Medford Riparian Inventory and Assessment

Bear Creek Tributaries

Prepared for

City of Medford

Prepared by

Wetland Consulting

Portland, Oregon

(503) 238-5942

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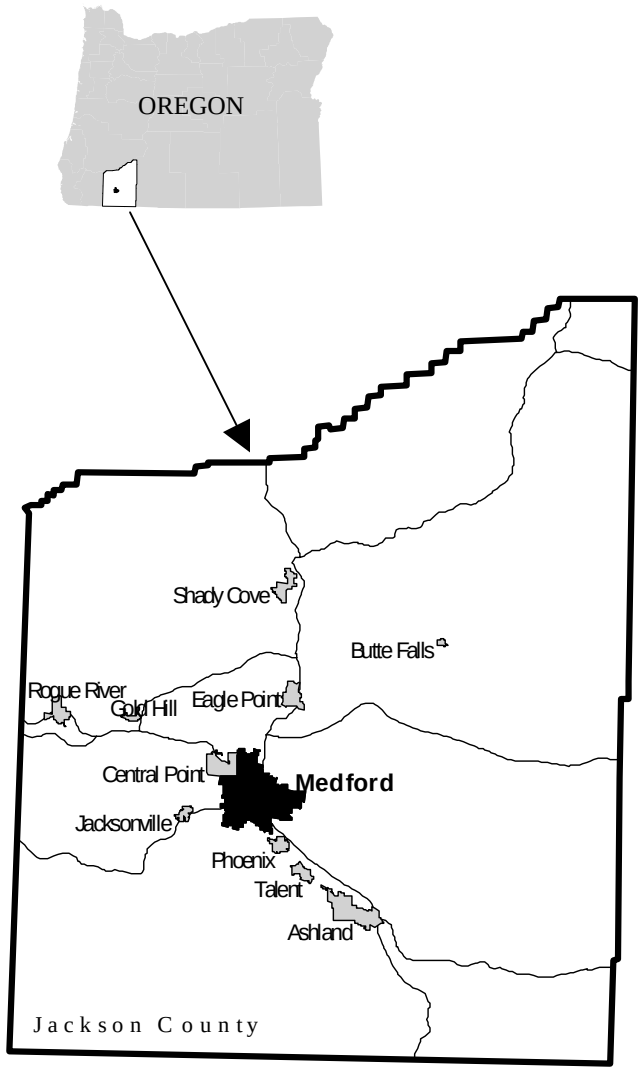
1.0 Introduction

1.1 Purpose

The purpose of this project was to inventory riparian areas along streams in Medford and to assess riparian area functions. "Riparian areas" are defined as “the area adjacent to a stream consisting of the area of transition from the aquatic ecosystem to a terrestrial ecosystem” in Medford’s Municipal Code (Section 10.921).

1.2 Study Area

The study area includes the riparian areas of all streams in the Medford Urban Growth Boundary with the exception of Bear Creek. Medford is located in Jackson County, Oregon approximately 30 miles north of the California/Oregon border at the intersection of Interstate 5 and State Highway 62 (Figure 1).



Source: Data provided by Oregon Geospatial Data Clearinghouse

FIGURE 1. STUDY AREA LOCATION

Medford Riparian Inventory and Assessment: Bear Creek Tributaries
Jackson County, Oregon

NORTH
no scale

2.0 Methods

I used the *Urban Riparian Inventory and Assessment Guide: A Tool for Oregon Land Use Planning* ("Guide") to identify riparian areas and assess riparian functions. I conducted the fieldwork for the project in May 2001. I provided a draft of this report to the City of Medford in April 2002 and presented the findings to a joint meeting of the Medford City Council and Planning Commission and at a public open house. Minor revisions to the report were made based on comments from those presentations and City of Medford staff.

2.1 Urban Riparian Inventory and Assessment Guide

The Urban Riparian Inventory and Assessment Guide describes itself as "a rapid inventory and assessment method for defining the location and the quality of riparian areas." The Guide includes procedures to identify riparian areas and assess four riparian functions: water quality, flood management, thermal regulation (water temperature) and wildlife habitat. There are nine general steps in completing the assessment (Table 1). The specific procedures I used for this project are described in the following sections.

2.1.1 Assemble Information and Prepare Riparian Inventory Overlays

I prepared riparian inventory base mapping and overlays in a geographical information system (GIS) using ArcView™ v. 3.2a software. Digital data was provided by the City of Medford Planning and Engineering Departments, Jackson County Geographic Information System Services, the Oregon Geospatial Data Clearinghouse and from digital data created for the 2001 draft City of Medford Local Wetland Inventory. Digital data included aerial photographs of the entire study area flown in March 1998 (black and white) and in June 2001 (color), topography, soils, drainage basins, hydrologic features, wetlands, FEMA floodplains, vegetation, the urban growth boundary, tax lots and roads.

2.1.2 Hydrologic Basins

I used the hydrologic basin mapping and basin codes from the Comprehensive Medford Area Drainage Master Plan (Brown & Caldwell 1996) for the project (Figure 2).

Drainage basin codes are:

BE - Bear Creek East

BS - Bear Creek South

BW - Bear Creek West

CR - Crooked Creek

EK - Elk Creek

LA - Larson Creek

LP - Lone Pine Creek

LZ - Lazy Creek

MD - Midway Creek (also called Upton Slough)

SW - Swanson Creek

Table 1. Riparian Inventory and Assessment Process

Step 1: Assemble Information & Prepare Riparian Inventory Overlays

Aerial photos, NWI, FEMA, Street, Tax Lot Maps, etc. Create an overlay to the aerial photo, showing information compiled in Step 1: streams, project boundaries, streets, landmarks, floodplains, etc.

Step 2: Determine & Code Hydrologic Basins

Identify and code the hydrologic basins and add the boundaries and codes to the base map overlays (see Appendix B).

Step 3: Determine & Code the Riparian Reaches

Determine reaches based on field work and review of information. Streams will have separate left and right reaches. The codes and boundaries will be added to the base map overlays in Step 8.

Step 4: Complete the Riparian Area Width Determination Form

Use the form to determine the width of the riparian area. Side 2 of the form contains the list of potential tree heights needed to determine the width.

Step 5: Complete the Riparian Characterization Form

Complete this form in the field for each reach. Data is used in Step 6.

Step 6: Complete the Riparian Function Assessment Form

Use data from Step 5 to answer the questions for each of the four (4) functions. Compile the scores to determine whether the riparian area's function is high, medium, or low.

Step 7: Compile Riparian Function Assessment Summary Table

Transfer the results for all the riparian areas from the forms completed in Step 6.

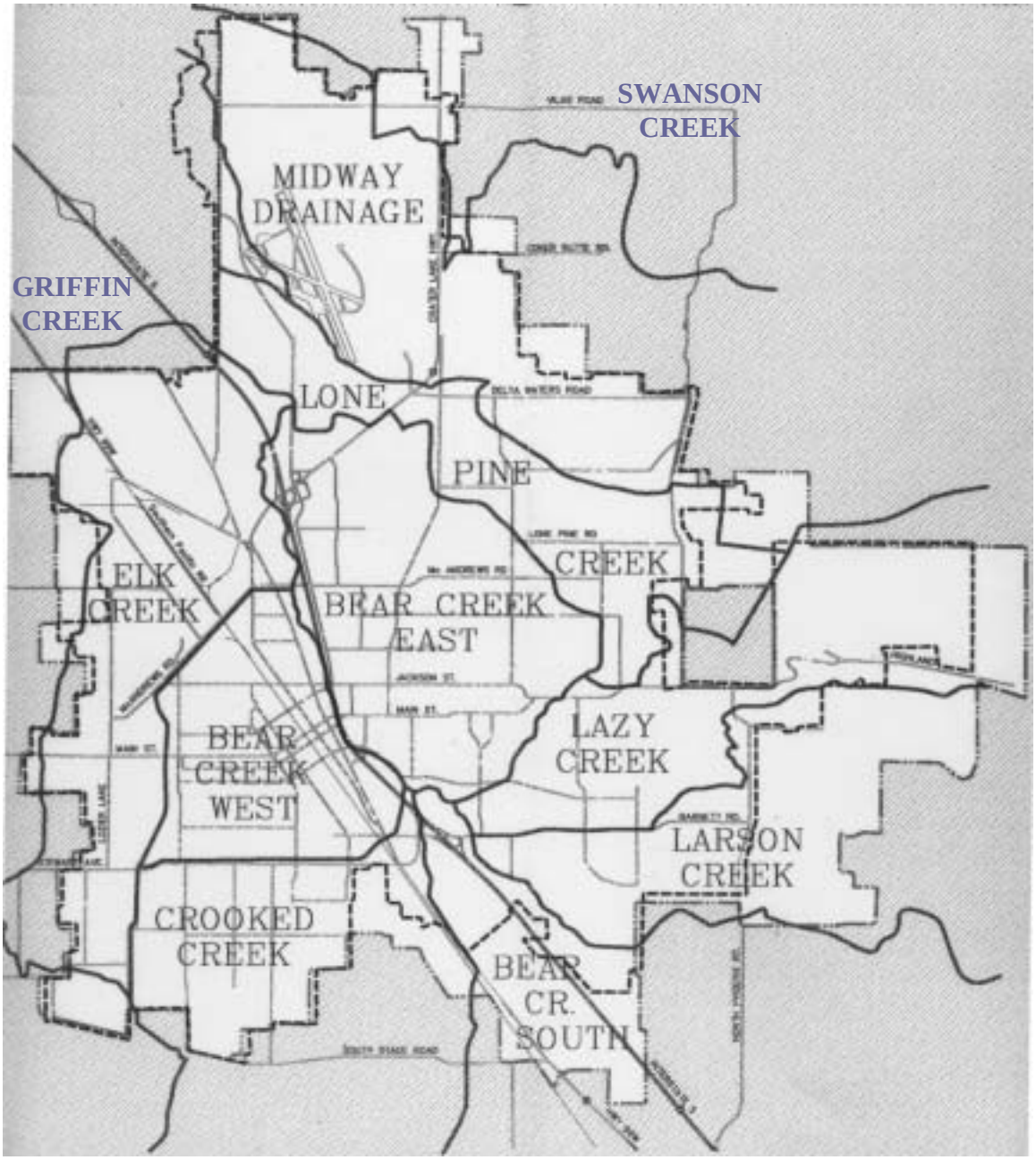
Step 8: Prepare Riparian Inventory Maps

Compile all the elements including graphics, codes, and boundaries.

Step 9: Use the Results

The riparian information is now ready for use in the local land use decision-making process, policy and ordinance formulation, restoration work, and for educational purposes.

Source: Urban Riparian Inventory and Assessment Guide (DSL 1998)



Source: Comprehensive Medford Area Drainage Master Plan (Brown and Caldwell 1996)

FIGURE 2. MEDFORD DRAINAGE BASINS

Medford Riparian Inventory and Assessment: Bear Creek Tributaries
Jackson County, Oregon

NORTH
no scale

2.1.3 Streams Inventory

I identified and mapped all streams in the Medford urban growth boundary with the exception of Bear Creek. I used the Statewide Planning Goal 5 definition of a stream: "a channel such as a river or creek that carries flowing surface water, including perennial streams and intermittent streams with defined channels, and excluding man-made irrigation and drainage channels" (Oregon Administrative Rules 660-23-090(1)(e)). I interpreted the definition to include all natural streams that have been channelized, rerouted, dammed or otherwise altered, consistent with the state definition of "natural waterways" used in administration of the Oregon Removal-Fill Law (Oregon Administrative Rules 141-85-0010(27)).

I used the Medford hydrological features digital mapping as a source of potential stream segments. I identified stream channel segments through review of March 1998 and June 2001 aerial photographs, 0.5 meter interval topographic contour mapping, USGS 7.5' quadrangle maps, National Wetland Inventory maps and the Comprehensive Medford Area Drainage Master Plan.

I created a digital streams layer in the GIS by copying those elements of the hydrological features mapping that I determined were streams based on the review of the source information. I also identified a small number of additional stream segments and hand digitized them.

The locations of stream boundaries in the digital hydrological features data were generally slighter lower than top of bank by approximately one to five feet resulting in mapped stream widths slightly narrower than the actual distance from top of bank to top of bank.

2.1.4 Riparian Reaches

Riparian reaches are segments of streams and adjacent riparian areas that have similar physical characteristics such as vegetation type, slope, geomorphic stream features (e.g. pool, riffle, run) or land use. The riparian areas on the right and left sides of a stream are considered separate reaches. I designated riparian reaches by reviewing aerial photographs and topographic mapping and then refined the reaches through field observations. Land use changes, followed by changes in riparian vegetation, were the most common factors used to identify reaches. I used a minimum reach length of 300 feet based on observations of riparian conditions and as a practical limit to efficiently complete the project. It is important to note that conditions within each reach were not completely uniform. Some reaches include portions where the vegetation, land use or other features differ from the majority of the reach.

Riparian reach codes include the two-letter hydrologic basin code followed by the reach number and "R" or "L" for right or left side of the stream. I assigned reach numbers beginning at stream mouths and working upstream. Right and left side designations were assigned while looking downstream. In this report I omit the R or L portion of the code when describing characteristics that apply to the reaches on both sides of the stream.

I modified the streams inventory and riparian reaches based on comments on the draft report. Reaches LA-16, LP-21 and a portion of LA-23 were deleted because these stream

segments no longer exist. Reaches BE-01, BE-02, CR-07, and LA-31 were missed in the initial streams inventory and were added.

2.1.5 Riparian Assessment Width Determination

The riparian assessment width is the area along a stream reach that is evaluated to determine riparian functional levels. The width is set equal to the average height at maturity of the dominant tree species found within the first 100 feet of the stream, referred to as "potential tree height" or PTH. The rationale for using potential tree height to determine riparian assessment width is that it represents the distance in which trees can affect streams through shading and contribution of organic material. The assessment width is measured from the stream top-of-bank or from the edge of any ponds or wetlands in or adjacent to the stream. Wetland locations are from the draft City of Medford Local Wetlands Inventory (Wetland Consulting 2001). Pond locations are from the City of Medford digital hydrological features data. A separate assessment width is determined for the right and left sides of the stream. The average potential tree height for common riparian trees in Oregon is in Table 2.

I modified the PTH for Oregon white oak to account for local conditions in the Medford area. The average mature height for Oregon white oak in foothill areas in southwest Oregon is approximately 35-40 feet (Reigel et al. 1992). I used a PTH of 40 feet for Oregon white oak. I also made a modification for willow-dominated sites. There are several willow species in the Medford area, often several species growing in the same area, and identification is difficult. Willow PTHs in the Guide range from 15 to 35 feet. I used a PTH of 35 feet for all willow-dominated sites.

Determining the PTH for a number of reaches in Medford was problematic. Some riparian areas in Medford have few or no trees. Others have a variety of exotic ornamental trees (non-native) but few or no native trees. Crooked Creek, Elk Creek, Lone Pine Creek and Midway Creek have extensive sections with little native riparian tree cover. I inferred the PTH from nearby reference sites that were similar in character and landscape position, as suggested in the Guide, where suitable reference sites existed. For the remaining reaches I determined PTH based on applicable reference sites throughout the study area and predicted vegetation based on soils mapping. I obtained predicted vegetation information from the Jackson County soil survey. Each soil mapping unit in the soil survey is assigned a vegetation type based on observations of vegetation typically found on undisturbed areas of that soil type. The vegetation types include tree, shrub and herbaceous species.

I completed Riparian Width Determination Forms for each reach. The forms include the PTH width, the rationale for the width selected, a brief description of the reach and a sketch of a typical cross section of the reach. Riparian Width Determination Forms are in Appendix A.

Table 2. Potential Tree Heights

Tree species	Common Name	Avg mature height (feet)
Acer macrophyllum	Big leaf maple	90
Abies grandis	Grand fir	120
Alnus rhombifolia	White alder	75
Alnus rubra	Red alder	65
Alnus sinuata	Wavy-leaved alder	20
Crataegus douglasii	Douglas hawthorn	20
Fraxinus latifolia	Oregon ash	75
Juniperus occidentalis	Western juniper	20
Malus fusca	Pacific crabapple	20
Myrica californica	California wax myrtle	20
Picea sitchensis	Sitka spruce	120
Pinus contorta	Lodgepole pine	80
Pinus contorta contorta	Shore pine	50
Pinus ponderosa	Ponderosa pine	100
Populus tremuloides	Quaking aspen	60
Populus trichocarpa	Cottonwood	120
Prunus emarginata	Bitter cherry	25
Pseudotsuga menziesii	Douglas fir	120
Rhamnus purshiana	Cascara	35
Quercus garryana	Oregon white oak	60
Salix amygaloides	Peach leaf willow	35
Salix exigua	Coyote willow	15
Salix geyeriana	Geyer willow	20
Salix hookeriana	Hooker's willow	20
Salix lasiandra	Pacific willow	35
Salix lasiolepis	Arroyo willow	30
Salix scouleriana	Scouler's willow	30
Salix sessilifolia	Soft-leaved willow	20
Salix sitchensis	Sitka willow	20
Thuja plicata	Western red cedar	120
Tsuga heterophylla	Western hemlock	120
Umbellularia californica	California bay	60

Source: Urban Riparian Inventory and Assessment Guide (DSL 1998)

2.1.6 Riparian Characterization Form

I completed a Riparian Characterization Form for each reach. The form is used to record information on each reach's physical and biological characteristics, information that will be the basis for the riparian functional assessments. I collected the information from field observations and through GIS analysis. Field observations were made from public roads or other publicly accessible points such as parks. I defined the field observations as onsite only if I was able to walk in the riparian area or directly observe representative sections.

I measured reach lengths in the GIS based on stream segment lengths or in some cases measured reaches on aerial photographs. I rounded all reach lengths to the nearest 25 feet. I measured stream widths in the GIS from aerial photographs, topographic contours and hydrologic features digital mapping. I determined stream flow to be perennial if the stream segment was below irrigated fields/orchards and/or water was observed in the channel in May 2001, which was a drought year. I considered stream segments to be intermittent if they were above irrigated areas and/or had no observed water in May 2001. I also used observations from several wetland delineation reports that included observations of stream hydrology.

I identified native trees and shrubs to species with the exception of willows. Non-native trees and shrubs were generally not identified. I did not generate a complete list of herbaceous plant species at each reach due to time constraints. Instead, I noted if sites fit into one or more of three common groups of herbaceous plants that are commonly found in riparian areas in Medford. The Oak grassland or Oak savanna group is dominanted by blue wildrye, bur chervil, hedgehog dogtail, roughstalk bluegrass, soft brome, vetch and wild oat. The pasture/field grasses group is dominated by brome grass, bulbous bluegrass, clover, common velvetgrass, medusahead, perennial ryegrass, star thistle, tall fescue and vetch. The weedy plant group is dominated by chickory, Queen Anne’s lace, poison hemlock and teasel. The basis for the three groups was vegetation data from wetland delineation reports cited in the reference section of this report, the research paper, “Foothill Oak Woodlands of the Interior Valleys of Southwestern Oregon” and the vegetation list in the draft 2001 City of Medford Local Wetland Inventory.

I determined that reaches on the south side of stream segments (streams with any orientation other than due north/south) had the potential to provide shade over the water at midday in summer. I considered reaches with woody vegetation hanging over the waters edge for 40% or more of the reach length to meet that criterion for the entire reach. Reaches that had a relatively equal mix of woody, herbaceous vegetation and bare ground were classified as having herbaceous vegetation dominant as that appeared to be consistent with the scoring methods in the functional assessment.

Riparian Characterization Forms are in Appendix A.

2.1.7 Riparian Function Assessment Form

I assessed riparian functions by answering multiple-choice questions on Riparian Function Assessment Forms using the information from the Riparian Characterization Forms. The Riparian Function Assessment Forms have separate sections for water quality, flood management, thermal regulation and wildlife habitat. Each multiple-choice answer has an associated point score. The total score of the answers for each function

indicates if the functional level is high (intact), medium (somewhat degraded) or low (severely degraded). Riparian Function Assessment Forms are in Appendix A.

2.1.8 Riparian Inventory Maps

I prepared riparian inventory maps in the GIS that include streams, ponds and wetlands in or adjacent to streams, riparian reaches and assessment widths, reference sites, existing trees and shrubs within 120' of streams, and riparian corridors that are regulated under City of Medford ordinances. The maps are in Appendix B. Riparian reaches are marked by straight lines perpendicular to the associated stream at the beginning and end of the reach. Riparian assessment widths were generated in the GIS by creating buffers of the required width from the mapped streams. Trees and shrubs within 120' of streams were copied from City of Medford vegetation coverage. City of Medford riparian corridors were mapped by generating 50' buffers in the GIS around the designated stream segments of Bear, Lone Pine, Lazy and Larson Creeks. Where locally significant wetlands were in or adjacent to the streams the 50’ buffer was generated from the wetland boundary.

Streams were mapped as described in the Streams Inventory section above. The locations of stream boundaries in the digital hydrological features data were generally slighter lower than top of bank by approximately one to five feet resulting in mapped stream widths slightly narrower than the actual distance from top of bank to top of bank. This also affected the mapped assessment widths and mapped riparian corridor boundaries that were created in the GIS at set distances from stream, wetland and pond boundaries. The disparity between the mapping and actual field measurements ranges from no disparity up to approximately ten feet. It is generally not visible at the printed map scale of 1:7200 (1 inch equals 600 feet). I do not believe the disparity in assessment width mapping was significant enough to affect the functional assessments. I do recommend that the riparian corridor boundary mapping be considered approximate and not adequate for regulatory purposes given these disparities.

2.1.9 Riparian Function Maps

I prepared a Riparian Function map for each of the four functions assessed. Each map covers the entire study area and shows how each reach ranked for the particular function. The maps are in Appendix C.

3.0 Results

3.1 Streams

I mapped approximately 36 miles of streams in the Medford urban growth boundary excluding Bear Creek. The primary streams are Swanson Creek, Midway Creek, Lone Pine Creek, Lazy Creek, Larson Creek, Crooked Creek and Elk Creek. The Bear Creek West drainage basin contains no streams other than Bear Creek. Streams are described in more detail in the sections below on each drainage basin.

3.2 Riparian Areas

3.2.1 Riparian Reaches

I divided the streams into 118 segments for a total of 236 riparian reaches (the right and left sides of each stream segment are a separate riparian reach). Descriptions of each reach are in the Riparian Width Determination Forms and the Riparian Characterization Forms (Appendix A). Riparian area inventory maps are in Appendix B. There are four 34" by 44" color map sheets. Reach lengths ranged from 300 feet to 5200 feet with the exception of reach MD-03 that is 10,500 feet long. Average reach length was 1611 feet. Reach lengths for all reaches are in Appendix D.

3.2.2 Riparian Area Characteristics

The upper portions of the Lazy Creek drainage basin (reaches LZ-13 to LZ-34), Larson Creek drainage basin (LA-24, LA-29 and LA-30) and Lone Pine Creek drainage basin (LP-18) are the least developed areas within the Medford urban growth boundary. These areas have relatively undisturbed stream channels and riparian areas with intact native Oregon white oak savanna plant communities. Impacts from human activities have generally been limited to grazing and construction of dirt roads. The riparian forests along Bear Creek contain the only other large areas of native riparian vegetation in the Medford urban growth boundary. The remaining stream segments and riparian areas in Medford have been modified by human activity of varying intensities. Portions of streams have been placed in underground pipes for distances from a few hundred to several thousand feet. Other stream segments have been channelized or rerouted into created channels. Stream flows in all Medford streams have been altered by irrigation and stormwater management. Riparian areas have been modified by removal of woody vegetation, residential development, industrial and commercial development, golf course development, airfield development, agricultural cropping, grazing and mowing for fire control.

3.2.3 Riparian Vegetation

Dominant riparian area vegetation in Medford is listed in Table 3 by common name and scientific name. Non-native trees and shrubs are not included. The list is based on field observations during the riparian inventory and supplemented with data from the wetland delineation reports listed in the reference section and the research paper "Foothill Oak Woodlands of the Interior Valleys of Southwestern Oregon".

Table 3. Dominant Plant Species in Medford Riparian Areas

Common Name	Scientific Name
TREES	
Black cottonwood	*Populus balsamifera spp. trichocarpa*
California black oak	*Quercus kelloggii*
Oregon ash	*Fraxinus latifolia*
Oregon white oak	*Quercus garryana*
Red alder	*Alnus rubra*
White alder	*Alnus rhombifolia*
Willow	*Salix spp.*
SHRUBS	
Himalayan blackberry	*Rubus discolor*
Poison oak	*Rhus diversiloba*
Snowberry	*Symphoricarpos albus*
Willow	*Salix spp.*
HERBS	
Bedstraw	*Galium sp.*
Black mustard	*Brassica nigra*
Blue wildrye	*Elymus glaucus*
Bulbous bluegrass	*Poa bulbosa*
Bur chervil	*Anthriscus scandicina*
California burclover	*Medicago polymorpha*
Cat's ear	*Hypochaeris radicata*
Chickory	*Cichorum intybus*
Cinquefoil	*Potentilla sp.*
Clover	*Trifolium spp.*
Common burdock	*Arctium minus*
Desert parsley	*Lomatium sp.*
Field mustard	*Brassica campestris*
Filaree	*Erodium cicutarium*
Hedgehog dogtail	*Cynosurus echinatus*
Meadow foxtail	*Alopecurus pratensis*
Medusahead	*Elymus caput-medusae*
Perennial ryegrass	*Lolium perenne*
Poison hemlock	*Conium maculatum*
Queen Anne's lace	*Daucus carota*
Roughstalk bluegrass	*Poa trivialis*
Self-heal	*Prunella vulgaris*
Six-weeks brome grass	*Vulpia bromoides*
Star thistle	*Centaurea solstitialis*
Tall fescue	*Festuca arundinacea*

Table 3. Dominant Plant Species in Medford Riparian Areas (continued)

Common Name	Scientific Name
Soft brome	*Bromus mollis*
Teasel	*Dipsacus sylvestris*
Thistle	*Cirsium sp.*
Two-color lupine	*Lupinus bicolor*
Velvet grass	*Holcus lanatus*
Vetch	*Vicia spp.*
Wild oat	*Avena fatua*

The only intact native riparian plant community in the study area is the Oregon white oak savanna or grassland community that occurs on the Cascade foothill slopes in the upper portions of the Lone Pine Creek, Lazy Creek and Larson Creek drainage basins. This community is dominated by Oregon white oak, poison oak, bur chervil, wild oat, soft brome, hedgehog dogtail, wildrye, roughstalk bluegrass and vetch. California black oak is also found in this plant community in the highest areas of the urban growth boundary. Riparian areas in the rest of Medford have a mix of native and non-native species. Dominant native tree species are willow, Oregon ash, black cottonwood and white alder.

3.2.4 Reference Sites

I selected 23 reference sites as examples of native riparian tree cover to determine PTH and assessment width for reaches that had no native tree cover (Table 4). Some of these include both the left and right reaches of a stream segment as one reference site. There is at least one reference site for each drainage basin except for Bear Creek East and Bear Creek West. I selected reference sites that contained the best examples of native riparian tree cover. However, there is limited native riparian tree cover in the Midway, Crooked, Bear Creek South and Elk drainage basins and in the lower reaches of the Lone Pine drainage basin. The reference sites for these areas are all highly modified by human activity and should not be considered examples of healthy riparian areas or models for stream and riparian restoration projects. Reference sites in the Lazy and Larson drainage basins and in the higher reaches of the Lone Pine drainage basin (sites LP-9 and LP-18) are less modified by human activity and have value as models for riparian area restoration. Individual reference sites are described briefly in the sections on each drainage basin that follow below.

3.3 Riparian Area Functions

The riparian area function assessment results are summarized in Figure 3, which shows the percentage of the total riparian reach length for the study area that rated high, medium and low for each function. Water quality functions rated the highest overall with 58% of total reach length ranked high/intact and 42% ranked medium/somewhat degraded. No reaches were ranked low/severely degraded for water quality. Flood management functions ranked medium/somewhat degraded for 89% of the reaches with 9% ranking low/severely degraded and only 2% ranking high/intact. Thermal regulation function varied the most of the four functions with almost one half (49.4%) of the reaches ranking medium/somewhat degraded and the remainder closely divided between high/intact (23.2%) and low/severely degraded (27.4%) rankings. Wildlife habitat functions rated the lowest overall with only 4% ranked high/intact, 74% medium/somewhat degraded and 22% ranked low/severely degraded. The most important factor affecting functional levels was the extent of woody vegetation in riparian areas. Woody vegetation plays a role in all four of the riparian functions assessed. No other factor has such a widespread influence on riparian area functions

The Riparian Function Assessment Forms for each reach provide the scoring and basis for the rankings for each of the four functions (Appendix A). The functional assessment results for the four functions for each reach are listed in Appendix D. Riparian function map for the entire study area for each of the four functions shows how each reach ranked. The maps are in Appendix C. There are four 24” by 36” color maps.

Table 4. Reference Sites

Reach
BS-01
BS-05
CR-03
CR-06
EK-06
LA-05
LA-9R
LA-13R
LA-18
LA-24
LA-30
LP-03
LP-07R
LP-09
LP-18
LZ-05
LZ-10
LZ-15
LZ-29
LZ-31
MD-02
MD-06R
SW-02R

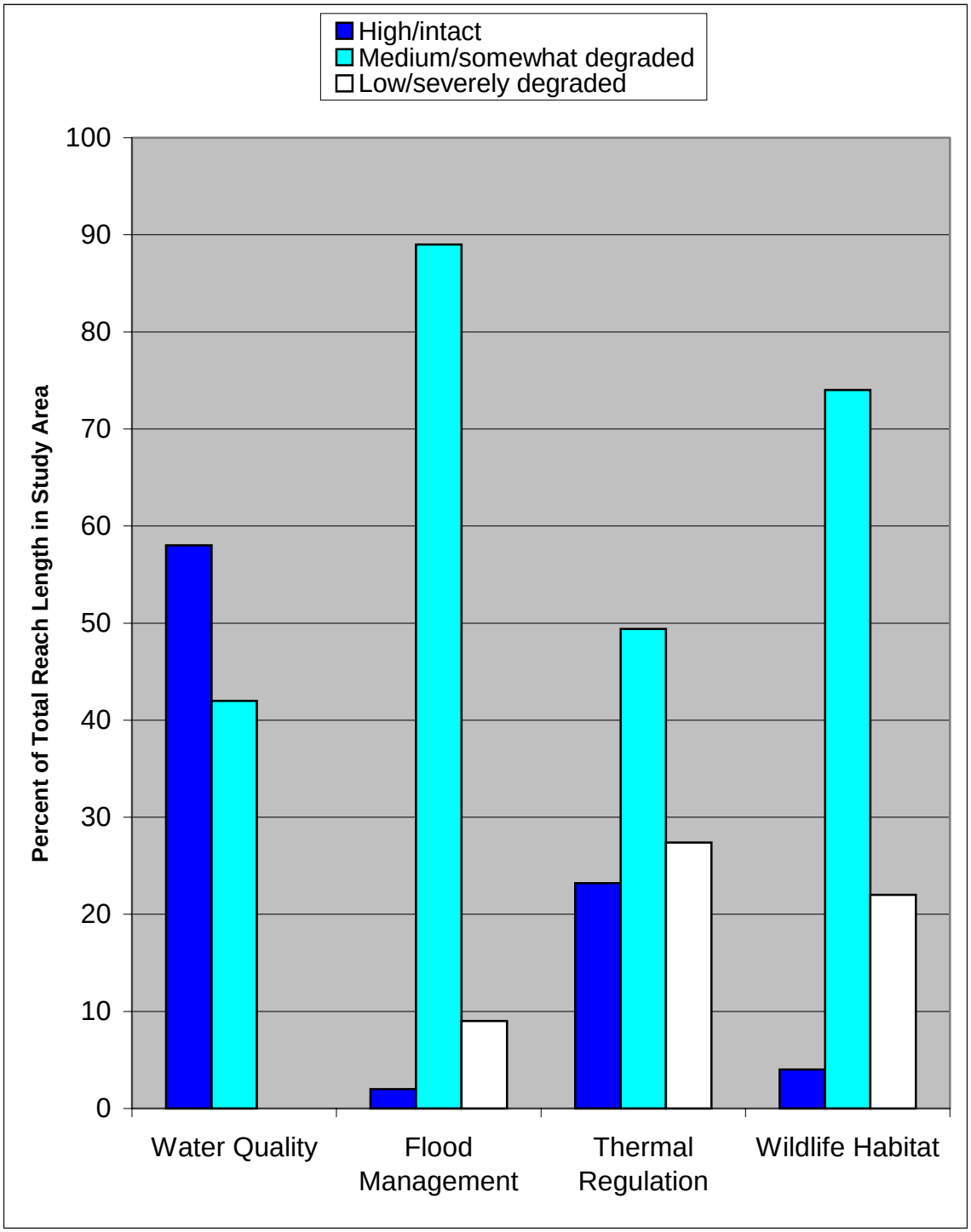


FIGURE 3. RIPARIAN FUNCTION ASSESSMENT RANKINGS

Medford Riparian Inventory and Assessment: Bear Creek Tributaries
Jackson County, Oregon

3.3.1 Water Quality Functions

Water quality functions rated the highest of the four functions with 58% of total reach length ranked high/intact and 42% ranked medium/somewhat degraded. No reaches were ranked low/severely degraded. Water quality function rankings are based on five factors:

1. Average slope in the riparian area (steeper slopes increase erosion potential);
2. Vegetation cover in the riparian area to filter runoff;
3. Vegetation cover at the top of bank and on the stream bank to prevent stream bank erosion;
4. Extent of impervious surfaces in the riparian area (rate of runoff, pollutants); and,
5. Water erosion hazard rankings of soils.

The large proportion of riparian reaches ranking high for water quality function is because most riparian areas in Medford have flat to moderate slopes, most stream banks are vegetated with herbaceous or woody vegetation and most soils in Medford have only a slight to moderate hazard of water erosion. The reasons for reaches ranking medium instead of high depended on reach location. Riparian reaches in flat parts of Medford were ranked medium due to a lack of woody vegetation and/or by having 25% or greater impervious surface in the riparian area. Reaches in hilly areas were ranked medium due to a lack of woody vegetation, steep slopes (>20%) and/or soils with a high hazard of water erosion.

3.3.2 Flood Management Functions

Flood management functions ranked medium/somewhat degraded for 89% of total reach length with another 9% ranking low/severely degraded and only 2% ranking high/intact. Flood management function rankings are based on three factors:

1. Flood prone areas (flat or depressional areas) adjacent to streams that can store floodwaters;
2. Woody vegetation in flood prone areas that slow flood flows; and,
3. Stream constriction by human-created features (channelization, riprap, concrete wall) that keep flood waters in stream channels and speed stream flow through the stream system potentially increasing flood damage downstream.

Reaches in flat areas in Medford generally have flood prone areas adjacent to streams but almost none have woody vegetation in the flood prone areas, which prevented high rankings. Reaches with stream channels not constricted by human-created features ranked medium while reaches with stream constriction ranked low. Hilly areas generally lack flood prone areas, which prevents high function rankings for those reaches. Reaches in hilly areas that are not constricted by human-created features, i.e. with a natural, sinuous stream channel and vegetated banks, are still important in flood management because they slow the passage of stream flow through the stream system. These reaches ranked medium in flood management function. Reaches in hilly areas with stream constriction by human-created features contribute little to flood management and ranked low.

3.3.3 Thermal Regulation Function

Thermal regulation functions ranked high/intact for 23.2% of total reach length, medium/somewhat degraded for 49.4% and low/severely degraded for 27.4%. Thermal regulation function rankings are based on three factors:

1. Orientation (south side of stream) and aspect of the riparian area allowing for shading of water at midday in summer by riparian vegetation;
2. Vegetation type in the riparian area; and,
3. Woody vegetation hanging over the edge of the water.

Reaches ranking high were on the south sides of streams and had woody vegetation dominant in the riparian area or at least had woody vegetation hanging over the edge of the water. Reaches ranking medium were on the north sides of streams or on streams oriented due north-south and were dominated by woody vegetation or had a combination of herbaceous vegetation with woody vegetation hanging over the edge of the water or were on the south sides of streams with riparian areas dominated by herbaceous vegetation. Reaches ranking low were on the north sides of streams or on streams oriented due north-south, were dominated by herbaceous vegetation or bare ground and almost never had woody vegetation hanging over the edge of the water.

3.3.4 Wildlife Habitat Function

Wildlife habitat functions ranked high/intact for 4% of total reach length, medium/somewhat degraded for 74% and low/severely degraded for 22%. The wildlife habitat function assessment is the most complex involving eight different factors involving vegetation, special habitat features (perennial stream flow, wetlands, ponds, large woody debris) and the extent of human disturbance in the riparian area. Reaches ranking high were on perennial streams with wetlands or ponds, had riparian areas dominated by woody vegetation and had minimal human disturbance to the riparian area and its vegetation. Reaches ranking medium had some fewer habitat features, less woody vegetation and more human disturbance. Reaches ranking low were dominated by herbaceous vegetation or bare ground, disturbed by human activity throughout the riparian area and usually without any special habitat features.

The complexity of the wildlife habitat function assessment method yields scores spread over a wider range than the assessment methods for the other three functions. There appeared to be a qualitative difference in reaches scoring at the top of the medium range as opposed to those scoring near the bottom. Reaches scoring 13 or 14 appeared to offer only marginally better wildlife habitat than those ranking low.

3.4 Drainage Basin Summaries

Results for each drainage basin are described in the following sections. The descriptions refer only to those portions of the drainage basin within the Medford urban growth boundary. The Bear Creek West drainage basin is omitted because it contains no streams other than Bear Creek.

3.4.1 Swanson Creek Drainage Basin

Only a small portion of the Swanson Creek drainage basin is within the Medford urban growth boundary. Two segments of Swanson Creek and four riparian reaches are in the urban growth boundary. Swanson Creek is a tributary to Whetstone Creek and is perennial due to irrigation return flows. The stream is channelized through reach SW-01 and has extensive fill material in the riparian area in reaches SW-01L and SW-02L.

Reach SW-02R is a reference site. The stream in reach SW-02 flows through an Oregon ash/willow forested wetland. See *Sterling Business Forms Wetland Report* (Terrascience, Inc. 1999) for a detailed description of the stream, wetlands and riparian area immediately upstream of this reach.

3.4.2 Midway Creek Drainage Basin

The Midway Creek drainage basin contains Midway Creek, also known as Upton Slough, and a short tributary referred to locally as Garrett Creek. There are nine stream segments and 18 riparian reaches in the basin. Midway Creek is a tributary of the Rogue River and is perennial due to irrigation return flows. Midway Creek and its riparian areas have been extensively modified by human activity including placement of long stream segments into underground pipes, stream channelization and relocation, removal of woody vegetation, industrial development, residential development and mowing for fire control. Most of the riparian areas in the basin have no significant woody vegetation with the exception of reference sites MD-02 and MD-06.

Reaches MD-03R and MD-03L are two miles long (the longest reaches in the study area, a mile longer than any other reach) and pass through the airfield at the Rogue Valley International-Medford Airport. The stream has been channelized through this entire reach and has no significant woody vegetation. Much of this stream segment was rerouted into a newly created channel in 1999-2000 as part of a runway extension project at the airport. Woody vegetation was planted along the new channel but has not yet matured enough to be a significant factor in riparian functions. Reach MD-04 is the portion of the previous channel of Midway Creek that still remains after the creek rerouting. This stream segment is now intermittent. Reach MD-05 is the only section of Midway Creek still in a natural stream channel.

Reach MD-02 is a reference site that contains Oregon white oak. Reach MD-06 is a reference site that includes Garrett Creek, a tributary that conveys drainage from Garrett Reservoir to Midway Creek. Garrett Creek flows through a willow/emergent wetland. See *Wetland Delineation Report for the Tower Development and Papillon Estates II Subdivision Sites Medford, Jackson County, Oregon* (Terra Science, Inc. 2000) for a detailed description of the stream, wetlands and riparian area in this reach.

3.4.3 Lone Pine Creek Drainage Basin

The Lone Pine drainage basin contains Lone Pine Creek and a number of unnamed tributaries in the upper portion of the basin. There are 22 stream segments and 44 riparian reaches in the basin. The lower reaches (LP-01 to LP-13 and LP-19 to LP-21) are perennial due to irrigation return flows. The upper reaches are intermittent. There are several large wetland areas along stream segments in the middle portion of the basin. Almost all of the streams and riparian areas in the basin have been extensively modified

by human activity including placement of long stream segments into underground pipes, stream channelization, placement of stream segments in concrete channels, removal of woody vegetation, residential development, agricultural cropping, mowing for fire control and grazing.

Reach LP-03 is a reference site containing patches of willows. Reach LP-09 is a reference site containing a short segment of a tributary to Lone Pine Creek with an intact canopy of black cottonwood and willow.

3.4.4 Bear Creek East Drainage Basin

The Bear Creek East drainage basin contains Baby Bear Creek. There are two stream segments and four riparian reaches. The stream is perennial; presumably due to irrigation return flows. The basin is heavily developed and the remnant portion of Baby Bear Creek is the only stream in the basin other than Bear Creek.

3.4.5 Lazy Creek Drainage Basin

The Lazy Creek drainage basin contains Lazy Creek and a number of unnamed tributaries in the upper portion of the basin. There are 34 stream segments and 68 riparian reaches in the basin. The lower reaches (LZ-01 to LZ-08) are perennial due to irrigation return flows. The upper reaches are intermittent. There are three large wetland areas above the confluence with Bear Creek (reaches LZ-01 and LZ-02). The wetlands appear to contain the original channel of Lazy Creek prior to the excavation of a new channel at some time in the past. Almost all of the streams and riparian areas in the lower reaches of the basin (LZ-01 to LZ-08) have been extensively modified by human activity including placement of long stream segments into underground pipes, stream channelization, placement of stream segments in concrete channels, removal of woody vegetation, residential development, golf course development and mowing for fire control. The upper reaches have not been as consistently modified by human activity as the lower reaches, however, a number of the reaches have had extensive modification due to the placement of stream segments into underground pipes, removal of woody vegetation and residential development. The highest reaches in the Lazy Creek drainage basin are in the some of the least developed landscapes in the Medford urban growth boundary and have been impacted only through grazing activity and the construction of dirt roads. These areas have relatively undisturbed stream channels and riparian areas with intact native Oregon white oak savanna plant communities.

Reach LZ-05 is a reference site in the lower portion of the basin containing mature black cottonwood, Oregon ash, willow and non-native maples. The reach has a paved recreational path. Reach LZ-10 is a reference site in the upper portion of the basin. The stream channel is a willow-dominated wetland within a narrow gully. The banks of the gully have Oregon ash and willow and Oregon white oak grows at the top of the bank. Reaches LZ-15, LZ-29 and LZ-31 are reference sites with the Oregon white oak savanna plant community dominated by Oregon white oak and poison oak.

3.4.6 Larson Creek Drainage Basin

The Larson Creek drainage basin contains Larson Creek and a number of tributaries in the upper portion of the basin including the north, middle and south forks of Larson

Creek. There are 30 stream segments and 60 riparian reaches in the basin. The lower reaches (LA-01 to LA-15) and some of the upper reaches (LA-18 to LA 20, LA-27) are perennial due to irrigation return flows. The other reaches are intermittent. Almost all of the streams and riparian areas in the basin have been modified by human activity including placement of long stream segments into underground pipes, stream channelization, placement of stream segments in concrete channels, removal of woody vegetation, residential development, orchards, grazing, haying, golf course development and mowing for fire control. The highest reaches in the basin have had the least amount of human impact and include reaches with relatively undisturbed stream channels and riparian areas with intact native Oregon white oak savanna plant communities.

Reach LA-05 is a reference site with mature white alder, black cottonwood, willow and non-native maples. The reach has a paved recreational path. Reach LA-9R is reference site that has had stream and riparian area restoration work. The riparian area has willow, Oregon ash and white alder. Reach LA-13R is a mile long reference site containing mature Oregon ash, black cottonwood, willow, snowberry and poison oak. Reach LA-18 is a reference site with willow and black cottonwood. Reaches LA-24 and LA-30 are reference sites containing the native Oregon white oak savanna plant community.

3.4.7 Bear Creek South Drainage Basin

The Bear Creek South drainage basin contains Gore Creek and an unnamed tributary to Bear Creek. There are seven stream segments and 14 riparian reaches in the basin. All of the reaches are perennial due to irrigation return flows. Gore Creek has been extensively channelized and its riparian areas have been modified by construction of warehouses, parking lots, agricultural cropping and grazing. The lowest reach (BS-01) has been rerouted. The unnamed tributary has also been extensively modified by human activity. It has been rerouted in its lowest reach (BS-05) where it passes through abandoned gravel quarry before reaching Bear Creek. Other human modifications include channelization and placement in underground pipes. The riparian areas have been modified by residential development and road construction.

Reaches BS-01 and BS-05 are reference sites containing black cottonwood, willow and Oregon ash.

3.4.8 Crooked Creek Drainage Basin

The Crooked Creek drainage basin contains Crooked Creek and a single tributary, Hansen Creek. There are six stream segments and 12 riparian reaches in the basin. All of the reaches are perennial due to irrigation return flows. All of the streams and riparian areas in the basin have been modified by human activity including placement of long stream segments into underground pipes, stream channelization, removal of woody vegetation, residential development, industrial development, haying, golf course development and mowing for fire control. The lower one half mile of both Crooked and Hansen Creeks are piped. Riparian areas in this basin have limited woody vegetation.

Reach CR-03 is a reference site containing scattered willows, Oregon ash and black cottonwood. Reach CR-06 is a reference site with willow growing along the streambanks.

3.4.9 Elk Creek Drainage Basin

The Elk Creek drainage basin contains Elk Creek and a single remnant segment of an unnamed tributary (reach EK-06). There are six stream segments and 12 riparian reaches in the basin. All of the reaches are perennial due to irrigation return flows. All of the streams and riparian areas in the basin have been modified by human activity including placement of long stream segments into underground pipes, stream channelization, removal of woody vegetation, residential development, commercial and industrial development, haying, grazing and mowing for fire control. The lower 1.5 miles of Elk Creek are piped.

Reach EK-06 is a reference site containing willow.

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Glossary

Areal cover: A measure of dominance defining the degree to which the portions of plants above the ground cover the ground surface.

Channel: An open conduit either naturally or artificially created which periodically or continuously contains moving water.

Channelize: To straighten the bed or banks of a stream or river or to line them with concrete or other materials.

Detention: Temporary storage of water. Typically, low areas that store flood water.

Dominant: The species controlling the environment.

DSL: Division of State Lands. State agency that administers Oregon's state-owned lands and regulates removal and fill in waterways and wetlands.

Erosion hazard: Likelihood of soil becoming unstable and subsequently being transported by flooding, surface runoff or channel velocities.

FEMA: Federal Emergency Management Agency. The federal agency that manages emergency response and hazard mitigation planing. Administers the National Flood Insurance Program (NFIP); and creates or reviews maps that define the location and elevation of the 1-percent chance flood (100 year floodplain).

Flood prone area: A topographic feature such as a depression, swale, flat area or 100-year floodplain within the riparian area that is prone to flooding.

Floodplain: An area adjacent to a water resource that is subject to flooding or inundation during a storm event.

Function: A characteristic action or role provided by riparian areas such as water quality, flood management, thermal regulation or wildlife habitat.

GIS or Geographical Information System: A system of hardware, software and data storage that allows for the analysis and display of information that has been geographically referenced.

Habitat: The environment in which the requirements of a specific plant or animal are met.

Headwaters: Tributary stream located in upper portions of a watershed.

Herbaceous vegetation: A plant, whether annual, biennial, or perennial, with non-woody stems that die back to the ground at the end of the growing season.

Hydrologic basin: An area of land that drains to a single point; usually defined by topography.

Impervious surface: A surface that cannot effectively absorb or infiltrate water, such as roads, parking lots, and sidewalks.

Intermittent stream: A stream that has interrupted flow or does not flow continuously.

Large woody debris: Dead material from trees and shrubs that is large enough to persist more than one season.

Local Wetland Inventory: A Goal 5 resource inventory defined by OAR 141-86-110 through 141-86-240.

Natural waterways: waterways created naturally by geological and hydrological processes, waterways that would be natural but for human-caused disturbances (e.g., channelized or culverted streams, impounded waters, partially drained wetlands or ponds created in wetlands) and that otherwise meet the definition of waters of the state, and certain artificially created waterways as defined in OAR 141-85-0010 (29).

NWI: National Wetland Inventory, database designed and established by the United States Fish and Wildlife Service (USFWS) that maps and classifies wetlands in the United States based on interpretation of aerial photographs.

OAR: Oregon Administrative Rules. A body of law that describes how legislation and other laws will be implemented.

Perennial stream: A continuously flowing stream.

Potential tree height (PTH): The potential height of a mature tree for a particular location. Determined by climate, geology, hydrology and landscape position.

Reach: A segment of a riparian area with relatively homogeneous physical characteristics. Its length parallel to the water resource can be determined by major changes in vegetation type, slope or by changes in land use.

Reference site: An area that exhibits the potential natural vegetation under a particular set of conditions. Used as a model for restoration of disturbed sites.

Riparian area: The area immediately adjacent to surface water such as rivers, streams, ponds, lakes, wetlands, and springs consisting of transition areas between an aquatic ecosystem to terrestrial ecosystem.

Riparian corridor: A Goal 5 resource that includes the water areas, fish habitat, riparian areas and significant wetlands within the riparian corridor boundary.

Runoff: That part of precipitation, snowmelt, or irrigation that flows across the land surface and into streams or other waterways. It can carry pollutants from the air and land into the receiving waters.

Statewide Planning Goal 5: Oregon's statewide planning goal that addresses open space, scenic and historic areas, and natural resources. The purpose of the goal is to conserve open space and protect natural and scenic resources.

Stream: A watercourse created by natural processes, or one that would be in a natural state if it were not for human-caused alterations.

Top of bank: Topographical break at the top of the stream bank; point at which flood water leaves the channel.

Vegetation layer: Canopy, midstory and groundcover levels of vegetation, commonly represented by trees, shrubs and herbaceous plant species. Determined by height of vegetation.

Water resource: Rivers, streams, lakes, ponds and adjacent wetlands. Forms the inner edge of the riparian area.

Wetland: Those areas that are inundated or saturated by surface or ground water at a frequency or duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

Woody vegetation: A plant with woody stems that persist throughout the growing season.

Appendix A. Riparian Width Determination Forms, Riparian Characterization Forms and Riparian Function Assessment Forms

Forms are arranged by reach number within each drainage basin. Drainage basins are arranged alphabetically.

DRAINAGE BASINS

Volume 1

BE - Bear Creek East

BS - Bear Creek South

CR - Crooked Creek

EK - Elk Creek

LA - Larson Creek

Volume 2

LZ - Lazy Creek

LP - Lone Pine Creek

MD - Midway Creek

SW - Swanson Creek

Appendix B. Riparian Inventory Maps

Four 34”x44” color map sheets

Appendix C. Riparian Function Maps

Four 24"x36" color map sheets

Appendix D. Riparian Function Assessment Results

Riparian Code	Reach Length (feet)	Water Quality	Flood Management	Thermal Regulation	Wildlife Habitat
BE-01L	425	High	High	High	Medium
BE-01R	425	High	High	Medium	Medium
BE-02L	650	High	Medium	High	Medium
BE-02R	650	High	Medium	Medium	Medium
BS-01L	1180	High	Medium	Medium	High
BS-01R	1180	High	Medium	High	High
BS-02L	1450	Medium	Medium	Low	Low
BS-02R	1450	High	Medium	Medium	Medium
BS-03L	325	Medium	Medium	Low	Low
BS-03R	325	Medium	Medium	Medium	Low
BS-04L	1900	High	Medium	Medium	Medium
BS-04R	1900	High	Medium	Medium	Medium
BS-05L	625	High	Medium	Medium	High
BS-05R	625	High	Medium	Medium	Medium
BS-06L	900	Medium	Low	Low	Low
BS-06R	900	Medium	Medium	Medium	Low
BS-07L	500	High	Medium	Medium	Medium
BS-07R	500	Medium	Medium	Medium	Low
CR-01L	3175	High	Medium	Low	Medium
CR-01R	3175	High	Medium	Medium	Medium
CR-02L	1475	High	Medium	Medium	Medium
CR-02R	1475	High	Medium	High	Medium
CR-03L	3300	Medium	Medium	Medium	Medium
CR-03R	3300	High	Medium	High	Medium
CR-04L	4000	High	Medium	Low	Medium
CR-04R	4000	High	Medium	Medium	Medium
CR-05L	1575	Medium	Medium	Low	Low
CR-05R	1575	Medium	Medium	Medium	Low
CR-06L	1675	High	Low	High	Medium
CR-06R	1675	High	Medium	Medium	Medium
CR-07L	825	High	High	Medium	Medium

Riparian Code	Reach Length (feet)	Water Quality	Flood Management	Thermal Regulation	Wildlife Habitat
CR-07R	825	High	High	Medium	Medium
EK-01L	1500	High	Medium	Low	Medium
EK-01R	1500	High	Medium	Low	Medium
EK-02L	2550	High	Medium	Medium	Medium
EK-02R	2550	Medium	Medium	Medium	Medium
EK-03L	4000	High	Medium	Low	Medium
EK-03R	4000	High	Medium	Low	Medium
EK-04L	475	Medium	Medium	Low	Low
EK-04R	475	Medium	Medium	Low	Low
EK-05L	6200	High	Medium	Low	Medium
EK-05R	6200	High	Medium	Low	Medium
EK-06L	1900	High	Medium	Medium	Medium
EK-06R	1900	High	Medium	Medium	Medium
LA-01L	2400	High	Medium	High	Medium
LA-01R	2400	Medium	Medium	Medium	Medium
LA-02L	600	High	Medium	Medium	Low
LA-02R	600	High	Medium	Low	Low
LA-03L	2250	Medium	Medium	High	Medium
LA-03R	2250	Medium	Medium	Medium	Medium
LA-04L	700	High	Medium	High	Low
LA-04R	700	Medium	Medium	Low	Low
LA-05L	1900	High	High	High	Medium
LA-05R	1900	High	High	Medium	Medium
LA-06L	550	Medium	Medium	Medium	Low
LA-06R	550	Medium	Medium	Low	Low
LA-07L	925	Medium	Medium	High	Medium
LA-07R	925	Medium	Medium	Low	Low
LA-08L	1275	Medium	Medium	High	Medium
LA-08R	1275	Medium	Medium	Medium	Medium
LA-09L	1875	Medium	Medium	High	Medium
LA-09R	1875	High	Medium	Medium	Medium
LA-10L	1000	High	Medium	Medium	Low
LA-10R	1000	Medium	Medium	Low	Low

Riparian Code	Reach Length (feet)	Water Quality	Flood Management	Thermal Regulation	Wildlife Habitat
LA-11L	900	High	Medium	High	Medium
LA-11R	900	High	Medium	Medium	Medium
LA-12L	725	High	Medium	Low	Medium
LA-12R	725	High	Medium	Low	Medium
LA-13L	5200	High	Medium	High	Medium
LA-13R	5200	High	Medium	Medium	High
LA-14L	1725	High	Medium	High	Medium
LA-14R	1725	High	Medium	Medium	Medium
LA-15L	2775	High	Medium	High	Medium
LA-15R	2775	High	Medium	Medium	Medium
LA-17L	950	Medium	Medium	Medium	Medium
LA-17R	950	Medium	Medium	Low	Medium
LA-18L	1350	High	Medium	High	High
LA-18R	1350	High	Medium	Medium	High
LA-19L	2325	High	Low	High	Medium
LA-19R	2325	High	Low	Medium	High
LA-20L	500	High	Low	High	Medium
LA-20R	500	High	Low	Medium	Medium
LA-21L	1525	High	Low	Medium	Low
LA-21R	1525	High	Low	Low	Low
LA-22L	525	Medium	Low	Low	Low
LA-22R	525	Medium	Low	Low	Low
LA-23L	1325	Medium	Medium	Medium	Low
LA-23R	1325	Medium	Medium	Low	Low
LA-24L	600	High	Medium	High	Medium
LA-24R	600	High	Medium	Medium	Medium
LA-25L	1800	Medium	Medium	Medium	Low
LA-25R	1800	Medium	Medium	Low	Low
LA-26L	550	Medium	Medium	Low	Medium
LA-26R	550	Medium	Medium	Low	Medium
LA-27L	975	High	Medium	High	Medium
LA-27R	975	High	Medium	Medium	Medium
LA-28L	2100	Medium	Medium	Medium	Low

Riparian Code	Reach Length (feet)	Water Quality	Flood Management	Thermal Regulation	Wildlife Habitat
LA-28R	2100	Medium	Medium	Low	Low
LA-29L	425	High	Medium	High	Medium
LA-29R	425	High	Medium	Medium	Medium
LA-30L	2100	High	Medium	High	Medium
LA-30R	2100	High	Medium	Medium	Medium
LA-31L	875	High	Medium	Medium	Medium
LA-31R	875	Medium	Low	Low	Medium
LP-01L	2900	Medium	Medium	High	Medium
LP-01R	2900	High	Medium	Low	Low
LP-02L	4200	Medium	Medium	Medium	Low
LP-02R	4200	High	Medium	Low	Low
LP-03L	1800	High	Medium	High	Medium
LP-03R	1800	High	Medium	Medium	Medium
LP-04L	1700	Medium	Medium	Medium	Low
LP-04R	1700	High	Medium	Low	Low
LP-05L	1100	Medium	Medium	Medium	Low
LP-05R	1100	Medium	Medium	Low	Low
LP-06L	775	High	Medium	High	Medium
LP-06R	775	High	Medium	Low	Low
LP-07L	700	High	Medium	High	Medium
LP-07R	700	High	Medium	Medium	Medium
LP-08L	1100	Medium	Medium	Medium	Medium
LP-08R	1100	Medium	Medium	Low	Medium
LP-09L	425	High	Medium	High	High
LP-09R	425	High	Medium	Medium	High
LP-10L	1675	Medium	Medium	Medium	Medium
LP-10R	1675	High	Low	Medium	Medium
LP-11L	1725	Medium	Low	High	Medium
LP-11R	1725	High	Medium	Medium	Medium
LP-12L	2100	Medium	Medium	High	Medium
LP-12R	2100	Medium	Low	Low	Medium
LP-13L	2000	Medium	Medium	High	Medium
LP-13R	2000	Medium	Medium	Medium	Medium

Riparian Code	Reach Length (feet)	Water Quality	Flood Management	Thermal Regulation	Wildlife Habitat
LP-14L	2350	Medium	Medium	Medium	Medium
LP-14R	2350	Medium	Medium	Low	Medium
LP-15L	350	Medium	Medium	Low	Low
LP-15R	350	Medium	Medium	Low	Low
LP-16L	300	Medium	Medium	Medium	Medium
LP-16R	300	Medium	Medium	Low	Medium
LP-17L	550	Medium	Medium	Medium	Medium
LP-17R	550	Medium	Medium	Low	Medium
LP-18L	3000	High	Medium	High	Medium
LP-18R	3000	High	Medium	Medium	Medium
LP-19L	700	High	Low	High	Medium
LP-19R	700	High	Medium	Medium	Medium
LP-20L	375	Medium	Low	Medium	Low
LP-20R	375	Medium	Low	Low	Low
LP-22L	650	Medium	Medium	Medium	Low
LP-22R	650	Medium	Medium	Low	Medium
LZ-01L	850	High	High	High	High
LZ-01R	850	High	Medium	Medium	High
LZ-02L	375	High	Medium	Medium	Medium
LZ-02R	375	Medium	Medium	Low	Medium
LZ-03L	1100	Medium	Medium	Medium	Medium
LZ-03R	1100	Medium	Medium	Low	Low
LZ-04L	1300	Medium	Medium	Medium	Low
LZ-04R	1300	High	Medium	Medium	Medium
LZ-05L	1375	High	Medium	High	Medium
LZ-05R	1375	Medium	Medium	Medium	Medium
LZ-06L	2250	Medium	Medium	Medium	Low
LZ-06R	2250	Medium	Medium	Medium	Medium
LZ-07L	2450	High	Medium	Medium	Low
LZ-07R	2450	Medium	Low	Low	Medium
LZ-08L	575	High	Medium	High	Medium
LZ-08R	575	High	Medium	Medium	Medium
LZ-09L	4200	High	Medium	High	Medium

Riparian Code	Reach Length (feet)	Water Quality	Flood Management	Thermal Regulation	Wildlife Habitat
LZ-09R	4200	High	Medium	Medium	Medium
LZ-10L	1200	High	Medium	High	Medium
LZ-10R	1200	High	Medium	Medium	Medium
LZ-11L	1600	Medium	Medium	High	Medium
LZ-11R	1600	Medium	Medium	Medium	Medium
LZ-12L	2000	High	Medium	High	Medium
LZ-12R	2000	High	Medium	Medium	Medium
LZ-13L	1150	High	Medium	Medium	Medium
LZ-13R	1150	High	Medium	Medium	Medium
LZ-14L	2425	High	Medium	High	Medium
LZ-14R	2425	High	Medium	Medium	Medium
LZ-15L	2000	High	Medium	Medium	Medium
LZ-15R	2000	High	Medium	Medium	Medium
LZ-16L	2450	High	Medium	High	Medium
LZ-16R	2450	High	Medium	Medium	Medium
LZ-17L	2200	High	Medium	High	Medium
LZ-17R	2200	High	Medium	Medium	Medium
LZ-18L	650	High	Low	Medium	Low
LZ-18R	650	Medium	Low	Medium	Low
LZ-19L	2275	High	Medium	High	Medium
LZ-19R	2275	Medium	Medium	Medium	Medium
LZ-20L	1650	High	Low	High	Medium
LZ-20R	1650	Medium	Low	Medium	Low
LZ-21L	2050	Medium	Medium	High	Medium
LZ-21R	2050	High	Medium	Medium	Medium
LZ-22L	1250	High	Medium	Medium	Medium
LZ-22R	1250	High	Medium	Medium	Medium
LZ-23L	1150	High	Medium	Medium	Medium
LZ-23R	1150	Medium	Medium	Medium	Medium
LZ-24L	875	Medium	Medium	Medium	Medium
LZ-24R	875	Medium	Medium	Medium	Medium
LZ-25L	1275	Medium	Medium	Medium	Medium
LZ-25R	1275	Medium	Medium	Low	Medium

Riparian Code	Reach Length (feet)	Water Quality	Flood Management	Thermal Regulation	Wildlife Habitat
LZ-26L	950	Medium	Medium	Medium	Medium
LZ-26R	950	Medium	Medium	Low	Medium
LZ-27L	1525	High	Medium	High	Medium
LZ-27R	1525	High	Medium	Medium	Medium
LZ-28L	600	High	Low	High	Low
LZ-28R	600	Medium	Low	Low	Low
LZ-29L	4775	Medium	Medium	Medium	Medium
LZ-29R	4775	Medium	Medium	Medium	Medium
LZ-30L	1350	High	Medium	High	Medium
LZ-30R	1350	High	Medium	Medium	Medium
LZ-31L	2700	Medium	Medium	High	Medium
LZ-31R	2700	Medium	Medium	Low	Medium
LZ-32L	600	Medium	Medium	Medium	Low
LZ-32R	600	Medium	Medium	Low	Low
LZ-33L	400	Medium	Medium	Medium	Medium
LZ-33R	400	Medium	Medium	Medium	Medium
LZ-34L	325	Medium	Medium	Medium	Medium
LZ-34R	325	Medium	Medium	Low	Medium
MD-01L	1375	Medium	Medium	Low	Low
MD-01R	1375	Medium	Medium	Low	Low
MD-02L	375	High	Medium	Medium	Medium
MD-02R	375	High	Medium	Medium	Medium
MD-03L	10500	Medium	Medium	Medium	Low
MD-03R	10500	High	Medium	Low	Medium
MD-04L	2200	High	Medium	Low	Low
MD-04R	2200	High	Medium	Low	Low
MD-05L	1925	High	Medium	Medium	Medium
MD-05R	1925	High	Medium	Low	Medium
MD-06L	2200	Medium	Low	High	Medium
MD-06R	2200	High	Low	Medium	Medium
MD-07L	600	Medium	Medium	Low	Low
MD-07R	600	High	Medium	Low	Medium
MD-08L	1100	Medium	Medium	Medium	Low

Riparian Code	Reach Length (feet)	Water Quality	Flood Management	Thermal Regulation	Wildlife Habitat
MD-08R	1100	Medium	Medium	Low	Low
MD-09L	300	High	Medium	Medium	Medium
MD-09R	300	High	Medium	Low	Medium
SW-01L	1100	Medium	Medium	Medium	Low
SW-01R	1100	High	Medium	Low	Low
SW-02L	775	Medium	Medium	Medium	Medium
SW-02R	775	High	Medium	Medium	Medium