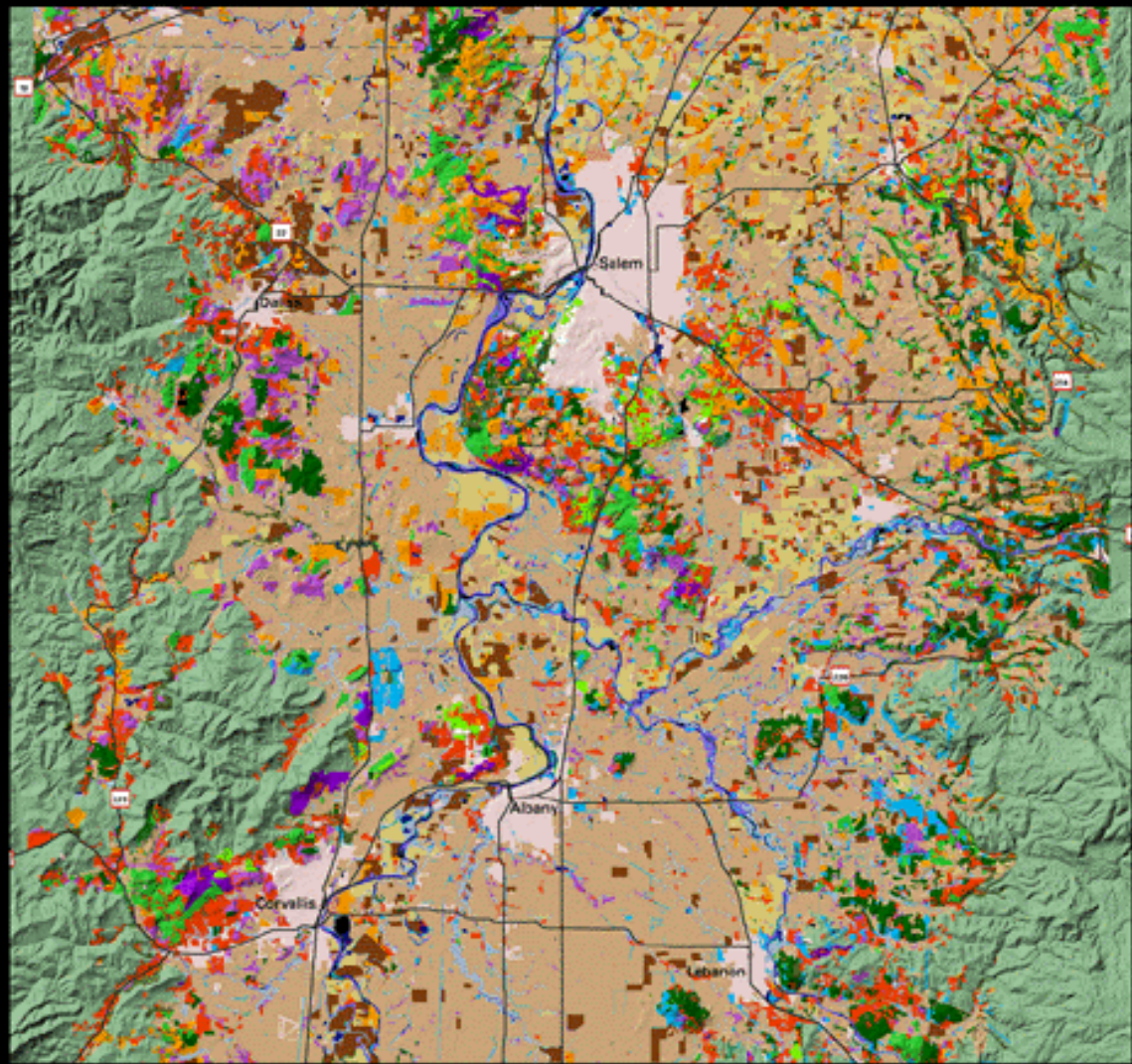


Willamette Valley  
Land Use / Land Cover Map  
**INFORMATIONAL REPORT**



Oregon Department of Fish and Wildlife  
June 10, 1998

***WILLAMETTE VALLEY  
LAND USE/LAND COVER MAP***

**Oregon Department of Fish and Wildlife**

IN COLLABORATION WITH:

**NW Region Habitat Conservation Section  
Ecological Analysis Center**

**Clair Klock  
Steve Smith  
Tom O'Neil  
Rebecca Goggans  
Charley Barrett**

**June 10, 1998**

*Updated February 19, 2002  
by the  
Northwest Habitat Institute*

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## **Abstract**

This report documents the construction of the Willamette Valley Land Use / Land Cover map by Oregon Department of Fish and Wildlife Ecological Analysis Center and NW Region Habitat programs. It was a three year effort to produce a GIS (Geographic Information System) map of the natural vegetation and land use / land cover in the Willamette Valley.

The explanations list the major associated species of each cover type. This list is only meant to let the reader understand the basic structure of the cover type. It should not be considered a whole botanical species list for any cover class. The Willamette Valley Land Use / Land Cover map will give biologists, land managers and the general public the following abilities:

1. To rapidly assess wildlife and agricultural land information;
2. To perform ecosystem and landscape assessments;
3. To identify potential habitat mitigation and restoration areas;
4. To assist private landowners with habitat projects;
5. To aid city urban growth planning, county, watershed, state and federal planning and projects;
6. To help plan industrial and agricultural impact on wildlife;
7. To identify sites for natural resources and agricultural research;
8. To be used in planning transportation corridor changes in respect to wildlife habitat resources;
9. To detect change with the aid of remote sensing or airborne videography;
10. To plan and evaluate for endangered & sensitive species recovery;
11. To track sensitive species and perform population and distribution analysis;
12. To be used in public and agency education;
13. Biologists will be able to map wildlife ranges with greater ease; and
14. The map will be used for historical analysis for tracking changes over time.

The mapping effort was done to allow wildlife and fisheries biologists to interact at a project level. We now have a map of the Willamette Valley with fine enough resolution to include small, but important habitat parcels.

Major portions of 7 counties (Benton, Clackamas, Lane, Linn, Marion, Polk, and Yamhill) and a small part of the southern edge of Washington County were mapped by this project. This report explains the rationale behind the map construction and utilization. Additionally, descriptions of the 22 natural vegetation cover types and 6 agricultural types and statistical summaries of these types for each county and the entire project area are included.

To help understand the magnitude and potential power of this endeavor, the 1993 GAP statewide Oregon vegetation map had approximately 7,000 individual polygons. The Willamette Valley Land Use / Land Cover map has approximately 43,300 individual polygons with discrete units as small as 0.12 hectare(1/3 acre).

## **Project Purpose and Accuracy**

The primary purpose of the report is informational. However the purpose of this project is not just an inventory of land use / land cover types but is a valuable analytical tool. Our goal is to give the reader an idea of the multiple capacities of the map. At this time, acquiring the map's GIS layer, metadata, and accuracy assesment report can be accessed via the Northwest Habitat Institute's web site at <http://www.nwhi.org>. To answer specific questions regarding the development and accuracy assessment contact Clair Klock at [klock@teleport.com](mailto:klock@teleport.com) or Tom O'Neil at [habitat@nwhi.org](mailto:habitat@nwhi.org).

The attribute accuracy of the project is based on land use / land cover types validation. The method was stratified random sampling points of each cover type. The overall accuracy of the map is 81%. A large percentage of the error was the difference between annual and perennial grass in the agricultural classification. Regarding each county, the accuracy assessment for Lane County was the lowest at 72% because of the initial time constraints and learning curve in that this was the first county interpreted. The agricultural layer of Lane County was originally lumped into one classification using aerial photographs. Benton county has a 79% overall accuracy, this is in part due to the fact that it was the first county done with an agricultural classification included and the developer was learning the classification process. Linn county has an overall accuracy of 86%. Though more diverse then some counties, this was also because mapping efficiency was improving. This difference in annual and perennial grasses can account for approximately 10 percent of the error in each county. When the error from annual and perennial grass is dropped, the accuracy jumps to 93%. Clackamas, Polk, and Marion counties each had an error rate of 83% while Yamhill county was 81%. Some of the error was a result of changes in land cover between the time of map construction and validation. Each of the county accuracies should increase similarly with the dropping of the annual and perennial grass types.

The entire map was constructed by one individual who had the experience to identify natural vegetation and agricultural uses in different seasons. All the validation was done by a single, but different, individual who had experience in identifying different vegetation and land use. Hence, the accuracy and error rates should be consistent throughout the project. The majority 90 - 95 % of identification was made in the field and approximately 5 - 10 % from the use of ODFW - WAC 1993 Willamette Valley Color Aerial Photo set at 1:24,000 resolution. The aerial photo set is housed at the ODFW N.W. Region office (Habitat Division) in Corvallis, OR.

The map is a depiction of the actual vegetation, not historical or potential vegetation types. It does not follow urban growth boundaries (UGB) and therefore shows actual vegetation cover at the time of construction.

Some of the pages of this report were designed for copying so they can accompany specific portions of the entire Willamette Land Use / Land Cover map (namely county for

individual cover type maps). Therefore, there will be statements that appear to be redundant. Several of the principal references that were used include:

Manual of Oregon Actual Vegetation

U.S Fish and Wildlife Service, Biodiversity Gap Analysis Project , Portland, OR.  
Draft 11/18/92

A Land Use and Land Cover Classification System for Use with Remote Sensor Data

Andersen, Hardy, Roach, Witmer

Natural Vegetation of Oregon and Washington , Franklin, J. & C. T. Dyrness

USDA, USFS General Technical Report PNW-8

USGS topographic and orthophoto quadrangles of the Willamette Valley



## Procedures and Equipment

The map was constructed by making mylar manuscripts from USGS Orthophotoquadangle and Topographic maps. These maps were updated by using the 1993 ODFW-WAC Willamette Valley color aerial photo set. This set of photos (approximately 2000) worked extremely well because they were taken in May and June of a wet year under excellent atmospheric conditions. Therefore, both the natural vegetation and agricultural areas could be easily separated by color shading, leaf development and moisture content of the ground. The polygons were identified by traveling all public roads (no private access was sought). Ninety percent of the polygons were identified from the field and the remaining from the color aerial photographs.

The manuscripts representing quadrangle sheets were then digitized on a Calcomp 9500 digitizing tablet using a Sun Sparc 1 Workstation with Solaris operating system and ESRI Arc/Info version 7.0.3 GIS software. All the sheets were digitized and edgematched for each county. Then cover type attributes were added and various drafts were produced until the map was thought to be as accurate as possible. The entire Willamette Valley map was then constructed by edgematching the individual county maps.

This report should be attached to the digital portion of the entire map or portions of the map as part of the metadata.

## Potential Applications

The Willamette Valley Land Use / Land Cover Map will give users the ability to:

1. Rapidly access land use status.

The digital version of the map has the capacity to find the acreage of each of the 22 types of natural vegetation and 6 types of agricultural uses in the valley portion of Lane, Linn, Benton, Polk, Yamhill, Marion and Clackamas County located within the Willamette Valley ecosystem and also in the ODFW NW Region. For evaluating a desired site, what used to take hours of tedious field work can now be completed in minutes. Wildlife Diversity staff of ODFW has already used this to identify locations and size of significant oak woodlands.

2. Perform ecosystem and landscape assessments.

Our computer programs have the capacity to analyze “connectivity”, “proximity”, “fragmentation”, ”buffer strip” components at the watershed level by describing vegetation characteristics so that the best viable wildlife habitat in a region can be determined. This will enable biologists to identify areas that can be targeted for land acquisition, habitat restoration and conservation easement projects. Also, the map will serve as a base for numerous modeling efforts, such as the development of a conservation strategy to maintain or increase Willamette Valley livability.

3. Identify potential habitat mitigation and restoration areas.

Sophisticated Geographic Information System (GIS) software such as ArcInfo® can be used to show corridors and potential habitat restoration areas. The ODFW biologists have already used the map to help identify potential sites for BPA mitigation sites.

4. Assist private landowners with habitat projects.

The Habitat Management staff in the ODFW NW Region has used the map to help evaluate potential habitat projects. ArcInfo® has been used to show actual acreage (hectares and/or acres) of vegetation and agricultural classifications to help facilitate landowner - ODFW cooperative agreements. ArcInfo® is able to show square surface area of ponds constructed under the direction of ODFW. Area of ponds taken at low and high pool will help manage specific plant and associated wildlife species.

5. Aid in planning urban growth and planning of city, county, watershed, state and federal projects.

For example, the map provides an inventory that can help meet LCDC Goal 3 (Agriculture) and Goal 5 (Natural Vegetation and Open Spaces) resources. This has already happened in the Muddy Creek (southwest of Corvallis) and the West Corvallis planning process. The maps was used in the public input phase of the planning process. The Muddy Creek project used the map as it's base Natural Vegetation and Agricultural GIS data layer to examine their growth alternatives. The Army Corp of Engineers also is using the map to help in the reallocation of water from the Willamette Valley Basin.

6. Identify potential sites for research.

The map will help researchers by allowing species and habitat relationships to be tested by locating cover classes, habitat types and agricultural areas specific to their questions.

7. Assess transportation corridor changes in respect to fish and wildlife habitat resources.

The map is an efficient and highly accurate method for biologists to analyze possible impacts on wildlife from changes in highway corridors and vegetation management policies.

8. Monitor land use change with the aid of remote sensing or airborne videography.

Using an initial field tested map such as the Willamette Valley map, airborne videography flown on the same flight line will make sampling habitat changes fast and efficient. Remotely sensed images overlaid on field tested maps will be able to evaluate change in a matter of weeks instead of the months and years of previous subjects.

9. Plan and evaluate for endangered species recovery.

The map will provide a valuable piece of information for endangered, threatened and sensitive species by depicting habitat, connectivity, patch size and location of their associated habitats.

10. Allow quick assessment of data.

This would be extremely valuable for correlating location data from Blue Herons, Osprey, Bald Eagle and variable rare neotropical birds such as the Meadowlark with existing vegetation.

11. Be used in public and agency education.

BLM has already used a portion of the map for a resource education project.

12. Track habitat changes over time.

The map can now serve as a baseline from which to track rates of change for various vegetation types and wildlife habitats. The mapping effort was done to allow wildlife and fisheries biologists to interact at a project level. They will have a map with fine enough resolution to include small, but important, habitat parcels.

To help understand the magnitude and potential power of this endeavor, the 1993 Oregon GAP vegetation map has 7,000 individual polygons. The Willamette Land Use / Land Cover map has approximately 40,000 individual polygons with discrete units as small as 0.12 hectare

## **Funding and Partnerships**

The funding for the project was provided by:

Oregon Department of Fish and Wildlife

- Habitat Department - N.W. Region
- Ecological Analysis Center
- Wildlife Diversity Program
- Wildlife Program - Portland

U.S. Fish and Wildlife Service (Department of Interior)/ Federal Aid

U.S. Army Corps of Engineers

## **Acknowledgments**

This project is indebted to the following people who assisted us with this endeavor. They are: Charley Barrett, Chris Kiilsgaard, Marla Trevithick, Greg and Christine White, Meg Shaughnessy, Dick Lantz, Dean Wheeler, David Anderson, Patricia Berger, JoAnn Yeager, Beverly Klock.

## Natural Vegetation Cover Types

This is a list of the natural vegetation type use in the Willamette Land Use/Land Cover map:

- 3 Urban & Industrial - all city and industrial areas
- 9 Water - rivers, lakes and ponds
- 20 Black Hawthorn Riparian, Hedgerows and Brushy Fields -
- 21 Cottonwood Riparian
- 22 Willow
- 30 Reed Canary Grass Wetland
- 31 Cattail - Bulrush
- 39 Hairgrass Prairie
- 463 Ash / Cottonwood - Maple Bottomland Pasture Mosaic
- 476 Oak / Douglas Fir - > 50% Oak
- 505 Douglas Fir / Oak - < 50% Oak
- 506 Oak - Madrone or Douglas Fir - Madrone - any % of madrone
- 510 Maple/Alder/Fir - Hardwoods Dominant
- 512 Douglas Fir or any conifer
- 999 Gravel Bars and Sand - usually along rivers
- 1000 Unclassified Forest - forested areas in the foothills of the Cascade and Coast Ranges

### **- 3 - Urban & Industrial**

This classification is an area consisting of industry or housing on the subdivision level (generally less than 0.4 hectare (1 acre) parcels. This does not follow urban growth boundaries (UGB). It depicts the actual land use at the time of map construction. Wildlife habitat information for these area can be obtained from the cities that are incorporated. Unincorporated urban area information can be found from the counties. A number of the small urban-industrial designations outside of the cities are mill sites or junk yards or isolated housing tracts.

Total Willamette Valley area in this landuse/land cover type is 114,196 acres (hectares = 46,213).

### **- 9 - Water**

This cover type included all rivers, streams, farm ponds large enough to fit the scaling of the map. Some of the areas may be seasonal. There are areas of water not included in this map because of narrow width and convoluted shape. These waters will generally be associated with the Ash (*Fraxinus latifolia*) - Cottonwood (*Populus trichocarpa*)-bottomland Pasture Mosaic, Cottonwood (*Populus trichocarpa*), Willow (*Salix spp.*), Cattail (*Triphyia latifolia*) - Bulrush (*Scirpus spp.*) that have somewhat linear shapes. For instance, the actual waters of Muddy Creek in Benton County, Rickreall Creek in Polk, or the majority of the Pudding River in Marion County are not shown because of size limitations due to map scale.

Total Willamette Valley area in this landuse/land cover type is 30,727 acres (hectares = 12,435).

### **- 20 - Black Hawthorn (*Cratageous douglasii*) Riparian, Hedgerows, Brush fields**

This cover class is characterized by Black Hawthorn (*Cratageous douglasii*) hedgerows and unmanaged pasture that have reverted to brushy habitat. The hedgerows can be of Hawthorn, volunteer Apple (*Pyrus fusca*) or Cherry (*Prunus spp.*), Indian Plum (*Osmaronia cerasiformis*), Himalaya blackberry (*Rubus discolor*), Poison Oak (*Rhus diveriloba*), Willow (*Salix spp.*), Red-Osier Dogwood (*Cornus stolonifera*), Currant and Gooseberry (*Ribes spp.*) Rose (*Rosa spp.*), Spirea (*Spiraea spp.*) or other brush species. Forbs and grasses species include Cowparsnip (*Heracleum lanatum*), Wild Rye (*Elymus cinerous*), Sedges (*Carex spp.*), Wheat Grass (*Agropyron spp.*), Bluegrass (*Poa spp.*). The hedgerows are characterized by medium height (less than 10 meters) and varying width (2 to 5 meters). Weedy strips with short brush species are also in this class. Solid strips along highway can be classed here if there is a brush component. If the strip is just weedy, then the classification falls into the Unmanaged pasture type.

Total Willamette Valley area in this landuse/land cover type is 52,710 acres (hectares = 21,331).



### **- 21 - Cottonwood (*Populus trichocarpa*) Riparian**

This represents an area dominated by cottonwoods. It is mostly located along major streams and rivers in narrow bands. Any upland cottonwood stands are very small. Associated species of Cottonwood (*Populus trichocarpa*) include Willow (*Salix spp.*), Alder (*Alnus rubra*), Pacific Dogwood (*Cornus nuttalii*), Black hawthorn (*Crategeous douglasii*), Red-Osier Dogwood (*Cornus stolonifera*), Chokecherry (*Prunus virginiana*), Western Hazel (*Corylus cornuta*), Serviceberry (*Amalanchier alnifolia*), Rose (*Rosa spp.*), Snowberry (*Symphoricarpos spp.*), The grass and forb component of this cover type includes Blackberry (*Rubus spp.*), Stinging Nettle (*Urtica dioica*), Cow Parsnip (*Heracleum lanatum*), Brome Grass (*Bromus spp.*), Sedge (*Carex spp.*), and Reed Canary Grass (*Phalaris arundinaceae*), Bluegrass (*Poa spp.*). There is a cottonwood component in the Ash-Cottonwood-bottomland Pasture Mosaic (463) cover type. Hybrid raised as agricultural crops are classified in the cottonwood cover type.

Total Willamette Valley area in this landuse/land cover type is 17,073 acres (hectares = 6909).

### **- 22 - Willow (*Salix spp.*)**

Most of the willow in the valley is associated with the periphery of the Cottonwood (*Populus trichocarpa*) stands or intermingled in the Ash (*Fraxinus latifolia*) -Cottonwood (*Populus trichocarpa*) - Bottomland Pasture Mosaic and Hedgerows. It is widespread throughout the valley, but is usually too narrow and of irregular shape to show on the map. You can expect to find it along any creek or river. Willow (*Salix spp.*) is extremely valuable in streambank stabilization and riparian erosion control. It is most likely to be dominant on gravel bars of the major rivers and creeks.

Total Willamette Valley area in this landuse/land cover type is 4,500 acres (hectares = 1821).

### **- 30 - Reed Canary Grass (*Phalaris arundinaceae*)**

This exotic species is widespread in the valley. A number of very narrow strips of Reed Canary Grass (much the same small narrow creeks) do not show up on the map because of its extremely narrow width and the fact that it interfaces with unmanaged pasture, water and hedgerow cover types. It is easy to pick out on the 1993 aerial photo set because of the lime green color in the spring. It will generally be found in the numerous drainage ditches and shallow meandering creeks throughout the valley. Because of its invasive nature, few other species are associated with Reed Canary Grass (*Phalaris arundinaceae*). Willow (*Salix spp.*), Spirea (*Spiraea spp.*), Rose (*Rosa spp.*) and Wild Barley (*Hordeum brachyantherum*) are occasionally found with this cover type.

Total Willamette Valley area in this landuse/land cover type is 6139 acres (hectares = 2485).

### **- 31 - Cattail (*Typha latifolia*) - Bulrush (*Scirpus spp.*)**

This cover type is usually associated with shallow ponds, marshes, standing water and roadside ditches. Generally monotypic, the Cattail-Bulrush cover type is associated peripherally with Sedges (*Carex spp.*), Willows (*Salix spp.*) and Reed Canary Grass (*Phalaris arundinaceae*). Water related species living in close proximity to this cover type are Knotweed (*Polygonum spp.*), Pondweed (*Potamogeton spp.*), and Bladderwort (*Utricularia spp.*). The small amount of this cover type throughout the valley is probably because its shallow water habitat has been and is easily converted to farmland.

Total Willamette Valley area in this landuse/land cover type is 849 acres (hectares = 343).

### **- 39 - Hairgrass Prairie (*Deschampsia caespitosa*)**

Hairgrass Prairie is under represented in the map because of the difficulty of identification. The best time to identify is early spring (when it first emerges) because of its light color and after it seeds out because of the lacy appearance of the seedheads. Time constraints did not allow a look for a closer examination of unmanaged agricultural areas. Species associated with Hairgrass are Aster (*Aster spp.*), Gentian (*Gentiana spp.*), Camas (*Camassia quamash*), Buttercup (*Ranunculus spp.*), Wild Celery (*Lomatium spp.*), Spiraea (*Spiraea spp.*), Rose (*Rosa spp.*), Fescue (*Festuca spp.*), Oat Grass (*Danthonia spp.*), Wild Barley (*Hordeum brachyantherum*), Rush (*Juncus spp.*), Sedge (*Carex spp.*). The opportunity for restoration of Hairgrass (*Deschampsia caespitosa*) Prairie habitat can be seen in the unmanaged pasture parcels located within the floodplains of the rivers and creeks in the valley.

Total Willamette Valley area in this landuse/land cover type is 212 acres (hectares = 86).

### **- 463 - Ash (*Fraxinus latifolia*) / Cottonwood (*Populus trichocarpa*) - Maple Bottomland Pasture Mosaic.**

It is a combination of deciduous species dominated by Oregon Ash (*Fraxinus latifolia*) and Black Cottonwood (*Populus trichocarpa*) and interspersed with open pasture. The delineation between the three is not practical on a large scale. The pastures generally flood annually and usually are invaded by Reed Canary Grass (*Phalaris arundinaceae*) when unmanaged. Oak (*Quercus garryana*), Alder (*Alnus rubra*), Maple (*Acer marcophyllum*), Western Redcedar (*Thuja plicata*), Douglas Fir (*Pseudotsuga menziesii*), Grand Fir (*Abies grandis*), Western Hemlock (*Tsuga heterophylla*), Willow (*Salix spp.*), cattail (*Typha latifolia*) - Bulrush (*Scirpus spp.*), Current and Gooseberry (*Ribes spp.*), Himalaya Blackberry (*Rubus discolor*), Blackberry (*Rubus spp.*), Snowberry (*Symphoricarpos spp.*), Spiraea (*Spiraea spp.*), Rose (*Rosa spp.*), Buttercup (*Ranunculus spp.*), Saxifrage (*Saxifraga spp.*), Hellebore (*Veratrum spp.*), Reed Canary Grass (*Phalaris arundinaceae*), Hairgrass (*Deschampsia caespitosa*), Sedges (*Carex spp.*) Rush (*Juncus spp.*), Fescue (*Festuca spp.*), and Wild Barley (*Hordeum brachyantherum*) can be found in this designation under the proper conditions.

This habitat is seasonal wetland and generally appears in large tracts or as a narrow convoluted stripe bordering streams.

Total Willamette Valley area in this landuse/land cover type is 85,627 acres (hectares = 34,652).

#### **- 476 - Oak (*Quercus spp.*) / Douglas Fir (*Pseudotsuga menziesii*)**

This cover type represent areas of closed canopy oak and areas of oak/fir mix where oak comprised greater than 50% of the stand. There is also an oak component associated with the Ash (*Fraxinus latifolia*) - Cottonwood (*Populus trichocarpa*) - bottomland Pasture Mosaic. These spots were too small and scattered to identify under the time constraints of this project. Associated species in this cover type make this cover type a truly diverse habitat. These species include White Fir (*Abies concolor*), Grand Fir (*Abies grandis*), Maple (*Acer macrophyllum*), Madrone (*Arbutus menziesii*), Serviceberry (*Amelanchier alnifolia*), Ceanothus (*Ceanothus spp.*), Oceanspray (*Holodiscus discolor*), Red Osier Dogwood (*Corylus cornuta*), Cherry (*Prunus spp.*) Rose (*Rosa spp.*), Poison Oak (*Rhus diversiloba*), Snowberry (*Symphoricarpos spp.*), Oregon Grape (*Berberis spp.*), Trailing Blackberry (*Rubus ursinus*). A wide variety of forbs and grasses are associated with this cover type. These species include Wild cucumber or Manroot (*Marah oreganus*), Harvest Lilly or Brodiaea (*Brodiaea elegans*), Strawberry (*Fragaria spp.*), Bedstraw (*Galium spp.*), Dogbane (*Apocynum spp.*), Lupine (*Lupinus spp.*), Tarweed (*Madia spp.*), Lovage (*Ligustichum spp.*), Plantain (*Plantago spp.*), Fringecup (*Tellima grandiflora*), Vetch (*Vicia spp.*) Bentgrass (*Agrostis spp.*), Brome Grass (*Bromus spp.*), Oatgrass (*Danthonia spp.*) Fescue (*Festuca spp.*), Wildrye (*Elymus spp.*) and Bluegrass (*Poa spp.*). The two ferns associated with this cover type are Sword Fern (*Polystichum munitum*), Bracken Fern (*Pteridium aquilinum*).

It can be noted that large areas of Oak and Oak-Douglas Fir were converted to Christmas tree land immediately prior the start of this project. Most of this was in the foothill area of Lane and Benton Counties, but some large areas were in eastern Marion and Clackamas Counties. The oak trees generally show up with a dark green color and rounded shadow on the 1993 aerial photo set.

Total Willamette Valley area in this landuse/land cover type is 61,580 acres (hectares = 24,920).

#### **- 505 - Douglas Fir (*Pseudotsuga menziesii*) / Oak (*Quercus spp.*)**

This cover type is characterized by whole stands of Douglas Fir (*Pseudotsuga menziesii*) and mixed Douglas Fir stands with less than 50% Oak (*Quercus spp.*). As in the Oak- Douglas Fir cover type the associated species in this cover type make a highly diverse habitat. These species include Grand Fir (*Abies grandis*), Western Hemlock (*Tsuga heterophylla*), Maple (*Acer marcophyllum* and *cincinatum*), Madrone (*Arbutus*), Incense cedar (*Calocedrus decurrens*), Serviceberry (*Amelanchier alnifolia*), Black Hawthorn (*Crataegus douglasii*), Ceanothus (*Ceanothus spp.*), Oceanspray (*Holodiscus discolor*), Poison Oak (*Rhus diversiloba*), Rose (*Rosa spp.*), Western Hazel (*Corylus cornuta*), Snowberry (*Symphoricarpos spp.*), Salal (*Gaultheria shallon*), Oregon Grape

(*Berberis spp.*), Blackberry (*Rubus spp.*), Fescue (*Festuca spp.*), and Bluegrass (*Poa spp.*). There is a high diversity of forbs and grasses including Yarrow (*Achillea millefolium*), Sandwort (*Arenaria spp.*), Strawberry (*Fragaria spp.*), Bedstraw (*Galium spp.*), Harebells (*Campanula spp.*) Prince's Pine or Pipsissewa (*Chimaphila spp.*), Miner's Lettuce (*Montia spp.*), Vanilla-leaf (*Achlys triphylla*), Trail Plant or Arrowleaf (*Adenocaulon bicolor*), Fringecup (*Tellima grandiflora*), Inside-out Flower (*Vancouveria hexanada*), Violet (*Viola spp.*), Lupine (*Lupinus spp.*), Brome grass (*Bromus spp.*), Orchard Grass (*Dactylis glomerata*), Fescue (*Festuca spp.*), Needlegrass (*Stipa spp.*) and Bluegrass (*Poa spp.*). The dominant ferns associated with this cover type are Sword Fern (*Polystichum munitum*) and Bracken Fern (*Pteridium aquilinum*).

As with the regular Oak cover type there was evidence that considerable conversion from Douglas Fir-Oak to solid Douglas Fir and Christmas tree plantations occurred immediately prior to the start of this project.

Total Willamette Valley area in this landuse/land cover type is 86,070 acres (hectares = 34,831).

### **- 506 - Oak-Madrone (*Quercus spp.*)-(*Arbutus menziesii*) or Douglas Fir-Madrone (*Pseudotsuga menziesii*)-(*Arbutus menziesii*)**

This classification represents the sighting of any madrone in the process of making this map. It represents the presence of any madrone (*Arbutus menziesii*) in either an Oak (*Quercus spp.*) or Douglas Fir (*Pseudotsuga menziesii*) stand. Time constraints did not permit a complete inventory of this cover class. It is not easy to pick madrone in a stand. The stand tend to be closed canopy and the madrone are isolated and often on the periphery of the stand. Associated species vary depending on the Oak or Douglas Fir component. If the stand is Oak dominant than the associated component is similar to the Oak- Douglas Fir cover type. These species include White Fir (*Abies concolor*), Grand Fir (*Abies grandis*), Maple (*Acer macrophyllum* and *circinatum*), Serviceberry (*Amelanchier alnifolia*), Ceanothus (*Ceanothus spp.*), Oceanspray (*Holodiscus discolor*), Rose (*Rosa spp.*), Snowberry (*Symphoricarpos spp.*), Lupine (*Lupinus spp.*), Oregon Grape (*Berberis spp.*), Blackberry (*Rubus spp.*). A wide variety of forbes and grasses are associated with this cover type. These species include Bluebells or Brodiaea (*Brodiaea elegans*), Strawberry (*Fragaria spp.*), Bedstraw (*Galium spp.*), Lupine (*Lupinus spp.*), Plantain (*Plantago spp.*), Fringecup (*Tellima grandiflora*), Bentgrass (*Agrostis spp.*), Brome Grass (*Bromus spp.*), Fescue (*Festuca spp.*), Needlegrass (*Stipa spp.*), and Bluegrass (*Poa spp.*).

If the dominant overstory is Douglas Fir, than the shrubs, forbs, grass associated species resemble the Douglas Fir - Oak cover type. These species include Grand Fir (*Abies grandis*), Maple (*Acer macrophyllum* and *circinatum*), Serviceberry (*Amelanchier alnifolia*), Ceanothus (*Ceanothus spp.*), Oceanspray (*Holodiscus discolor*), Honeysuckle (*Lonicera spp.*), Rose (*Rosa spp.*), Hazel (*Corylus cornuta*), Snowberry (*Symphoricarpos spp.*), Indian Plum (*Osmaronia cerasiformis*), Wild cucumber or Manroot (*Marah oreganus*), Blackberry (*Rubus spp.*), and Poison Oak (*Rhus diversiloba*). Prevalent grass species include Brome grass (*Bromus spp.*), Bentgrass (*Agrostis spp.*), Fescue (*Festuca spp.*), Wildrye (*Elymus spp.*) and Bluegrass (*Poa spp.*). There is a high diversity of forbes including Yarrow (*Achillea millefolium*), Anemone (*Anemone spp.*), Sandwort (*Arenaria*

spp.), Bedstraw (*Galium* spp.), Bluebells or Brodiaea (*Brodiaea elegans*), Miner Lettuce (*Montia* spp.), Fringecup (*Tellima grandiflora*), Lupine (*Lupinus* spp.). Dominant fern in this cover type are Sword Fern (*Polystichum munitum*) and Bracken Fern (*Pteridium aquilinum*)

Madrone was never found during this mapping effort to be a dominant overstory species in the Willamette Valley as is true for other parts of the state.

It can be noted that Oak-Madrone or Douglas Fir Madrone cover has been converted to Douglas Fir or Christmas trees. This would be especially true for the southern valley of Lane and Benton counties. During field checking, there was considerable evidence of conversion reaching into the foothills of the coast range.

Total Willamette Valley area in this landuse/land cover type is 23,527 acres (hectares = 9,521).

### **- 510 - Maple (*Acer macrophyllum*) / Alder (*Alnus rubus*) / Douglas Fir (*Pseudotsuga menziesii*)**

This cover type is mostly represented on the periphery of the valley. The Red Alder (*Alnus rubus*) and Bigleaf Maple (*Acer macrophyllum*) are often associated with creeks and rivers. Douglas Fir (*Pseudotsuga menziesii*) is an incidental component of this vegetation type. This cover type is present in the higher gradient areas in the foothills of the valley. As the streams enter the valley floor, the cover type usually changes to Ash (*Fraxinus latifolia*)-Cottonwood (*Populus trichocarpa*)-bottomland Pasture Mosaic and Cottonwood. The Maple (*Acer macrophyllum*) and/or Red Alder (*Alnus rubus*) component had to be greater than 50%. Mixed stands were not noted in this classification system. The only areas that were difficult to classify were the Chehalem Mountain (Yamhill & Washington Counties), Ecola Hills (Polk County) and Salem Hills area (Marion County). It was especially difficult in the Salem Hills because it is all mixed canopy, and often evenly spaced. This cover type supports a wide variety of trees, shrubs, forbs, grasses and ferns. The associated species of this classification include Western Redcedar (*Thuja plicata*), Pacific Dogwood (*Cornus nuttalli*), Vine Maple (*Acer circinatum*), Salmonberry (*Rubus spectabilis*), Thimbleberry (*Rubus parviflora*), Salal (*Gaultheria shallon*), Red-Osier Dogwood (*Corylus cornuta*), Oceanspray (*Holodiscus discolor*), Indian Plum (*Osmaronia cerasiformes*), Rhododendron (*Rhododendron macrophyllum*), Snowberry (*Symphoricarpos* spp.), Oregon Grape (*Berberis* spp.), Red-flowering Currant (*Ribes sanguineum*), Blackberry (*Rubus* spp.), Elderberry (*Sambucus* spp.) Caracara (*Rhamnus purshiana*). Some of the forbs are Anemone (*Anemone* spp.), Arnica (*Arnica* spp.), Wild cucumber or Manroot (*Marah oreganus*), Bleeding Heart (*Dicentra formosa*), Trillium (*Trillium* spp.), Violet (*Viola* spp.), Miner's Lettuce (*Montia* spp.), Waterleaf (*Hydrophyllum* spp.), Bunchberry (*Cornus canadensis*), Pyrola (*Pyrola* spp.), Wood Sorrel (*Oxalis* spp.), Fringecup (*Tolema grandiflora*), Sedge (*Carex* spp.), Inside-Out Flower (*Vancouveria hexanda*) and Foam-flower (*Tiarella* spp.). Major grass species are Brome grass (*Bromus* spp.), and Fescue (*Festuca* spp.). This cover type has a wide variety of ferns. There are Sword Fern (*Polystichum munitum*), Maidenhair Fern (*Adiantum pedatum*), Deer Fern (*Blechnum spicant*), Wood Fern (*Dryopteris austriaca*), Licorice Fern (*Polypodium glycyrrhiza*), and Bracken Fern (*Pteridium aquilinum*).

Most of this deciduous cover type developed in response to logging or fire and failure to replant with coniferous species. Because of the deciduous nature of the overstory, there is a highly variable shrub, forb, and grass understory. This cover type generally has more fern species than other cover types, except possibly, the Douglas Fir cover type. It is not addressed in this project, but the Alder-Maple-Fir mix also supports a large number of moss and lichen (Bryophytes) species.

Total Willamette Valley area in this landuse/land cover type is 45,955 acres (hectares = 18,597).

### **- 512 - Douglas Fir (*Pseudotsuga menziesii*)**

This cover type is represented by scattered patches throughout the entire valley. It is most prevalent in hilly areas. For the purpose of this project, Douglas Fir (*Pseudotsuga menziesii*) was classified only in the foothills area of the Coast and Cascade Range from on-site identification. Any thing beyond that which appeared on the 1993 aerial photo set was classified as Unclassified Forest. It may be noted that Christmas tree plantings (especially small parcels) will be reclassified as regular Douglas Fir if they remain unharvested. The cover type also represents any other conifer, such as Western Redcedar (*Thuja plicata*), Western Hemlock (*Tsuga heterophylla*), Noble Fir (*Abies procera*). These species are a extremely small part of the area and are usually mixed with Douglas Fir. The Douglas Fir in the lower elevations is replaced by Western Hemlock as elevation increases. Other tree and shrub species associated with the Douglas Fir at the low elevation of the Willamette Valley are Grand Fir (*Abies grandis*), Noble Fir (*Abies procera*), Big-leaf Maple (*Acer macrophyllum*), Red Alder (*Alnus rubra*), Madrone (*Arbutus menziesii*), Incense cedar (*Calocedrus decurrens*), Pacific Yew (*Taxus brevifolia*), Vine Maple (*Acer circinatum*), Serviceberry (*Amelanchier alnifolia*), Oregon Grape (*Berberis spp.*), Pacific Dogwood (*Cornus nuttalli*), Western Hazel (*Corylus cornuta*), Salal (*Gautheria shallon*), Oceanspray (*Holodiscus discolor*), Ninebark (*Physocarpus capitatus*), Rhododendron (*Rhododendron macrophyllum*), Azalea (*Rhododendron occidentale*), Snowberry (*Symphoricarpos spp.*), Blackberry (*Rubus spp.*), Himalaya Blackberry (*Rubus discolor*), Huckleberry (*Vaccinium spp.*), Elderberry (*Sambucus spp.*). The dominant forbs and grasses found with this cover type are Vanilla-leaf (*Achlys triphylla*), Anemone (*Anemone spp.*), Arnica (*Arnica spp.*), Sandwort (*Arenaria spp.*), Aster (*Aster spp.*), Clintonia (*Clintonia spp.*), Vari-leaved Collomia (*Collomia spp.*), Bunchberry (*Cornus canadensis*), Bleeding Heart (*Dicentra formosa*), Larkspur (*Delphinium spp.*), Fairybells (*Disporum spp.*), Avens (*Geum spp.*), Strawberry (*Fragaria spp.*), Chickweed (*Galium spp.*), Twistedstalk (*Streptopus spp.*), Alumroot (*Heuchera micranta*), Twinflower (*Linnaea spp.*), Miner Lettuce (*Montia spp.*), Wood Sorrel (*Oxalis oregana*), Pyrola (*Pyrola secunda*), Foam Flower (*Tiarella trifoliata*), Menziesii Tolmeia (*Tolmeia menziesii*), Trillium (*Trillium spp.*), Chocolate Lilly or Riceroor (*Frillaria spp.*), Inside-Out Flower (*Vancouveria hexanadra*), Goldenrod (*Solidago spp.*)Violet (*Viola spp.*), Sedges (*Carex spp.*), Brome Grass (*Bromus spp.*), Fescue (*Festuca spp.*).

Total Willamette Valley area in this landuse/land cover type is 85,903 acres (hectares = 34763).

**- \_\_\_\_\_.3 - Forest/Urban Interface Cover Types:**

**- 21.3 - Cottonwood/Urban Interface** Total Willamette Valley area in this landuse/land cover type is 241 acres (hectares = 98).

**- 463.3 - Ash-Cottonwood-Bottomland Pasture Mosaic/ Urban Interface** Total Willamette Valley area in this landuse/land cover type is 932 acres (hectares =377).

**- 476.3 - Oak-Douglas Fir/Urban Interface** Total Willamette Valley area in this landuse/land cover type is 1,115 acres (hectares = 451).

**- 510.3 - Maple-Alder-Fir/Urban Interface** Total Willamette Valley area in this landuse/land cover type is 1868 acres (hectares = 756).

**- 512.3 - Douglas Fir/Urban Interface** Total Willamette Valley area in this landuse/land cover type is 2,743 acres (hectares = 1110).

All five of these cover types represent urban housing in the understory of the listed forest types. Generally the understory plant species associated with these forest species have been eliminated or drastically altered by lawn and brush clearing. The wildlife species are impacted greatly by human disturbance, livestock grazing and the presence of domestic dogs and cats in all parts of the understory.

**- 999- Gravel Bars and Sand**

This cover type shows gravel and sand bars of river and creeks. It also shows the location of large gravel and sand removal areas. A large area usually indicates a commercial sand and gravel operation. Willow (*Salix spp.*) and Cottonwood (*Populus trichocarpa*) are the first species to colonize the sand and gravel area in the river channel. Because of the dynamics of this area, the sand and gravel bars as well as their vegetation cover change rapidly compared to other vegetation cover types.

Total Willamette Valley area in this landuse/land cover type is 2,768 acres (hectares = 1,121).

**- 1000 - Unclassified Forest**

This cover type was added so that land use / land cover maps from ODFW and other agencies would be more accurate. They could be easily merged with the Willamette Land Use / Land Cover map to complete the entire valley or basin. This class does not have the same resolution and detail as the other classes in the map, but is sufficient for general forested areas not impacted by intensive agriculture and urbanization.

## **Agricultural Land Cover Types**

The agricultural divisions were developed by Steve Smith and Clair Klock. They are loosely based on similar pesticide use and/or irrigation requirements. The crops are treated generally the same way in regard to the application of pesticides and cultural techniques in land preparation and harvest.

2.1 - Annual Row Crops

2.2 - Annual grass

2.3 - Perennial Grass

2.4 - Orchards, Vineyards, Berries, Christmas trees, Nursery Stock

2.5 - Unmanaged pasture

2.6 - Recreational Fields, Parks and Cemeteries

### **- 2.1 - Row Corps**

Farmland used for production of annual crops such as vegetables and herbs is characterized by bare soil, vegetable and annual plant debris either into the field or along the periphery. The location tends to be along bottomland area of streams and rivers and areas having sufficient source of irrigation. There is a wide range of soil conservation practices in this category.

Total Willamette Valley area in this landuse/land cover type is 103,019 acres (hectares = 41,691).

### **- 2.2 - Annual Grass**

Farmland used for production of annual grasses such as wheat, oats, barley and rye is characterized by upland and rolling hill terrain, generally without irrigation.

Total Willamette Valley area in this landuse/land cover type is 93,617 acres (hectares = 37,885).

### **- 2.3 - Perennial Grass**

Farmland used for the production of perennial grass such as grass seed and hay. This class comprised the majority of agricultural area of the valley. It is characterized by dark green, clumpy appearance on the 1993 aerial photo set. Perennial grass is generally grown without irrigation.



Total Willamette Valley area in this landuse/land cover type is 823,945 acres (hectares = 333,440).

#### **- 2.4 - Orchards, Vineyards, Berries, Christmas Trees, Nursery Stock**

Farmland used for production of tree fruits (apples, peaches, pears, hazelnuts), vineyards (grapes, Kiwi), berries (strawberries, raspberries, blueberries, blackberries), Christmas trees, and nursery stock (ornamental container and greenhouse operations). This cover type is generally located in upland area with access to high volume of irrigation. Christmas trees are characterized by upland areas, poorer class soils and no irrigation. The majority of this cover type in the valley can be found in Marion and Clackamas Counties. This category cover a broad spectrum of crops. The main difference is that there a food and non-food crops in this category.

Total Willamette Valley area in this landuse/land cover type is 111,421 acres (hectares = 45,091).

#### **- 2.5 - Unmanaged Pasture**

Farmland that appears to have no active management such as fertilizer application, irrigation or weed control. This land might be grazed by livestock, but shows no evidence of irrigation. It can also be characterized by uncut hay, organic debris from the previous season, uncut standing dead grass, exotic plants (Tansy ragwort (*Senecio jacobea*), Thistle (*Cirsium spp.*), Himalaya blackberry (*Rubus discolor*) and their debris, patches of shrubs Hawthorn (*Crataegous spp.*), Snowberry (*Symphoricarpos spp.*), Spirea (*Spireae spp.*), Poison oak (*Rhus diversiloba*), and encroachment of various tree species (depending on terrain). This category appears on 1993 aerial photo set as brown, yellow, medium green with grainy texture. It is generally located in foothill areas.

The land usually has been cleared and farmed intensively in the past. In the present version of the Willamette Map the owners of these lands either graze livestock or are not doing anything with the land. In the instances where the owner is not actively managing the land, it is either reverting to brushy field or volunteer forest. The totally unmanaged land has high potential for inclusion into habitat protection programs. For instance, there is an excellent opportunity to utilize the strip along I-5 identified in this cover type, as Western Meadowlark habitat, if ODOT would change their moving timetables.

Total Willamette Valley area in this landuse/land cover type is 171,559 acres (hectares = 69,428).

#### **- 2.6 - Recreational Fields, Parks and Cemeteries**

This land that is generally located in agricultural zones, but is used as parks and cemeteries. These lands can be and often are associated with some type of forest cover. Parks which had a forest type as dominant overstory were identified in that particular overstory cover type. Suitability as wildlife habitat is highly variable. This is due to the management of the understory. If the grounds were kept in "park-like" conditions the wildlife diversity would naturally decrease. In the area where the natural understory

species were allowed to develop, the wildlife diversity would be greater. In order to get a true picture of protected parkland and open space, the ownership GIS layer for local, county, state, federal parks and biodiversity conservation organization lands would need to be laid over the Willamette Vegetation Map. This is a critical step in analyzing the valley for ecological corridors and connectivity of habitat types.

The parks were include in the agricultural category because they are usually adjacent to agricultural areas and are open space. These areas are generally treated as non-food and non grazing areas in regard to pesticide use.

Total Willamette Valley area in this landuse/land cover type is 3,003 acres (hectares = 1,215 ).

## **Clustering Cover Types**

This is a suggested grouping of Willamette Land Use/Land Cover Cover types to Habitat clusters:

### **Agricultural** ( 2.1, 2.2, 2.3, 2.4, 2.5, 2.6)

The 2.5 type may need its own class. There is a significant opportunity for upland wildlife habitat restoration and improvement. Some of this land is rapidly becoming brushy fields and young forest.

### **Riparian** ( 9,20,21,21.3,22,30,31,39,463, 463.3,999)

The 20 cover type would not always fit this class. Some of 20 classification is upland brushy fields.

### **Oak** (476, 476.3, 505, 505.3, 506, 506.3)

The 506 cover type might need to be on it own due to the smaller area and the fact that it can be either oak or Douglas Fir associated.

### **Upland Forest** (510, 510.3, 512, 512.3)

### **Unclassified Forest** (1000)

### **Urban** (3)

## County Comments

### *Benton County*

Below are some subjective comments by Clair Klock derived during the production of the Benton County portion of the Willamette Land Use / Land Cover map. These are generalizations and therefore are not backed by statistical data.

The valley portion of the county is characterized by row crops in the bottomland along the Willamette River. The majority of upland areas are perennial grass field. This is for the production of grass seed and hay. This upland area also has a limited amount of annual grasses such as wheat, oats and barley. All of these areas are subject to standing water in the winter months if not thoroughly tilled. The few buttes generally have oaks with a pasture component. The foothill area blending into the coast range have a combination of uses. This region primarily is Christmas tree farms, and perennial grasses(usually hay or livestock grazing). The secondary use seems to be rural non-farm small parcels (agriculture land under little or no management). There are a few large acreage's in this category .

There is a trend towards breaking the larger perennial grassland into these smaller parcels and subsequent single-family dwelling construction. A good share of these rural non-farm acreage are listed as unmanaged pasture and have potential to become valuable upland wildlife areas.

The foothill area is also seeing a conversion from Oak and Oak associated cover types to Christmas tree plantation and solid Douglas Fir Forest. This is especially true for southern Benton county.

As far as natural vegetation cover is concerned, the major effect is the year by year conversion in the form of small parcels to agriculture and housing and contained draining of hydric soils. There is a conversion of Oak and Oak associated habitat to Oak Urban habitat in the Corvallis and Philomath areas. This means that the canopy or overstory remained intact, but the understory is drastic altered or eliminated in favor of lawns and other human landscape designs. This understory removal as well as the drastic increase of domestics cats and dogs and human disturbances is essentially eliminates the area as viable habitat for a majority of wildlife. The largest single parcel with wildlife diversity significance is Finley Natural Wildlife Refuge.

Map accuracy in listed as 79%.

## ***Clackamas County***

There is a large portion of valley habitat not included in the Willamette Land Use / Land Cover map because it was not part of the N.W. Region of ODFW and not all is included in the 1993 aerial photo set. This is all of the county north of the Willamette River and north and east of the Canby, Yoder and Scotts Mill quadrangles. Below are some subjective comments derived during the production of the Clackamas County portion of the Willamette Land Use / Land Cover map. These are generalizations and therefore not backed by statistical data.

The valley portion of the county is characterized by row crops in the bottomland along the Willamette River, Pudding and Mollala Rivers. The upland areas are a combination of all the agricultural cover types. There is no real clear dominant use. Parcel sizes have a tendencies to be smaller and have hedgerows, than the south end of the valley. This is also true for the northeast corner of Marion County. The land is naturally better drained than the rest of the Willamette Valley. This is because the area is interlaced with all types and sizes of creeks and swales. This land pattern lead to a extremely checkered design involving both the agricultural and natural vegetation cover classes. The foothill area blending into the Cascade Range also reflects a combination of uses. This region has no clearcut dominant land use. Due to urban pressure, rural non-farm small parcels (agriculture land under little or no management) is a strong factor in the landscape. The large parcels are being (or have been) broken to make smaller ranchettes with single-family dwelling. Most have their own wells and are on individual residential septic systems. This division of land is not only small foothill areas as the rest of the valley, but flat high value farmland such as annual and perennial grass and row crop fields. This is especially true for the area north and east of Canby, but is widespread throughout the scope of the project area. The occupants of these small farms (2 to 20 acres) maintain their agricultural status by raising livestock and doing nursery work or Christmas trees. This is the origin of some very small stands of Douglas Fir timber. There are a few large parcels in this category. These are sizable contiguous areas having excellent potential for possible inclusion in Oregon's new Wildlife Conservation program.

The foothill area is also seeing a conversion from all types of forested areas to Christmas tree plantations and solid Douglas Fir Forest. This is especially true for the eastern part of the county.

As far as natural vegetation cover is concerned, the major effect is the year by year conversion in the form of small parcels to agriculture and housing. There is a conversion of all forested vegetation types to forested urban designation. This means that the canopy or overstory remained intact, but the is drastic altered or eliminated in favor of lawns and other human landscape designs. This overstory removal as well as the drastic increase of domestics cats and dogs and human disturbances is essentially eliminates the area as viable habitat for a majority of wildlife.

Map accuracy is listed at 83%.

## ***Lane County***

There is a small area up the McKenzie and Middle Fork of the Willamette that has not been mapped because it wasn't included in the 1993 aerial set. This area is located in the Waterville and Leaburg and Lowell and Fall Creek .

Below are some subjective comments by Clair Klock derived during the production of the Lane County portion of the Willamette Land Use / Land Cover map. These are generalizations and therefore not backed by statistical data.

The valley portion of the county is characterized by row crops in the bottomland along the Willamette River. The majority of upland areas are perennial grass field. This is for the production of grass seed and hay. This upland area also has a limited amount of annual grasses such as wheat, oats and barley. Most of these areas are subject to standing water in the winter months if not thoroughly tilled. The exception is the area around Pleasant Hill. This is on a higher terrace intermingled with creeks and swales that facilitate better drainage. The foothill area blending into the Coast Range and the hills south of Eugene-Springfield area have a combination of uses. This region primarily is natural vegetation and perennial grass (usually hay or livestock grazing). The secondary use seems to be rural non-farm small parcels (agriculture land under little or no management). This is especially true for the area southeast and southwest of Eugene and the Marcola area. There are a few large parcels in this category .

There is a trend towards breaking the larger perennial grassland into these smaller parcels and subsequent single-family dwelling construction. A good share of these rural non-farm acreage are listed as unmanaged pasture and have potential to become valuable upland wildlife areas.

The foothill area is also seeing a conversion from Oak and Oak associated cover types to Christmas tree plantation and solid Douglas Fir Forest. This is especially true for south and southwestern Lane County.

As far a natural vegetation cover is concerned, the major effect is year by year conversion in the form of small parcels to agricultural and housing and continued draining of hydric soils. There is a conversion of Oak and Oak associated habitat to Oak Urban habitat in areas south of Eugene. This means that the canopy or overstory remained intact, but the understory is drastically altered or eliminated in favor of lawns and other human landscape designs. This understory removal as well as the drastic increase of domestic cats and dogs and human disturbances essentially eliminates the area as viable habitat for a majority of wildlife.

Map accuracy is listed at 72%.

## ***Linn County***

Below are some subjective comments derived during the production of the Linn County portion of the Willamette Land Use / Land Cover map. These are generalizations and therefore not backed by statistical data.

The valley portion of the county is characterized by row crops in the bottomland along the Willamette and Santiam Rivers. The majority of upland areas are perennial grass fields. This is for the production of grass seed and hay. This upland area also has a limited amount of annual grasses such as wheat, oats and barley. All of these areas are subject to standing water in the winter months if not thoroughly tilled. The field survey portion of this project was done immediately following the 1996 Willamette Valley flood. The vast majority of fences showed high water debris across the whole extent of Linn County. The few buttes generally have oaks with a pasture component. The foothill area blending into the Cascade range has a combination of uses. This region primarily is perennial grasses (usually hay or livestock grazing). The secondary use seems to be rural non-farm small parcels (agriculture land under little or no management). This is especially true for the area east of Lebanon, Brownsville and Sweet Home. There are a few large parcels in this category .

There is a trend towards breaking the larger perennial grassland into these smaller parcels and subsequent single-family dwelling construction. A good share of these rural non-farm acreages are listed as unmanaged pasture and have potential to become valuable upland wildlife areas. The foothill area is also seeing a conversion from Oak and Oak associated cover types to solid Douglas Fir Forest.

As far as natural vegetation cover is concerned, the major effect is year by year conversion in the form of small parcels to agriculture and housing and continued draining of hydric soils. There is a conversion of all types of forested land to forested urban designation. This means that the canopy or overstory remained intact, but the overstory is drastic altered or eliminated in favor of lawns and other human landscape designs. This understory removal as well as the drastic increase of domestics cats and dogs and human disturbances essentially eliminates the area as viable habitat for a majority of wildlife.

The largest single feature of significance for wildlife diversity opportunity in Linn County is the abandoned railroad right-of-way from Brownsville to the Coburg area. There have been patches already converted to farmland.

Map accuracy is listed at 86%.

## ***Marion County***

Below are some subjective comments derived during the production of the Marion County portion of the Willamette Land Use / Land Cover map. These are generalizations and therefore not backed by statistical data.

The valley portion of the county is characterized by row crops in the bottomland along the Willamette River. Marion County probably illustrates the largest diversity in landscape pattern and natural vegetation diversity. This pattern is heavily influenced by the urban pressures of Salem, Woodburn, and Silverton. The upland areas are a combination of crop cover types. The landscape pattern changes drastically from south to north. The southern part of Marion County is more like the southern end of the valley. This area is characterized by large perennial and annual grass field, bordered by row crops on the lower river terraces. The area is subject to standing water in the winter months, if not thoroughly tiled. There is no clearcut trend of dominant land use in northern Marion County. It is truly a checkerboard pattern. The area is generally less wet than southern part of the county. The land ownership is probably in smaller parcels if compared to the agricultural land of the southern valley.

The foothill area blending into the Cascade Range have a combination of uses. This region primarily is Christmas tree farms, and perennial grasses (usually hay or livestock grazing). The secondary use seems to be small rural non-farm parcels (agriculture land under little or no management) especially in the Salem area. There are a few large parcels in this category. There is a trend towards breaking the larger perennial grassland into these smaller parcels and subsequent single-family dwelling construction. A good share of these rural non-farm acreage are listed as unmanaged pasture and have potential to become valuable upland wildlife areas. The largest area of wildlife diversity significance is the Ankeny Natural Wildlife Refuge.

The foothill area is also seeing a conversion from Oak and Oak associated cover types to Christmas tree plantation and solid Douglas Fir Forest. There is especially true for the eastern part of the county..

As far as natural vegetation cover is concerned, the major effect is year by year conversion in the form of small parcels to agriculture and housing and contained draining of hydric soils. There is a conversion of all types of forested areas to forested urban designation. This means that the canopy or overstory remained intact, but the understory is drastic altered or eliminated in favor of lawns and other human landscape designs. This understory removal as well as the drastic increase of domestics cats and dogs and human disturbances is essentially eliminates the area as viable habitat for a majority of wildlife. There is a conversion of large parcel of natural and agricultural cover type to small(2-10 acre) ranchettes, especially in the hills south and east of Salem and the Silverton area. This type of land use is still categorized in the natural and agricultural cover types, but has the same effect on wildlife diversity as the Forested Urban areas. Most of these areas have their own well and individual septic system.

Map accuracy is listed at 83%.



## **Polk County**

There is a small portion of valley habitat not included in the Willamette Land Use / Land Cover map because it was not included in the 1993 aerial photo set. This area is located in the Grand Ronde and Midway quadrangles. The Polk and Yamhill county boundary split this area.

Below are some subjective comments derived during the production of the Polk County portion of the Willamette Land Use/Land Cover Map. These are generalizations and therefore not backed by statistical data.

The valley portion of the county is characterized by row crops in the bottomland along the Willamette River. The majority of upland areas are perennial grass fields. This is for the production of grass seed and hay. This upland area also has a limited amount of annual grasses such as wheat, oats and barley. All of these areas are subject to standing water in the winter months if not thoroughly tiled. The few buttes generally have oaks with a pasture component. The foothill area blending into the coast range and the Ecola Hills (west and northwest of Salem) have a combination of uses. This region primarily is orchards, Christmas tree farms, and perennial grasses (usually hay or livestock grazing).

The secondary use seems to be rural non-farm small acreages (agriculture land under little or no management). There are a few large acreage's in this category . There is a tendency towards breaking the larger perennial grassland into these smaller parcels and subsequent single-family dwelling construction. A good share of these rural non-farm acreages are listed as unmanaged pasture and have potential to become valuable upland wildlife areas. The new Oregon Wildlife Conservation program offers excellent opportunities to increase upland wildlife habitat.

The foothill area is also seeing a conversion from Oak and Oak associated cover types to Christmas tree plantation and solid Douglas Fir Forest.

As far a natural vegetation cover is concerned, the major effect is year by year conversion, in the form of small parcels to agriculture and housing. There is a conversion of Oak and Oak associated habitat to Oak Urban habitat in areas west of Salem. This is also happening to the mixed Maple-Alder-Douglas Fir-Oak stands south of Salem. This means that the canopy or overstory remained intact, but the understory is drastic altered or eliminated in favor of lawns and other human landscape designs. This understory removal as well as the drastic increase of domestics cats and dogs and human disturbances is essentially eliminates the area as viable habitat for a majority of wildlife. The largest area of wildlife diversity significance is the Baskett Slough Natural Wildlife Refuge.

Map accuracy is listed at 83%.

## ***Yamhill County***

There is a small portion of valley habitat not included in the Willamette Land Use / Land Cover map because it was not included in the 1993 aerial photo set. This area is located in the Grand Ronde, Midway and Springer Mountain quadrangles. The Polk and Yamhill county boundary split this area.

Below are some subjective comments derived during the production of the Yamhill County portion of the Willamette Land Use / Land Cover map. These are generalizations, and therefore not backed by statistical data.

The valley portion of the county is characterized by row crops in the bottomland along the Willamette River. The upland areas are a combination of all the agricultural cover types, but perennial grass dominants. The southern part of the valley has a tendency to have larger parcel size of annual and perennial grass crops. There are few hedgerows. There is a definite tendency toward hedgerows and smaller parcel sizes in the north end of the valley. Instead of a 300 acre parcel with one crop cover type as in the south end of the valley, there will be three 100 acre parcels with a variety of crop cover types. The northeast corner of the county near Dundee has no clear dominant use. This is also true for the northeast corner of Marion County. The land is naturally better drained than the rest of the Willamette Valley. This is because the area is interlaced with all types and sizes of creeks and swales. This land pattern leads to a extremely checkered design involving both the agricultural and natural vegetation cover classes. The foothill area blending into the Cascade Range and Chehalem Mountain also reflects a combination of uses. This region has no clearcut dominant land use. Due to urban pressure, it seems to be rural non-farm small parcels (agriculture land under little or no management) is a strong factor. The large parcels are being (or have been) broken to make smaller ranchettes with single-family dwellings. Most have their own wells and are on individual residential septic systems. This is especially true for the area around Newberg. The occupants of these small farms (2 to 20 acres) maintain their agricultural status by raising livestock and doing nursery work or Christmas trees. This is the origin of very small acreages of Douglas Fir timber. There are a few large parcels in this category. These are sizable contiguous areas having excellent potential for possible inclusion in Oregon's new Wildlife Conservation program.

The foothill area is also seeing a conversion from Oak, Oak associated, and Maple-Alder-Fir cover types to Christmas tree plantations and solid Douglas Fir Forest.

As far a natural vegetation cover is concerned, the major effect is the year by year conversion of small parcels to agriculture use and housing. There is a conversion of all forested vegetation types to forested urban designation. This means that the canopy or overstory remained intact, but the understory is drastic altered or eliminated in favor of lawns and other human landscape designs. This understory removal as well as the drastic increase of domestics cats and dogs and human disturbances is essentially eliminates the area as viable habitat for a majority of wildlife. This problem exist around all the urban centers is the valley.

Map accurarcy is listed at 81%.

<b>Statistics</b>					
<b>Willamette Valley Vegetation Map</b>					
<b>March 17, 1998</b>					
<b>Total Area excluding Unclassified Forest</b>				Hectares	Acres
3	Urban			46213.845	114196.43
9	Water			12435.199	30727.92
20	Black Hawthorn, Hedgerows and Bushy Fields			21331.278	52710.52
21	Cottonwood			6909.3153	17073.22
21.3	Cottonwood Urban			97.691514	241.4
22	Willow			1821.1819	4500.22
30	Reed Canary Grass			2484.6303	6139.63
31	Cattail - Bulrush			343.42169	848.61
39	Hairgrass Prairie			85.911067	212.29
463	Ash - Cottonwood - bottomland Pasture Mosaic			34652.236	85627.19
463.3	Ash - Cottonwood - bottomland Pasture Mosaic Urban			377.24141	932.18
476	Oak - Douglas Fir - > 50% Oak			24920.842	61580.49
476.3	Oak - Douglas Fir Urban			451.49748	1115.67
505	Douglas Fir - Oak - < 50% Oak			34831.501	86070.16
505.3	Douglas Fir - Oak Urban			3311.2324	8182.2
506	Oak - Madrone or Douglas Fir - Madrone			9521.1145	23527.09
510	Maple - Alder - Fir			18597.806	45955.99
510.3	Maple - Alder - Fir Urban			756.12585	1868.42
512	Douglas Fir or any conifer			34763.995	85903.35
512.3	Douglas Fir Urban			1110.1099	2743.13
999	Gravel and Sand			1120.571	2768.98
1000	Unclassified Forest				
<b>Total Natural Vegetation Area</b>				<b>256136.75</b>	<b>632925.09</b>
<b>Agricultural Land Cover Types</b>					
2.1	Annual Row Crops			41690.647	103019.41
2.2	Annual Grass			37885.809	93617.49
2.3	Perennial Grass			333440.07	823944.98
2.4	Orchards, Vineyards , Berries Christmas Trees and Nursery Stock			45090.631	111420.92
2.5	Unmanaged pasture			69427.546	171558.50
2.6	Parks and Cemeteries			1215.4257	3003.37
<b>Total Agricultural Area</b>				<b>528750.13</b>	<b>1306564.67</b>
<b>Grand Total Area</b>				<b>784886.87</b>	<b>1939489.76</b>

<b>Statistics</b>					
<b>Benton County Vegetation Map</b>					
<b>March 17,1998</b>					
<b>Total Area excluding Unclassified Forest</b>				Hectares	Acres
3	Urban			3760.59	9292.58
9	Water			1061.92	2624.05
20	Black Hawthorn, Hedgerows and Bushy Fields			1429.58	3532.56
21	Cottonwood			433.74	1071.78
21.3	Cottonwood Urban			0.00	0.00
22	Willow			210.53	520.22
30	Reed Canary grass			181.13	447.58
31	Cattail - Bulrush			76.94	190.13
39	Hairgrass Prairie			39.44	97.45
463	Ash - Cottonwood - bottomland Pasture Mosaic			3777.88	9335.30
463.3	Ash - Cottonwood - bottomland Pasture Mosaic Urban			21.11	52.17
476	Oak - Douglas Fir - > 50% Oak			3017.97	7457.53
476.3	Oak - Douglas Fir - Urban			191.16	472.36
505	Douglas Fir - Oak - < 50% Oak			2775.16	6857.55
505.3	Douglas Fir - Oak - Urban			470.58	1162.83
506	Oak - Madrone or Douglas Fir - Madrone			1524.68	3767.54
510	Maple - Alder -Fir			1823.03	4504.79
510.3	Maple -Alder - Fir - Urban			9.49	23.45
512	Douglas Fir or any conifer			1166.58	2882.68
512.3	Douglas fir - Urban			32.31	79.83
999	Gravel and Sand			120.27	297.20
1000	Unclassified Forest				
<b>Total Natural Vegetation Area</b>				<b>22124.08</b>	<b>54669.58</b>
<b>Agricultural Land Cover Types</b>					
2.1	Annual Row Crops			5254.52	12984.15
2.2	Annual Grass			4062.31	10038.15
2.3	Perennial Grass			23293.07	57558.20
2.4	Orchards, Vineyards , Berries Christmas Trees and Nursery Stock			3383.77	8361.45
2.5	Unmanaged pasture			8470.22	20930.28
2.6	Parks and Cemeteries			188.89	466.75
<b>Total Agricultural Area</b>				<b>44652.78</b>	<b>110338.98</b>
<b>Grand Total Area</b>				<b>66776.87</b>	<b>165008.56</b>

<b>Statistics</b>					
<b>Clackamas County Vegetation Map</b>					
<b>March 17,1997</b>					
<b>Total Area excluding Unclassified Forest</b>				Hectares	Acres
3	Urban			940.06	2322.93
9	Water			642.78	1588.34
20	Black Hawthorn, Hedgerows and Bushy Fields			824.11	2036.40
21	Cottonwood			256.09	632.81
21.3	Cottonwood Urban			300.14	741.65
22	Willow			90.31	223.16
30	Reed Canary grass			97.20	240.19
31	Cattail - Bulrush			0.00	0.00
39	Hairgrass Prairie			0.00	0.00
463	Ash - Cottonwood - Bottomland Pasture Mosaic			1953.05	4826.07
463.3	Ash -Cottonwood - Bottomland Pasture Mosaic Urban			53.83	133.02
476	Oak - Douglas Fir - > 50% Oak			433.82	1071.99
476.3	Oak - Douglas Fir Urban			38.01	93.93
505	Douglas Fir - Oak - < 50% Oak			1779.20	4396.49
505.3	Douglas Fir - Oak Urban			10.81	26.72
				0.00	
506	Oak - Madrone or Douglas Fir - Madrone			93.84	231.88
				0.00	
510	Maple - Alder -Fir			594.21	1468.33
510.3	Maple - Alder - Fir Urban			89.63	221.48
512	Douglas Fir or any conifer			1353.73	3345.12
512.3	Douglas Fir Urban			250.31	618.52
999	Gravel and Sand			75.96	187.71
1000	Unclassified Forest				
<b>Total Natural Vegetation Area</b>				<b>9877.10</b>	<b>24406.74</b>
Agricultural Land Cover Types					
2.1	Annual Row Crops			2593.17	6407.84
2.2	Annual Grass			1429.67	3532.78
2.3	Perennial Grass			11654.06	28797.70
2.4	Orchards, Vineyards , Berries Christmas Trees and Nursery Stock			5651.79	13965.81
2.5	Unmanaged pasture			2868.52	7088.24
2.6	Parks and Cemeteries			62.38	154.14
<b>Total Agricultural Area</b>				<b>24259.59</b>	<b>59946.51</b>
<b>Grand Total Area</b>				<b>34136.69</b>	<b>84353.25</b>

<b>Statistics</b>					
<b>Lane County Vegetation Map</b>					
<b>March 17,1998</b>					
<b>Total Area excluding Unclassified Forest</b>				Hectares	Acres
3	Urban			15719.37	38843.25
9	Water			4530.32	11194.62
20	Black Hawthorn, Hedgerows and Bushy Fields			1938.37	4789.79
21	Cottonwood			1940.81	4795.82
21.3	Cottonwood Urban			0.00	0.00
22	Willow			287.78	711.11
30	Reed Canary grass			972.58	2403.29
31	Cattail - Bulrush			192.76	476.31
39	Hairgrass Prairie			0.00	0.00
463	Ash - Cottonwood - bottomland Pasture Mosaic			4913.85	12142.34
463.3	Ash - Cottonwood - bottomland Pasture Mosaic			10.13	25.04
476	Oak - Douglas Fir - > 50% Oak			4064.81	10044.33
476.3	Oak - Douglas Fir Urban			0.00	0.00
505	Douglas Fir - Oak - < 50% Oak			10086.53	24924.26
505.3	Douglas Fir - Oak - Urban			973.19	2404.80
506	Oak - Madrone or Douglas Fir - Madrone			6034.03	14910.34
510	Maple - Alder -Fir			2672.09	6602.84
510.3	Maple - Alder - Fir Urban			48.15	118.99
512	Douglas Fir or any conifer			2563.58	6334.72
512.3	Douglas Fir Urban			93.10	230.05
999	Gravel and Sand			290.09	716.82
1000	Unclassified Forest				
<b>Total Natural Vegetation Area</b>				<b>57331.53</b>	<b>141668.72</b>
<b>Agricultural Land Cover Types</b>					
2.1	Annual Row Crops			4263.18	10534.51
2.2	Annual Grass			1938.62	4790.41
2.3	Perennial Grass			39994.37	98827.84
2.4	Orchards, Vineyards , Berries Christmas Trees and Nursery Stock			2598.60	6421.26
2.5	Unmanaged pasture			17739.32	43834.64
2.6	Parks and Cemeteries			272.09	672.35
<b>Total Agricultural Area</b>				<b>66806.19</b>	<b>165081.01</b>
<b>Grand Total Area</b>				<b>124137.72</b>	<b>306749.73</b>

Statistics					
<b>Linn County Vegetation Map</b>					
<b>March 17,1998</b>					
<b>Total Area excluding Unclassified Forest</b>				Hectares	Acres
3	Urban			5930.28	14653.97
9	Water			2384.67	5892.63
20	Black Hawthorn, Hedgerows and Bushy Fields			7061.28	17448.72
21	Cottonwood			1863.36	4604.45
21.3	Cottonwood - Urban			0.00	0.00
22	Willow			600.38	1483.57
30	Reed Canary grass			180.67	446.44
31 &(231 - mislabeled 31)	Cattail - Bulrush			32.94	81.40
39	Hairgrass Prairie			0.00	0.00
463	Ash - Cottonwood - bottomland Pasture Mosaic			8801.64	21749.23
463.3	Ash - Cottonwood - bottomland Pasture Mosaic Urban			23.01	56.85
476	Oak - Douglas Fir - > 50% Oak			3453.66	8534.15
476.3	Oak - Douglas Fir - Urban			25.62	63.30
505	Douglas Fir - Oak - < 50% Oak			3140.62	7760.60
505.3	Douglas Fir - Oak - Urban			155.24	383.61
506	Oak - Madrone or Douglas Fir - Madrone			156.79	387.43
510	Maple - Alder -Fir			3995.45	9872.93
510.3	Maple - Alder - Fir Urban			16.13	39.87
512	Douglas Fir or any conifer			7120.97	17596.23
512.3	Douglas Fir Urban			263.77	651.78
999	Gravel and Sand			184.11	454.95
1000	Unclassified Forest				
<b>Total Natural Vegetation Area</b>				<b>45390.58</b>	<b>112162.11</b>
Agricultural Land Cover Types					
2.1	Annual Row Crops			3838.25	9484.48
2.2	Annual Grass			9787.48	24185.29
2.3	Perennial Grass			107804.64	266389.98
2.4	Orchards, Vineyards , Berries Christmas Trees and Nursery Stock			1713.47	4234.05
2.5	Unmanaged pasture			12365.44	30555.54
2.6	Parks and Cemeteries			138.25	341.61
<b>Total Agricultural Area</b>				<b>135647.52</b>	<b>335190.95</b>
<b>Grand Total Area</b>				<b>181038.10</b>	<b>447353.06</b>

Statistics

**Marion County Vegetation Map**

March 17, 1998

<b>Total Area excluding Unclassified Forest</b>		<b>Hectares</b>	<b>Acres</b>
3	Urban	12,837.611	31,722.43
9	Water	1,910.171	4,720.14
20	Black Hawthorn, Hedgerows and Bushy Fields	5,628.191	13,907.56
21	Cottonwood	1,451.831	3,587.55
21.3	Cottonwood Urban	52.749	130.35
22	Willow	360.518	890.86
30	Reed Canary Grass	382.225	944.50
31	Cattail - Bulrush	10.962	27.09
463	Ash - Cottonwood - bottomland Pasture Mosaic	6,218.914	15,367.27
463.3	Ash - Cottonwood - bottomland Pasture Mosaic Urban	235.501	581.94
476	Oak - Douglas Fir - > 50% Oak	2,675.665	6,611.71
476.3	Oak - Douglas Fir Urban	195.413	482.88
505	Douglas Fir - Oak - < 50% Oak	4,001.825	9,888.73
505.3	Douglas Fir - Oak Urban	1,586.046	3,919.20
506	Oak - Madrone or Douglas Fir - Madrone	577.644	1,427.39
510	Maple - Alder - Fir	4,796.220	11,851.72
510.3	Maple - Alder - Fir Urban	312.788	772.92
512	Douglas Fir or any conifer	5,778.772	14,279.66
512.3	Douglas Fir Urban	367.206	907.38
999	Gravel and Sand	272.501	673.36
1000			
<b>Total Natural Vegetation Area</b>		<b>49,652.752</b>	<b>122,694.63</b>
<b>Agricultural Land Cover Types</b>			
2.1	Annual Row Crops	18,747.244	46,325.45
2.2	Annual Grass	7,029.156	17,369.42
2.3	Perennial Grass	64,931.160	160,448.41
2.4	Orchards, Vineyards, Berries Christmas Trees and Nursery Stock	14,905.587	36,832.51
2.5	Unmanaged Pasture	13,274.765	32,802.66
2.6	Parks and Cemeteries	451.818	1,116.47
<b>Total Agricultural Area</b>		<b>119,339.729</b>	<b>294,894.92</b>
<b>Grand Total Area</b>		<b>168,992.481</b>	<b>417,589.56</b>



<b>Statistics</b>						
<b>Polk County Vegetation Map</b>						
<b>March 17,1998</b>						
<b>Total Area excluding Unclassified Forest</b>				Hectares	Acres	
3	Urban			3060.14	7561.73	
9	Water			933.46	2306.62	
20	Black Hawthorn, Hedgerows and Bushy Fields			1334.53	3297.68	
21	Cottonwood			387.87	958.45	
21.3	Cottonwood Urban			0.00	0.00	
22	Willow			142.47	352.04	
30	Reed Canary grass			317.02	783.37	
31	Cattail - Bulrush			25.33	62.59	
39	Hairgrass Prairie			0.82	2.02	
463	Ash - Cottonwood - bottomland Pasture Mosaic			3729.40	9215.52	
463.3	Ash - Cottonwood - bottomland Pasture Mosaic - Urban			29.47	72.82	
476	Oak - Douglas Fir - > 50% Oak			6415.75	15853.59	
476.3	Oak - Douglas Fir - Urban			142.66	352.52	
505	Douglas Fir - Oak - < 50% Oak			4302.33	10631.24	
505.3	Douglas Fir - Oak - Urban			0.00	0.00	
506	Oak - Madrone or Douglas Fir - Madrone			587.41	1451.51	
510	Maple - Alder -Fir			1200.25	2965.87	
510.3	Maple - Alder - Fir - Urban			22.61	55.88	
512	Douglas Fir or any conifer			3161.61	7812.48	
512.3	Douglas Fir Urban			11.06	27.32	
999	Gravel and Sand			97.63	241.26	
1000	Unclassified Forest					
<b>Total Natural Vegetation Area</b>				<b>25901.81</b>	<b>64004.51</b>	
<b>Agricultural Land Cover Types</b>						
2.1	Annual Row Crops			3417.59	8445.01	
2.2	Annual Grass			6183.44	15279.55	
2.3	Perennial Grass			43096.65	106493.71	
2.4	Orchards, Vineyards , Berries Christmas Trees and Nursery Stock			7022.31	17352.43	
2.5	Unmanaged pasture			6692.61	16537.74	
2.6	Parks and Cemeteries			32.55	80.44	
<b>Total Agricultural Area</b>				<b>66445.15</b>	<b>164188.88</b>	
<b>Grand Total Area</b>				<b>92346.97</b>	<b>228193.39</b>	

<b>Statistics</b>					
<b>Yamhill County Vegetation Map</b>					
<b>March 17,1998</b>					
<b>Total Area excluding Unclassified Forest</b>				Hectares	Acres
3	Urban			3924.57	9697.78
9	Water			967.56	2390.89
20	Black Hawthorn, Hedgerows and Bushy Fields			2930.83	7242.22
21	Cottonwood			531.59	1313.58
21.3	Cottonwood - Urban			0.00	0.00
22	Willow			127.52	315.10
30	Reed Canary grass			317.69	785.03
31	Cattail - Bulrush			4.45	11.00
39	Hairgrass Prairie			8.83	21.83
463	Ash - Cottonwood - bottomland Pasture Mosaic			5133.20	12684.35
463.3	Ash - Cottonwood - bottomland Pasture nMosaic - Urban			4.19	10.36
476	Oak - Douglas Fir - > 50% Oak			4821.23	11913.47
476.3	Oak - Douglas Fir - Urban			1.30	3.21
505	Douglas Fir - Oak - < 50% Oak			8164.78	20175.54
505.3	Douglas Fir - Oak - Urban			15.52	38.35
506	Oak - Madrone or Douglas Fir - Madrone			512.16	1265.56
510	Maple - Alder -Fir			2835.24	7006.01
510.3	Maple - Alder - Fir - Urban			200.07	494.39
512	Douglas Fir or any conifer			12319.20	30441.27
512.3	Douglas Fir - Urban			36.02	89.00
999	Gravel and Sand			80.00	197.68
1000	Unclassified Forest				
<b>Total Natural Vegetation Area</b>				<b>42935.95</b>	<b>106096.62</b>
Agricultural Land Cover Types					
2.1	Annual Row Crops			3351.04	8280.57
2.2	Annual Grass			7032.83	17378.43
2.3	Perennial Grass			40989.09	101285.84
2.4	Orchards, Vineyards , Berries Christmas Trees and Nursery Stock			3351.04	8280.57
2.5	Unmanaged pasture			7699.56	19025.95
2.6	Parks and Cemeteries			69.44	171.60
<b>Total Agricultural Area</b>				<b>62493.01</b>	<b>154422.96</b>
<b>Grand Total Area</b>				<b>105428.97</b>	<b>260519.58</b>

**Willamette Valley Quadrangle Maps Used  
(Topographic and/or Orthophoto)**

***Quadrangles*                      *BENTON COUNTY***

Harrisburg	Monroe
Monroe S.W.	Flat Mt.
Greenberry	Peoria
Riverside	Corvallis
Wren	Corvallis N.W.
Forest Peak	Lewisburg

***Quadrangles*                      *CLACKAMAS COUNTY***

Elk Prairie	Scotts Mill
Wilhoit	Fernwood
Woodburn	Yoder
Mollalla	Sherwood
Canby	Oregon City

***Quadrangles*                      *LANE COUNTY***

Monroe S.W.	Monroe
Harrisburg	Marcola N.W.
Coburg	Junction City
Elmira S.E.	Eugene West
Eugene east	Springfield
Crow	Cottage Grove N.W.
Cottage Grove N.E.	Lowell N.W.
Cottage Grove S.E.	

***Quadrangles*                      *LINN COUNTY***

Marcola	Coburg
Junction City	Brownville S.E.
Brownville S.W.	Indian Head
Harrisburg	Sweet Home
Brownville N.E.	Brownville N.W.
Halsey	Peoria

SnowPeak S.W. (Lacomb)	Onehorse Slough
Lebanon	Tangent
Riverside	Lewisburg
Albany	Crabtree
Scio	Snow Peak N.W.
Lyons	Lyons S.W.
Stayton	Turner
Sidney	

***Quadrangles***

***MARION COUNTY***

Lewisburg	Albany
Crabtree	Monmouth
Sidney	Turner
Stayton	Stayton SW
Lyons	Rickerall
West Salem	East Salem
Stayton NE	Drakes Crossing
Elk Prairie	Mission Bottom
Gervais	Silverton
Scotts Mill	Wilhoit
Dayton	St. Paul
Woodburn	Yoder
Mollalla	Newburg
Sherwood	Canby
Oregon City	

***Quadrangles***

***POLK COUNTY***

Lewisburg	Forest Peak
Corvallis N.W.	Sidney
Monmouth	Airlie North
Falls City	West Salem
Rickerall	Dallas
Socialist Valley	Sherdian
Ballston	Amity
Mission Bottom	

***Quadrangles***

***YAMHILL COUNTY***

Mission Bottom  
Ballston  
Stony Mt.  
McMinnville  
Newburg  
Carlton  
Turner Creek  
Laurelwood

Amity  
Sheridan  
Muddy Valley  
Dayton  
Dundee  
Fairdale  
Gaston