second visit, cattle and sheep grazing were observed, dredge spoils activities were taking place along the north shore, and a sewage sludge disposal operation was underway.

Portland General Electric Company (PGE), a major property owner, is now in the process of preparing a development plan for its portion of the inventory site, and has completed a final environmental impact statement (EIS) on proposed fill and eventual conversion to a deepwater port facility of the eastern portion of the site. They are presently working with a number of local, state, and federal agencies and special interest groups to adequately address concerns on adverse environmental impacts. In response to these environmental concerns, an interagency committee was

formed to develop and implement quantitative habitat evaluation procedures (HEP) that would document the value of various habitats on West Hayden Island. Results from the HEP study were published in October 1985. These data provided the basis for impact assessment of the various development alternatives in the final EIS, and provided baseline information for the development of a proposed mitigation plan. The HEP committee has initiated the mitigation planning process, the results of which must be approved as a condition of a fill permit by the U.S. Army Corps of Engineers. Information contained in the EIS was used to augment staff observations and data collected from other sources.

It should be noted that this Overview is not intended to replace the EIS prepared for the PGE-owned property. Instead it will be used by the City to augment the EIS data for Goal 5 purposes, assess the western end of the island as a whole regardless of property ownership, and provide continuity of inventory methodology between this and other wetland and wildlife habitat sites. For more detailed information on the PGE-owned property, the reader is referred to the EIS.

SOILS AND TOPOGRAPHY

Soils on West Hayden Island are similar to other islands in the vicinity, and include Faloma Silt Loam, Pilchuck Sand (protected and unprotected), Rafton Silt Loam, and Sauvie Silt Loam. These soils are characterized by poor drainage and high risk of flooding. The Faloma, Rafton, and Sauvie soils are hydric, and are therefore treated by the U.S. Fish and Wildlife Service as wetlands.

HYDROLOGY

The hydrology of West Hayden Island is almost completely dominated by the Columbia River. A major part of the site is inundated annually, and most is within the 100-year flood plain. No other free-flowing streams are located on site, so wetlands which are not connected directly with the river are influenced by groundwater levels, which fluctuate with river level.

WETLAND COMMUNITIES

Out of the 760-acre inventory site, about 154 acres are identified as wetlands according to the U.S. Army Corps of Engineers. However, wetlands determination used in the City's inventory was the system devised by the U.S. Fish and Wildlife Service, described in the publication,*Classification of Wetlands and Deep Water Habitats.* Results from the two systems can differ.

In addition to the above-mentioned wetlands, the north, west, and south boundaries of West Hayden Island are riverbanks. This site contains all three general freshwater wetland systems as classified according to the U.S. Fish and Wildlife Service, Classification of Wetlands and Deepwater Habitats of the United States: Riverine (river-related), Lacustrine (lake-related), and Palustrine (swamp or marsh-related). Seven different wetland types occur within the three systems. Of importance is not only the variety of wetland types, but also immediate proximity to uplands of great structural diversity and relative protection from human intrusion.

Following are the types of identified wetlands on West Hayden Island:

Riverine, Lower Perennial/Tidal, Unconsolidated Shore, Sand, Permanently Flooded.

Riverine, Lower Perennial/Tidal, Unconsolidated Shore, Sand, Seasonally Flooded.

Lacustrine, Littoral, Unconsolidated Bottom, Permanently Flooded.

Lacustrine, Littoral, Emergent Wetland, Persistent, Semipermanently and Seasonally Flooded.

Palustrine, Emergent Wetland, Persistent, Seasonally Flooded.

Palustrine, Scrub-Shrub, Broad-leaf Deciduous, Seasonally and Intermittently Flooded.

Palustrine, Forested, Broad-leaf Deciduous, Seasonally and Intermittently Flooded.

FLORA

Vegetation is dominated by a cottonwood-ash forest. Trees are estimated to be 30-70 years old with canopy closure of about 80-95 percent. The forest is mixed with openings of meadows, seasonal wetlands, and ponds. The beach-forest ecotone is highly variable due to dredge spoils deposition. Understory vegetation appears to be classic for this riparian natural community. Shrubs are dominated by snowberry, elderberry, and blackberry. Red-osier dogwood, flowering dogwood, willow, and hawthorn are present. Herbs include bedstraw, sword fern, nettle, arnica, salmonberry, thimbleberry, and grasses. Snags are present at a density estimated by PGE at about 40 per acre in wooded wetlands and 20 per acre in the cottonwood/ash forests. Mature willows, particularly in the wetland areas along the south shoreline, were noted, some of which provide cavity habitat. Forested areas such as are present throughout the island provide important nesting, roosting, and perching places for a large number of birds and bats, some of which are mentioned elsewhere in this overview.

Found during the spring visit was Artemisia lindleyana (Columbia River Mugwort) growing in damp sand below the high water mark, along the north river shore between the railroad bridge and the power lines. The exact status of this plant is being debated by the scientific community; the Oregon Natural Heritage Program removed it from its endangered plant list in 1984, but the Oregon Native Plant Society contends that, based on the best available information, the plant remains endangered. According to Russ Jolly of the Oregon Native Plant Society, A. lindleyana appears to require annual flooding of its sandy habitat. Dam construction on the Columbia River has reduced this habitat considerably.

It has also been suggested by Jean Siddal, of the Oregon Plant Society, that a search be conducted for Howellia aquatalis, a rare plant which favors site characteristics similar to what are present.

FAUNA

West Hayden Island contains great structural diversity, and therefore high wildlife habitat value. What is lost through grazing practices now taking place, is offset by the area's potential in habitat values. A wide variety of invertebrate species is present, including insects and spiders. Given the variety of wetland types and amount of ecotone edge, amphibian and reptile production is probably considerable and quite diverse, particularly when compared with other areas in the Portland Urban Services Boundary. This animal life provides food for a variety of birds and mammals, which may also take advantage of the physical surroundings for cover, perching or resting, and nesting or burrowing. Wildlife species lists contained in Portland General Electric Company's EIS (Appendix C) is representative of the site.

Birds

On West Hayden Island, as on most wildlife habitat sites inventoried throughout the Portland Urban Services Boundary, birds were the most noticeable form of wildlife. The variety of species, as well as the activities observed, provides an indication of overall habitat value. As could be expected from a site of this size and diversity, a number of birds representing a wide variety of habitat needs were seen in a relatively short period of time. Following is a list of species observed during the spring site visit:

Species	Comments
Northern Flicker	
Killdeer	Nesting behavior
Mallard	Many pair observed
Northern Pintail	Two pair observed
Mourning Dove	
American Goldfinch	

Species (continued)	Comments
Red-tailed Hawk	
Ruby-crowned Kinglet	
Swallows	Several species: violet-green, barn, tree, and cliff.
White-crowned Sparrow	
Canada Goose	Exhibiting defensive nesting behavior Thirty-seven goslings on pond west of power line. Considerable goose nesting and rearing obvious.

A number of other bird species are known to be present, but were not observed. More complete lists are contained in the 1987 PGE document *West Hayden Island Marine Industrial Park Final EIS.*

The area over the island was observed to be heavily used by swallows foraging for flying insects. This also indicates its importance for other insectivores such as nighthawks and flycatchers.

The presence of amphibians is important for many birds such as the Great Blue, Green-backed, and, more rarely, the Black-crowned Night Heron. Reptiles are prey for birds, such as the Red-tailed Hawk.

From observations made and noted previously, this appears to be an area for Canada Goose nesting and rearing. Some ducks, such as the Northern Pintail and Mallards observed, also appear to use the site for nesting and rearing. Double-crested Cormorants also use the site. The wetlands and deep water at West Hayden Island are used by the Canada Goose, a variety of ducks while wintering and migrating, and possibly the Tundra Swan.

Food, water, and vegetative habitat exists for a number of raptors. In addition to the presence of amphibians, reptiles, and small mammals, the island supports a population of California Quail, which is an important prey species for some raptors. Because it is used by ducks, and because of other habitat characteristics, the site does have potential for use by Peregrine Falcons. The American Kestrel probably uses this habitat for hunting, perching, roosting, and possibly breeding and nesting. Resident and migrating Northern Harriers may hunt the meadow, wetland, beach, and dredge spoils areas regularly. Cooper's and Red-tailed Hawks, and American Kestrel have been sighted, and are noted in the EIS, while Sharp-shinned Hawks may also be permanent residents on the island. Rough-legged hawks and occasional Bald Eagles may utilize the site for perching and roosting while migrating or wintering.

American Bitterns could use some of the wetland areas for foraging while nesting or migrating, although cattle grazing has removed most of the cover for these species. The American Coot has been observed, according to the EIS, and may feed and nest within the existing lacustrine and riverine littoral areas.

The beach and dredge disposal areas are possibly wintering or migrating areas for plover, killdeer, sandpiper, yellowlegs, dowitcher, and sanderling. A killdeer was observed displaying defensive nesting behavior. A variety of gull and tern species also may use the beach and river habitats for foraging and resting. However, dredge disposal operations severely impacts these wildlife activities.

The forest canopy, sub-canopy, floor, edge, and the dredge spoils area are used by the Band-tailed Pigeon, Mourning Dove, American Crow, and many small song birds for foraging, roosting, perching, breeding, nesting, and staging while migrating, summering, or residing. The locally-rare Tricolored Blackbird is known to have nested in the Smith-Bybee Lakes area immediately to the south.

Habitat functions for owls remain unknown. Given the interspersion with other very high quality natural areas, Great Horned Owls, which have been observed, could nest here. This local habitat may also be utilized for foraging by the Western Screech Owl.

The forested areas function as foraging and nesting habitat for a variety of woodpeckers. The presence of various snags suggests they may be abundant, and Northern Flickers and Downy Woodpeckers have been observed, according to the EIS.

Mammals

The forest, riparian, and marsh habitats can support a variety of small mammals such as moles and mice. These animals are primarily herbivorous, though some will take grubs and worms. Stable populations of these small mammals are very important to predators such as hawks, falcons, owls, weasels, skunks, and coyotes. The presence or absence of these small mammals will indicate a crucial element, food, in the ability of the habitat to support higher trophic levels.

Though not directly observed, it is probable that a variety of aquatic mammals live on West Hayden Island. Beaver may be the most common, but muskrat and nutria may also be found. The island could also harbor river otter, but observing or taking a census of these mammals is difficult because of their aquatic nature and because den entrances are usually below the ordinary low water level.

Suitable habitat exists at West Hayden Island to support some black-tailed deer (tracks were observed during the fall visit). Other Columbia River islands are used by mainland deer for fawning and rearing. If this dynamic is true at Hayden Island, the island may be a source of recruitment for other natural areas such as Kelly Point Park and Smith and Bybee Lakes, where tracks, scat, and bedding areas were noted.

A variety of bat species may use the area for foraging, resting, and breeding. The forests offer cover, while insects from both the forest and wetland areas provide food. Bats using this area may be valuable in controlling night-flying insects in this part of the Portland/Vancouver metropolitan area.

A more complete list of mammals likely to occur on West Hayden Island is contained in Appendix C of Portland General Electric Company's EIS, and is representative of the area as a whole.

CONCLUSION AND RECOMMENDATIONS FOR FUTURE RESEARCH

West Hayden Island represents a significant wildlife habitat resource due to its size, location within the Portland Urban Services Boundary, and relatively high amount of protection it has received from human intrusion and modification. The mature cottonwood forest with its high structural diversity presents an unusually valuable wildlife habitat for an area in an urban location. With the potential for interspersion with adjacent mainland wetland and wildlife habitat sites, it may play an important role in supporting bird and animal species which would not normally be found in an intensive urban area. Rare plants exist or may exist due to habitat characteristics. Existing and potential wildlife habitat on Hayden Island may be able to support some bird and animal species known to have existed in the recent past, but have been extirpated from the area.

Grazing is presently the single greatest adverse impact on the natural area. Removal of grazing animals would improve water quality and allow growth of grasses and low shrubs which in turn would attract an even greater variety and abundance of birds and animals. Dredging operations also present a major impact on shoreline natural habitats, particularly in the summer and early fall.

It is suggested that more detailed information on the status of migratory, wintering, summering, and residential wildlife be prepared before conditions are altered, so an estimate of overall impacts on the ecosystem can be made and used as a basis for decisions on the future land use of West Hayden Island. This has in part been done with PGE's Habitat Evaluation Procedures (HEP), which has documented the value of various habitats for ten representative bird and animal species.