BEFORE THE METRO COUNCIL

FOR THE PURPOSE OF DIRECTING STAFF TO APPLY FUNCTIONAL, SCIENCE BASED CRITERIA IDENTIFYING POSSIBLE FISH AND WILDLIFE HABITAT ON REGION-WIDE MAPS AND REPORTING BACK TO THE NATURAL RESOURCE COMMITTEE FOR ITS REVIEW	))))))))	RESOLUTION NO 01-3087A Introduced by Mike Burton, Executive Officer

WHEREAS, the Regional Framework Plan and Urban Growth Management Functional Plan ("UGMFP") state that Metro will undertake a program for protection of fish and wildlife habitat; and

WHEREAS, the Title 3, Section 5 of the UGMFP sets forth actions that the Metro Council anticipated that Metro would take in identifying, considering and protecting regionally significant fish and wildlife habitat conservation areas; and

WHEREAS, this resolution represents a preliminary step in identifying criteria to address the direction of the UGMFP by determining significant resources for riparian corridors and wildlife consistent with State Goal 5; and

WHEREAS, the Regional Framework Plan and Metro's Regional Urban Growth Goals and Objectives identify watersheds as the appropriate scale for Metro to consider in identifying fish and wildlife habitats; and

WHEREAS, on May 9, 2001, the Metro Natural Resource Committee directed staff to prepare draft functional, science-based criteria for identifying significant resources pertaining to riparian corridors and wildlife habitat consistent with State Goal 5; and

WHEREAS, Staff presented to the Natural Resource Committee on June 6, 2001 draft criteria for identifying possible riparian corridor and wildlife resources based on six functions derived from a review of scientific literature; and

WHEREAS, staff also presented to the Natural Resource Committee on June 6, 2001, three pilot areas were mapped applying these criteria to limited landscapes within the region; and

WHEREAS, the Goal 5 Technical Advisory Committee, the Metro Technical Advisory Committee (MTAC), Metro Policy Advisory Committee (MPAC) and the Water Resources Policy Advisory Committee (WRPAC) have seen the presentation of these criteria and pilot maps and have completed recommendations and forwarded their recommendations to the Metro; and

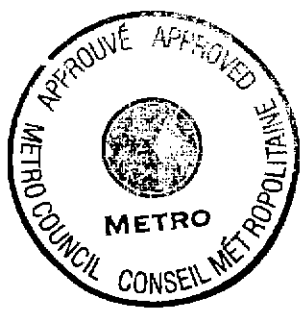
WHEREAS, the Natural Resources Committee has solicited public comment, provided public notice and held a public meeting for the purpose of hearing public comments and recommendations; NOW, THEREFORE,

BE IT RESOLVED;

1. That the Metro Council hereby directs staff to use the criteria as described in Exhibit A and apply these to map possible riparian corridor and wildlife habitat areas throughout the region.
2. That the Metro Council directs staff to complete the development of criteria to include uplands wildlife habitat with the riparian corridor criteria described in Exhibit A and to map these areas region-wide.
3. That the Metro Council directs staff to complete work items 1 and 2 above and present these data and maps to the Metro Natural Resource Committee in September, 2001 or as soon thereafter when such data and maps are available.

4. That the Metro Council may alter both the criteria and application of the mapping of these criteria prior to adoption of significant resources related to riparian corridors and wildlife habitat areas, after public comment and review.
5. That the Metro Council will invite broad public review of these data and maps prior to any Metro Council action.
6. That the Metro Council's direction to staff in this resolution is not a final action designating significant resources for riparian corridors and wildlife habitat areas or a final action to protect those areas once designated.

ADOPTED by the Metro Council this 26th day of July 2001.



David Bragdon, Presiding Officer

Approved as to Form:

Daniel B. Cooper, General Counsel

DRAFT 7/17/2001

Exhibit A

Metro Goal 5 Fish and Wildlife Habitat
Functional Values and Landscape Features for Identifying Significant Riparian Corridors

MICROCLIMATE AND SHADE			
How does the function help fish and wildlife?	**Contributing landscape features**	**Criteria for mapping the landscape features**	
		Primary functional value	**Secondary functional value**
Undisturbed riparian corridors have a unique microclimate. • This allows for increased plant diversity, and thus a variety of food and cover opportunities for fish and wildlife. • Riparian corridors have reduced summertime temperatures, higher humidity levels, and provide protection from wind in the winter, which benefits wildlife. Riparian vegetation provides shade. • Shade moderates the amount of light reaching the stream and thus helps to reduce water temperature. • Water temperature is one of the most important factors influencing salmon and other aquatic species: they depend on cold, clean water. • Riparian vegetation is most effective in providing shade and moderating stream temperature on smaller streams. *(See pages 5-6; 11; ; 15-25; 38-39; and 42 in the April 2001 draft of the Aquatic and Riparian Habitat chapter in Metro's Science Literature Review.)*	Stands of trees and other vegetated areas Range of widths recommended to maintain the function identified in the scientific literature: Shade: 39-250 ft[1] Microclimate:75-780 ft	The landscape feature has **PRIMARY** functional value if it is: a forest or woody vegetation landcover type within **100 feet**[2] of: a surface stream; a hydrologically connected wetland[3]; or an area subject to flooding (includes the 1996 flood inundation and FEMA 100-year floodplain).	
	Stands of trees and other vegetated areas As indicated above, the range of widths for microclimate is 75-780 ft. The outer range is given a secondary value for microclimate function.		The landscape feature has **SECONDARY** functional value if it is: a forest or woody vegetation landcover type within **100 to 780** feet of: a surface stream; a hydrologically connected wetland; or an area subject to flooding (includes the 1996 flood inundation and FEMA 100-year floodplain) and is not a primary feature.

[1] All distances are for one side of a stream or other water feature as measured from the top of bank, and should be applied to each side of the water feature.
[2] 100 feet is the most commonly cited width identified in the scientific literature as necessary for shade, and close to the minimum necessary for maintaining riparian microclimate.
[3] "Hydrologically-connected wetlands" are wetlands located partially or wholly within ¼ mile of a surface stream or flood area.

STREAMFLOW MODERATION AND WATER STORAGE

How does the function help fish and wildlife?	Contributing landscape features	Criteria for mapping the landscape features	
		Primary functional value	Secondary functional value
The riparian corridor may contain wetlands, soils and vegetation that allow groundwater recharge and discharge, help to store rainwater, prevent flooding, and provide sources of stream flow during dry parts of the year. • Wetlands may occur adjacent to stream channels and within the floodplain of the riparian corridor. Wetlands comprise a very small proportion of the landscape and yet host a significant number of specialized plant and animal species. • Wetlands are important storage areas for flow, particularly during dry seasons, when they become a source of water to the stream. • The hyporheic zone allows groundwater to mix with stream water, which changes chemical properties of the water, cools water temperature, and stimulates biological activity. • Riparian forests and other vegetation act as a sponge to hold water, slow stormwater runoff, and maintain stable flow in streams (base flow). • Un-compacted topsoil rich in organic materials can hold water and slow stormwater runoff. *(See pages 2-4; 7; 15-25 in the April 2001 draft of the Aquatic and Riparian Habitat chapter in Metro's Science Literature Review.)*	<u>Wetlands and floodplains</u> The scientific literature has indicated that all riparian associated wetlands and floodplains if protected, provide streamflow moderation and water storage.	The landscape feature has **PRIMARY** functional value if it is: <u>a wetland or other water body</u>[4] with a hydrologic connection to a surface stream. **OR** <u>an area subject to flooding</u> (includes the 1996 flood inundation and FEMA 100-year floodplain)	
	<u>Forests, other vegetative cover and undeveloped soils</u> Increased levels of impervious surfaces interrupt the hydrologic cycle, alter stream structure, and degrade the chemical profile of the water that flows through streams. These changes affect fish and wildlife in various ways, and are cumulative within watersheds. <u>Forests</u> Riparian and upland vegetation helps moderate streamflow by intercepting, absorbing and facilitating storage of rainfall. Water stored in groundwater is slowly released over time.		The landscape feature has **SECONDARY** functional value if it is: <u>a forest, woody vegetation, or low structure vegetation/undeveloped soils landcover type</u> within **300 feet**[5] of a surface stream. **OR** <u>a forest landcover type</u> that is contiguou to the riparian corridor (starts within **300 feet**[6] but extends beyond)

[4] "Other water body" could include lakes, ponds, reservoirs, or manmade water feature that is not a water quality facility or farm pond.

[5] All upland forests, vegetation, and undeveloped soils help to moderate streamflow and store water. Staff used 300 feet here because some data layers for landcover types do not extend past 300 feet from a stream.

[6] Forest landcover is the only type that extends beyond 300 feet in the Metro database and thus excludes other types.

BANK STABILIZATION, SEDIMENT AND POLLUTION CONTROL

How does the function help fish and wildlife?	Contributing landscape features	Criteria for mapping the landscape features	
		Primary functional value	Secondary functional value
Riparian vegetation provides bank stabilization and sediment control. Wetlands or vegetated floodplains also help to remove sediment, excess nutrients, and chemical pollutants. • Sediment in streams originates from streambank erosion, from within the channel, from upland activities, and from natural disturbances. • Sediment occurs naturally in any stream, but changes in the amount and size of the sediment can have negative impacts on fish and other aquatic wildlife, as well as water quality. • Riparian vegetation helps trap pollutants that are attached to sediment particles. • Riparian vegetation helps to moderate streamflow by intercepting, absorbing, and storing rainfall. • Maintaining low structure vegetation and uncompacted topsoil rich in organic materials allows stormwater to infiltrate into the ground rather than flow over the surface (reduced surface erosion & filters pollutants). (Uncompacted topsoil does not include dirt roads, parking lots, etc.) *(See pages 6-7; 15-25; 39-40 in the April 2001 draft of the Aquatic and Riparian Habitat chapter in Metro's Science Literature Review.)*	Default to maintain basic functions This 50-foot band is specifically to prevent channelization and ensure future bank stability and prevent bank erosion through allowing vegetation to propagate on stream banks.	The landscape feature has PRIMARY functional value if it is: within **50 feet** of a surface stream and is not a forest, woody vegetation, or low structure vegetation/undeveloped soils landcover type. OR	
	Forest and other vegetation Range of widths recommended to maintain the function identified in the scientific literature: • Bank stabilization: ½ site potential tree height to 170 ft • Sediment control: 10 ft (sand) – 400 ft (clay) • Pollutant removal: 13-141 ft	a forest, woody vegetation, or low structure vegetation/undeveloped soils landcover type within **100 feet**[7] of a surface stream. OR	
	Steep slopes The scientific literature indicates that vegetated steep slopes adjacent to all streams provide bank stabilization, sediment and pollution control.	a forest, woody vegetation, or low structure vegetation/undeveloped soils landcover type within **100-200 feet** of a surface stream if the slope is greater than 25%. OR	
	Wetlands and floodplains The scientific literature has indicated that all riparian associated wetlands and floodplains play a critical role in sediment and pollution control.	a forest, woody vegetation, or low structure vegetation/undeveloped soils landcover type within **100 feet** of a hydrologically connected wetland (title 3 wetland); or a forest, woody vegetation, or low structure vegetation/ undeveloped soils landcover type[8] within an area subject to flooding (includes the 1996 flood inundation and FEMA 100-year floodplain).	
	Steep slopes The scientific literature indicates that for slopes over 25 percent the buffer should be measured from the break in slope to reduce sediment loading from mass wasting events.		The landscape feature has **SECONDARY** functional value if it is: a forest, woody vegetation, or low structure vegetation/undeveloped soils landcover type located on a slope great than 25%, that starts within 175 feet[9] of surface stream reach and runs to the fir effective break in slope.

[7] The Metro science paper indicates 100 feet as a suitable average distance for vegetation contributing to filtering.
[8] The woody vegetation and low structure vegetation/undeveloped soils landcover types are mapped to 300 feet, the forest landcover type is mapped to the edge of the floodplain.
[9] 175 feet was chosen due to the method used for mapping riverine slopes.

LARGE WOOD AND CHANNEL DYNAMICS			
How does the function help fish and wildlife?	**Contributing landscape features**	**Criteria for mapping the landscape features**	
		Primary functional value	**Secondary functional value**
Large woody debris (LWD), such as branches, logs, uprooted trees, and root wads, is a key component of aquatic habitats in the Pacific Northwest. LWD enters streams either directly from the adjacent riparian area, from upland hillslopes through windthrow or debris avalanches, or from upstream sources. • LWD helps form important habitat for fish such as pools, riffles, eddies, side channels, meanders, and instream cover (overhanging vegetation). Stream complexity is critical for salmon because at various life stages they require different types of habitat. • LWD also controls the routing of water and sediment, dissipates stream energy, protects streambanks, stabilizes streambeds, helps retain organic matter, and acts as a surface for biological activity. Over time, streams move back and forth across the valley floor; this area is called the channel migration zone. Most streams have a channel migration zone, except when the channel is constrained by narrow valleys or ravines or altered by human development. • This area is frequently defined by the 100-year floodplain, and defines where aquatic or wetland habitat could exist in the future. • Flood events of varying size and frequency play a vital role in maintaining a diversity of riparian plant species and aquatic habitat. • Biological productivity is enhanced in the floodplains because sediment and nutrients are deposited during the advance and retreat of floodwaters. *(See pages 9-10; 15-25; 40; and 41 in the April 2001 draft of the Aquatic and Riparian Habitat chapter in Metro's Science Literature Review.)*	<u>Forest</u> → Range of widths recommended to maintain the function identified in the scientific literature: • Large woody debris: one site potential tree height; 150-262 ft <u>Floodplains</u> → The scientific literature demonstrates that frequently flooded areas should be maintained to allow for the channel migration zone. <u>Default to maintain basic functions</u>[10] → The channel migration zone is basically defined by the floodplain, but where there is no mapped floodplain a default of 50 feet was selected to allow for the channel migration zone.	The landscape feature has **PRIMARY** functional value if it is: <u>a forest landcover type</u> within **150 feet** of a surface stream, or <u>a hydrologically connected wetland</u>. **OR** within an <u>area subject to flooding</u> (includes the 1996 flood inundation and FEMA 100-year floodplain). **OR** <u>within 50 feet</u> of a surface stream.	
	<u>Forest</u> → As indicated above, the range of widths for large woody debris is 150-262 feet. The outer range is given a secondary value for large wood contribution.	→	The landscape feature has **SECONDARY** functional value if it is: <u>a forest landcover type</u> within **150 to 262 feet** of a surface stream.

[10] Application of the <u>default to maintain basic functions</u> will be limited to low and moderate gradient channel types.

ORGANIC MATERIAL SOURCES			
How does the function help fish and wildlife?	**Contributing landscape features**	**Criteria for mapping the landscape features**	
		Primary functional value	**Secondary functional value**
Riparian vegetation provides a majority of the energy and hydrocarbons in aquatic food webs. • Leaves, fruit, cones, insects, and other organic matter fall directly into the stream channel from the riparian area, or move by wind, erosion, or as dissolved materials in groundwater. • In smaller streams, most of the organic matter used by aquatic communities comes from the adjacent forest, while in larger streams and rivers organic matter may come from aquatic plants and upstream sources. • Fallen insects from riparian vegetation can make up 40-50% of the diet of trout and juvenile salmon during the summer months. *(See pages 8; 15-25; and 40 in the April 2001 draft of the Aquatic and Riparian Habitat chapter in Metro's Science Literature Review.)*	<u>Vegetation</u> → Range of widths recommended to maintain the function identified in the scientific literature: • Small woody debris: 100 ft • Organic litterfall: ½ site potential tree height; 100-170 ft	The landscape feature has **PRIMARY** functional value if it is: <u>a forest or woody vegetation landcover type</u> within **100 feet** of a surface stream, or a hydrologically connected wetland. **OR**	
	<u>Floodplains</u> → Organic material can enter the aquatic environment when the stream floods and carries away organic material from a vegetated area.	a forest or woody vegetation landcover type within <u>an area subject to flooding</u> (includes the 1996 flood inundation and FEMA 100-year floodplain)	
	<u>Vegetation</u> → As indicated above, the range of widths for organic material sources is 100-170 feet. The outer range is given a secondary value for organic material source contribution.	→	The landscape feature has **SECONDARY** functional value if it is: <u>a forest or woody vegetation landcover type</u> within **100 to 170 feet** of a surface stream.

RIPARIAN WILDLIFE HABITAT AND CONNECTIVITY			
How does the function help fish and wildlife?	**Contributing landscape features**	**Criteria for mapping the landscape features**	
		Primary functional value	**Secondary functional value**
Wildlife are attracted to riparian areas because of the abundance of food sources, cover, and proximity of drinking water. • Natural riparian areas provide a complex and highly productive food web. • Riparian vegetation in the form of grasses, shrubs, trees and other plants provides wildlife habitat for reproduction, nesting, roosting, foraging and protection from the weather and from competitive and predatory species. • Structural complexity exists when there is a diversity of plant species, multiple canopy layers, and snags and downed woody material. Much of the biodiversity found in riparian areas depends on this structural complexity. • Riparian corridors, due to their linear shape, enable wildlife movement between habitat patches. • In the summer, the specialized microclimate in riparian corridors creates diverse habitat characteristics desirable to many species, such as amphibians. • Most wildlife species (92% of non-fish wildlife in this region) utilize riparian areas at some point in their life history for water, food, and shelter. Since riparian areas frequently serve as corridors through the urbanized landscape, they also provide movement and dispersal routes. *(See pages 10; 15-25; 41-42 in the April 2001 draft of the Aquatic and Riparian Habitat chapter in Metro's Science Literature Review.)*	<u>Forest and vegetative cover</u> → Range of widths recommended to maintain the function identified in the scientific literature: • Edge effect: 20 ft (noise) -2,000 ft (minimize predation) • Terrestrial LWD and structural complexity: 1 site potential tree height outside a buffer to 650 ft • Movement corridors: 328 ft • Specific wildlife needs: 100 ft (e.g. frogs & salamanders) – 656 ft (Rufous-sided towhee breeding populations)	The landscape feature has **PRIMARY** functional value if it is: <u>a forest, woody vegetation, or low structure vegetation/undeveloped soils landcover type</u> within **328 feet**[11] of a surface stream, or a hydrologically connected wetland[12]. **OR**	
	<u>Floodplains</u> → The entire width of the floodplain provides essential spawning and rearing habitat for fish and important year round habitat for birds, turtles, beavers, muskrats and other wildlife.	a forest, woody vegetation, or low structure vegetation/undeveloped soils landcover type <u>within an area subject to flooding</u> (includes the 1996 flood inundation and FEMA 100-year floodplain)[13].	
	<u>Forest cover</u> → All forest cover between 328 and 2,000 feet is given secondary functional value based on the needs of wildlife identified above.		The landscape feature has **SECONDARY** functional value if it is: <u>a forest landcover type</u> within **328 to 2,000 feet** of a surface stream, or a hydrologically connected wetland.

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[11] Staff recommends 328 feet, the width identified for wildlife movement corridors in the scientific literature, as the most appropriate minimum width for wildlife habitat.

[12] Data on woody vegetation is limited to within 300 feet of a stream, therefore wetlands outside of this boundary would only receive a primary functional value for the forest landcover type within 328 feet.

[13] The woody vegetation (non-forest woody vegetation types such as shrubs) and low structure vegetation/undeveloped soils landcover types are mapped to 300 feet, the forest landcover type is mapped to the edge of the floodplain.

An Approach for Rating the Ecological Functions and Identifying Significant Riparian Corridors

Determining resource significance requires the application of ecological functional values to landscape features and the subsequent rating of those features. The table on the following page is an example of an evaluation tool that assigns a numerical score to riparian corridors based on the ecological functions (benefits provided by resources for fish and wildlife) occurring at any given site. It is a science-based framework for identifying significant riparian corridors from a regional perspective.

The following steps must be taken in determining regional resource significance:

1. **Delineating Resource Features (Goal 5 Inventory).** Using year 2000 aerial photos and other data sources, landscape features such as stands of trees, woody vegetation, meadows, wetlands, steep slopes and flood areas are delineated along the region's streams and rivers. This information, collected as part of Metro's Geographic Information System (GIS), can be displayed on maps to graphically illustrate the condition of riparian corridors across the landscape. (This step provides some information about location, quality and quantity of the resources, more information will be included in Metro's Final Goal 5 Inventory Analysis. Step 2 provides additional data on quality).

2. **Assigning Functional Values (Attachment A).** After delineation, the resource features are given either a primary functional value or a secondary functional value based on the importance of the feature relative to the function (benefit) it provides for fish and wildlife. The importance of the feature is determined by applying criteria derived from, and substantiated by, the scientific literature review. The features are then mapped.

3. **Rating Landscape Features (table on following page).** A rating system allows landscape features to be evaluated for the ecological functions they are currently providing. Landscape features that make a critical contribution get a primary value; others get a secondary value. A numerical score can be assigned to each of the primary and secondary functional values for a given landscape feature (for example: 6 points to each primary functional value and 1 point to each secondary functional value). The scores would be additive for any given landscape features and reflect a relative scale of current ecological function.

4. **Determining Significant Riparian Corridors.** A threshold score must be identified for determining resource significance. A rating table, as described in Step 3, is one method that could be used. A determination of significance could range from including all mapped areas receiving any rating value to a subset of those areas. ***The Metro Council would determine the significance threshold.***

5. **Classifying Significant Riparian Corridors.** After determining resource significance, all significant resource sites could be classified and given a letter ranking. This ranking would indicate relative significance for use in the economic, social, environment and energy (ESEE) analysis. For example, if using the letters A, B, and C, Class A resource sites might receive a higher score in the environment portion of the analysis than Class C sites.

Example: Numerical scoring for ecological functions of landscape features

Primary functional value		Secondary functional value		Numeric score
6		0		36
5		1		31
5		0		30
4		2		26
4		1		25
4		0		24
3		3		21
3		2		20
3		1		19
3		0		18
2		4		16
2		3		15
2	AND	2	EQUALS	14
2		1		13
2		0		12
1		5		11
1		4		10
1		3		9
1		2		8
1		1		7
1		0		6
0		6		6
0		5		5
0		4		4
0		3		3
0		2		2
0		1		1

Notes:
1. There are 6 primary functions and 6 secondary functions.
2. In this example, each primary function is assigned 6 points and each secondary function is assigned 1 point.

Range of recommended buffer widths

While studies result in a variety of recommended buffer widths for the riparian area, all recommend some level of protection for this important resource for fish and wildlife. If riparian buffers of sufficient width are maintained along streams in the urban area they can provide good quality habitat within an altered landscape (Knutson and Naef 1997). Table 5 below summarizes the range of riparian area widths recommended in the scientific literature to protect fish and wildlife habitat. In an urban area restoration is likely to play an important role in addition to protection of habitat that is currently in good condition (May 2000).

Table 5: Range of riparian area widths for fish and wildlife habitat

AQUATIC HABITAT			
Function		Reference	Minimum width *(each side of stream)*
Temperature regulation and shade	Shade	FEMAT 1993	100 ft
	Shade	Castelle et al. 1994	50-100 ft
	Shade	Spence et al. 1996	98 ft
	Shade	May 2000	98 ft
	Shade	Osborne and Kovacic 1993	33-98 ft
	Shade/reduce solar radiation	Brosofske et al. 1997	250 ft
	Control temperature by shading	Johnson and Ryba 1992	39-141 ft
Bank stabilization and sediment control	Bank stabilization	Spence et al. 1996	170 ft
	Sediment removal and erosion control	May 2000	98 ft
	Ephemeral streams	Clinnick et al. 1985	66 ft
	Bank stabilization	FEMAT 1993	½ SPTH
	Sediment control	Erman et al. 1977	100 ft
	Sediment control	Moring 1982	98 ft
	Sediment removal	Johnson and Ryba 1992	10 ft (sand) – 400 ft (clay)
	High mass wasting area	Cederholm 1994	125 ft
Pollutant removal	Nitrogen	Wenger 1999	50-100 ft
	General pollutant removal	May 2000	98 ft
	Filter metals and nutrients	Castelle et al. 1994	100 ft
	Pesticides	Wenger 1999	>49 ft
	Nutrient removal	Johnson and Ryba 1992*	13 – 141 ft
Large woody debris and organic litter	Large woody debris	FEMAT 1993	1 SPTH
	Large woody debris	Spence et al. 1996	1 SPTH
	Large woody debris	Wenger 1999	1 SPTH
	Large woody debris	May 2000*	262 ft
	Large woody debris	McDade et al. 1990	150 ft
	Small woody debris	Pollock and Kennard 1998	100 ft
	Organic litterfall	FEMAT 1993	½ SPTH
	Organic litterfall	Erman et al. 1977	100 ft
	Organic litterfall	Spence et al. 1996	170 ft
Aquatic wildlife	Cutthroat trout	Hickman and Raleigh 1982	98 ft
	Brook trout	Raleigh 1982	98 ft
	Chinook salmon	Raleigh et al. 1986	98 ft
	Rainbow trout	Raleigh et al. 1984	98 ft
	Cutthroat trout, rainbow trout and steelhead	Knutson and Naef 1997	50 – 200 ft
	Maintenance of benthic communities (aquatic insects)	Erman et al. 1977	100 ft
	Shannon index of macroinvertebrate diversity.	Gregory et al. 1987	100 ft
	Trout and salmon influence zone (Western Washington)	Castelle et al. 1992	200 ft

TERRESTRIAL HABITAT

Function		Reference	Minimum width *(each side of stream)*
Wildlife needs	Willow flycatcher nesting	Knutson and Naef 1997	123 ft
	Frogs and salamanders	NRCS 1995	100 ft
	Full complement of herpetofauna	Rudolph and Dickson 1990	>100 ft
	Belted Kingfisher roosts	USFWS HEP Model	100 – 200 ft
	Deer	NRCS 1995	200 ft
	Smaller mammals	Allen 1983	214 – 297 ft
	Birds	Jones et al. 1988	246 – 656 ft
	Beaver	NRCS 1995	300 ft
	Minimum distance needed to support area-sensitive neotropical migratory birds	Hodges and Krementz 1996	328 ft
	Western pond turtle nests	Knutson and Naef 1997	330 ft
	Pileated woodpecker	Castelle et al. 1992	450 ft
	Bald eagle nest, roost, perch Nesting ducks, heron rookery and sandhill cranes	Castelle et al. 1992	600 ft
	Pileated woodpecker nesting	Small 1982	328 ft
	Mule deer fawning	Knutson and Naef 1997	600 ft
	Rufous-sided towhee breeding populations	Knutson and Naef 1997	656 ft
	Fish and Wildlife	FEMAT 1993	Two-site potential tree heights; 300 ft
	General wildlife habitat	May 2000	328 ft
Edge effect	Interior bird species	Tassone 1981	164 ft
	Neotropical migrants	Keller et al. 1993	328 ft
	Effect of increased predation	Wilcove et al. 1986	2,000 ft
	Noise reduction of a mature evergreen buffer	Harris 1985	20 ft
	Reduce commercial noise	Groffman et al. 1990	100 ft
LWD and structural complexity	Snags and downed wood	FEMAT 1993	1 SPTH outside the buffer
	Width necessary to minimize non-native vegetation	Hennings 2001	650 ft
Movement corridors	Travel corridor for red fox and marten	Small 1982	328 ft
	Minimum to allow for interior habitat species movement	Environment Canada 1998	328 ft
Microclimate	Maintain microclimate	May 2000	328 ft
	Prevent wind damage	Pollock and Kennard 1998	75 ft
	Approximate natural conditions	Brosofske et al. 1997	250 ft
	Maintain microclimate	Knutson and Naef 1997	200-525 ft
	Maintain humidity and soil temperature	Chen et al. 1995	98 – 787 ft
	Maintain microclimate	FEMAT 1993	3 SPTH

Acronyms:

SPTH: site potential tree height
NMFS: National Marine Fisheries Service
NRCS: National Resource Conservation Service
USFWS: U.S. Fish and Wildlife Service
FEMAT: Forest Ecosystem Management Assessment Team

NATURAL RESOURCES COMMITTEE REPORT

CONSIDERATION OF RESOLUTION NO. 01-3087A, FOR THE PURPOSE OF DIRECTING STAFF TO APPLY FUNCTIONAL, SCIENCE BASED CRITERIA IDENTIFYING POSSIBLE FISH AND WILDLIFE HABITAT ON REGION-WIDE MAPS AND REPORTING BACK TO THE NATURAL RESOURCE COMMITTEE FOR ITS REVIEW.

Date: July 20, 2001 Presented by: Councilor McLain

Committee Action: At its July 18, 2001 meeting, the Natural Resources Committee voted 3-0 to recommend Council adoption of Resolution 01-3087A. Voting in favor: Councilors Atherton, McLain and Hosticka

Background

- Situation: The Metro Council is continuing to address portions of Title 3 of the Urban Growth Management Functional Plan. The water quality section was adopted in 1997. Current work addresses fish and wildlife habitat protection, meeting the requirements of state planning Goal 5, and meeting other policy objectives called out in the Vision Statement.

  Resolution 01-3087 directs Metro staff to map region-wide riparian features according to criteria identified in exhibit A. This activity is an interim step in council delineation of significant regional resources, but does not represent a final decision. Staff will return to the Natural Resources Committee in September of 2001, and the committee will deliberate further at that time on the utility of the criteria, the rating system leading to designation of significant resources, and the policy discussion on the linkage between significance and designation as regional resources.

  The resolution also expresses Council agreement for staff to proceed to map three pilot sites relating to uplands, and return to the Natural Resources Committee in September with the results of that mapping, and analysis of criteria that could be used for region-wide mapping of upland areas.

  The draft riparian criteria have been subject to significant review and discussion by Metro's advisory committees, local jurisdictions and other interested parties. MPAC, WRPAC, and the Goal 5 TAC have all agreed to move ahead with mapping of the criteria at this time. The Natural Resources Committee has held two public hearings and deliberated on this issue at several meetings, prior to recommending that staff move ahead.

- Existing Law: Oregon Administrative Rules divisions 16 and 23 cover Goal 5. Metro policy guiding the development of this aspect of Title 3 is found in several places, but

especially the Regional Framework Plan and the Urban Growth Management Functional Plan.

- Budget Impact: Work carried out in this resolution has been budgeted in relation to the Goal 5 work plan. Preliminary mapping of uplands may lead to a review in the fall of resources needed to complete that work.

Committee Issues/Discussion: Chair Hosticka stated that the reason to take on this Goal 5 and Title 3 work is to fulfill a regional vision, identified in many Metro policy documents. Fulfilling this vision will have the benefit of meeting multiple local, state and possibly federal, objectives.

Several policy issues were discussed at committee that were identified through public comment (see attachment). The first has to do with the process of identifying regional resources, and whether doing so requires a discrete step, separate from identifying significant resources. Chair Hosticka said this has not been decided yet, that the public is welcome to identify criteria it thinks is relevant, and that the committee will take up this issue after seeing the maps in September.

As to whether this effort is attempting to address not only state Goal 5 requirements, but also National Marine Fisheries Service 4d exceptions, the chair referred to the Goal 5 Vision Statement. Addressing ESA requirements was one element in the stated purpose of the Goal 5 Vision Statement.

In response to comments regarding a comprehensive citizen outreach and communication plan, the chair directed staff to review the current public involvement activities, and develop a workplan. Councilor McLain will work with staff in this endeavor.

The committee accepted minor amendments to the criteria, including adding the FEMA 100 year flood plain in addition to the 1996 flood event, as factors in several criteria.

Staff Report

CONSIDERATION OF RESOLUTION 01-3087, FOR THE PURPOSE OF DIRECTING STAFF TO APPLY FUNCTIONAL, SCIENCE BASED CRITERIA IDENTIFYING POSSIBLE FISH AND WILDLIFE HABITAT ON REGION-WIDE MAPS AND REPORTING BACK TO THE NATURAL RESOURCE COMMITTEE FOR ITS REVIEW

Date: June 29, 2001 Presented by: Mike Burton

DESCRIPTION

Approval of this resolution would provide policy direction to Metro staff and result in the mapping of the criteria described in Exhibit A to identify possible fish and wildlife resources region wide. It would also provide a description of the Metro Council's thoughts about the best approach to criteria for determining significant resources, with the understanding that after this mapping is completed, the Metro Council could revise its thoughts about the criteria. These criteria could also help begin to address other Goal 5 requirements concerning the quantity, quality, location, adequacy of information and regional resources. Approval of this resolution would not prevent the Metro Council from revising the criteria once the region wide maps were completed and accordingly, the approval of this resolution would not result in an irrevocable action or a final decision.

Existing Law

Relevant State law in regard to this resolution includes Oregon Administrative Rules, divisions 16 and 23 that concern Goal 5. The rule calls for three steps: 1. complete an inventory, 2. analyze the economic, social, environmental and energy (ESEE) consequences of protecting or not protecting the resources and 3. creating a program. This resolution pertains to the first step, inventory, and does not pertain to later Metro Council decisions concerning the ESEE analysis or the program.

Specifically, OAR 660-023-0030, Inventory Process states:

"(1) Inventories provide the information necessary to locate and evaluate resources and develop programs to protect such resources. The purpose of the inventory
process is to compile or update a list of significant Goal 5 resources in a jurisdiction. This rule divides the inventory process into four steps.....

(a) Collect information about Goal 5 resource sites;

(b) Determine the adequacy of the information;

(c) Determine the significance of resource sites; and

(d) Adopt a list of significant resource sites.

Background

Metro's Goal 5 Vision Statement, October, 2000, states: "The overall goal is to conserve, protect and restore a continuous ecologically viable streamside corridor system, from the streams' headwaters to their confluence with other streams and rivers, and with their floodplains in a manner that is integrated with the surrounding urban landscape ". This statement, along with the balance of the Goal 5 Vision Statement was recommended by the Metro Policy Advisory Committee that represents the cities,

counties and special districts of the region and sets the overall policy direction of the region's work in addressing fish and wildlife habitat.

More recently, the Natural Resource Committee of the Metro Council has discussed the most appropriate approach to determining significant resources as defined by Goal 5 as they relate to fish and wildlife habitat within the region. The Natural Resource Committee, after hearing public testimony, concluded on May 9, 2001, that they wanted to see functional, science based criteria to further consider and discuss. Exhibit A is a proposed approach that has been mapped in three pilot, or test areas.

Budget Impact

While the result of this resolution, if adopted, would result in further staff work including criteria refinements and mapping region wide, this is part of the Goal 5 work plan.

Outstanding Questions

None.

Executive Officer's Recommendation

The Executive Officer recommends approval of Resolution 01-3087.

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BEFORE THE METRO COUNCIL

FOR THE PURPOSE OF DIRECTING STAFF TO APPLY FUNCTIONAL, SCIENCE BASED CRITERIA IDENTIFYING POSSIBLE FISH AND WILDLIFE HABITAT ON REGION-WIDE MAPS AND REPORTING BACK TO THE NATURAL RESOURCE COMMITTEE FOR ITS REVIEW	))))))))	RESOLUTION NO 01-3087 Introduced by Mike Burton, Executive Officer

WHEREAS, the Regional Framework Plan and Urban Growth Management Functional Plan ("UGMFP") state that Metro will undertake a program for protection of fish and wildlife habitat; and

WHEREAS, the Title 3, Section 5 of the UGMFP sets forth actions that the Metro Council anticipated that Metro would take in identifying, considering and protecting regionally significant fish and wildlife habitat conservation areas; and

WHEREAS, this resolution represents a preliminary step in identifying criteria to address the direction of the UGMFP by determining significant resources for riparian corridors and wildlife consistent with State Goal 5; and

WHEREAS, the Regional Framework Plan and Metro's Regional Urban Growth Goals and Objectives identify watersheds as the appropriate scale for Metro to consider in identifying fish and wildlife habitats; and

WHEREAS, on May 9, 2001, the Metro Natural Resource Committee directed staff to prepare draft functional, science-based criteria for identifying significant resources pertaining to riparian corridors and wildlife habitat consistent with State Goal 5; and

WHEREAS, Staff presented to the Natural Resource Committee on June 6, 2001 draft criteria for identifying possible riparian corridor and wildlife resources based on six functions derived from a review of scientific literature; and

WHEREAS, staff also presented to the Natural Resource Committee on June 6, 2001, three pilot areas were mapped applying these criteria to limited landscapes within the region; and

WHEREAS, the Goal 5 Technical Advisory Committee, the Metro Technical Advisory Committee (MTAC), Metro Policy Advisory Committee (MPAC) and the Water Resources Policy Advisory Committee (WRPAC) have seen the presentation of these criteria and pilot maps and have completed recommendations and forwarded their recommendations to the Metro; and

WHEREAS, the Natural Resources Committee has solicited public comment, provided public notice and held a public meeting for the purpose of hearing public comments and recommendations; NOW, THEREFORE,

BE IT RESOLVED;

1. That the Metro Council hereby directs staff to use the criteria has described in Exhibit A and apply these to mapping possible riparian corridor and wildlife habitat areas throughout the region.
2. That the Metro Council directs staff to complete the development of criteria to include uplands wildlife with the riparian corridor criteria described in Exhibit A and to map these areas region-wide.
3. That the Metro Council directs staff to complete work items 1 and 2 above and present these data and maps to the Metro Natural Resource Committee in September, 2001 or as soon thereafter when such data and maps are available.

4. That the Metro Council may alter both the criteria and application of the mapping of these criteria prior to adoption of significant resources related to riparian corridors and wildlife habitat areas, after public comment and review.
5. That the Metro Council will invite broad public review of these data and maps prior to any Metro Council action.
6. That the Metro Council's direction to staff in this resolution is not a final action designating significant resources for riparian corridors and wildlife habitat areas or a final action to protect those areas once designated.

ADOPTED by the Metro Council this _____ day of _____ 2001.

_____
David Bragdon, Presiding Officer

Approved as to Form:

_____
Daniel B. Cooper, General Counsel

DRAFT 5/30/2001

Metro Goal 5 Fish and Wildlife Habitat
Functional Values and Landscape Features for Identifying Significant Riparian Corridors

MICROCLIMATE AND SHADE			
How does the function help fish and wildlife?	**Contributing landscape features**	**Criteria for mapping the landscape features**	
		Primary functional value	**Secondary functional value**
Undisturbed riparian corridors have a unique microclimate. • This allows for increased plant diversity, and thus a variety of food and cover opportunities for fish and wildlife. • Riparian corridors have reduced summertime temperatures, higher humidity levels, and provide protection from wind in the winter, which benefits wildlife. Riparian vegetation provides shade. • Shade moderates the amount of light reaching the stream and thus helps to reduce water temperature. • Water temperature is one of the most important factors influencing salmon and other aquatic species: they depend on cold, clean water. • Riparian vegetation is most effective in providing shade and moderating stream temperature on smaller streams. *(See pages 5-6; 11; ; 15-25; 38-39; and 42 in the April 2001 draft of the Aquatic and Riparian Habitat chapter in Metro's Science Literature Review.)*	Stands of trees and other vegetated areas → Range of widths recommended to maintain the function identified in the scientific literature: Shade: 39-250 ft[1] Microclimate:75-780 ft	The landscape feature has **PRIMARY** functional value if it is: a forest or woody vegetation landcover type within **100 feet**[2] of: a perennial, seasonal, or ephemeral stream reach that runs at the surface; a hydrologically connected wetland; or an area subject to flooding (approximately the 1996 flood inundation).	
	Stands of trees and other vegetated areas → As indicated above, the range of widths for microclimate is 75-780 ft. The outer range is given a secondary value for microclimate function.	→	The landscape feature has **SECONDARY** functional value if it is: a forest or woody vegetation landcover type within **100 to 780** feet of: a perennial, seasonal, or ephemeral stream reach that runs at the surface; a hydrologically connected wetland; or an area subject to flooding (approximately the 1996 flood inundation) and is not a primary feature.

[1] All distances are for one side of a stream or other water feature as measured from the top of bank, and should be applied to each side of the water feature.
[2] 100 feet is the most commonly cited width identified in the scientific literature as necessary for shade, and close to the minimum necessary for maintaining riparian microclimate.

STREAMFLOW MODERATION AND WATER STORAGE

How does the function help fish and wildlife?	Contributing landscape features	Criteria for mapping the landscape features	
		Primary functional value	Secondary functional value
The riparian corridor may contain wetlands, soils and vegetation that allow groundwater recharge and discharge, help to store rainwater, prevent flooding, and provide sources of stream flow during dry parts of the year. • Wetlands may occur adjacent to stream channels and within the floodplain of the riparian corridor. Wetlands comprise a very small proportion of the landscape and yet host a significant number of specialized plant and animal species. • Wetlands are important storage areas for flow, particularly during dry seasons, when they become a source of water to the stream. • The hyporheic zone allows groundwater to mix with stream water, which changes chemical properties of the water, cools water temperature, and stimulates biological activity. • Riparian forests and other vegetation act as a sponge to hold water, slow stormwater runoff, and maintain stable flow in streams (base flow). • Un-compacted topsoil rich in organic materials can hold water and slow stormwater runoff. *(See pages 2-4; 7; 15-25 in the April 2001 draft of the Aquatic and Riparian Habitat chapter in Metro's Science Literature Review.)*	<u>Wetlands and floodplains</u> The scientific literature has indicated that all riparian associated wetlands and floodplains if protected, provide streamflow moderation and water storage.	The landscape feature has **PRIMARY** functional value if it is: <u>a wetland or other water body</u>[3] with a hydrologic connection to a perennial, seasonal, or ephemeral stream reach that runs at the surface. **OR** <u>an area subject to flooding</u> (approximately the 1996 flood inundation)	
	<u>Exposed, uncompacted soil</u> Increased levels of impervious surfaces interrupt the hydrologic cycle, alter stream structure, and degrade the chemical profile of the water that flows through streams. These changes affect fish and wildlife in various ways, and are cumulative within watersheds. <u>Forests</u> Riparian and upland vegetation helps moderate streamflow by intercepting, absorbing and storing rainfall. Water stored in groundwater is slowly released over time.		The landscape feature has **SECONDARY** functional value if it is: <u>a forest, woody vegetation, or low structure vegetation/uncompacted topsoil landcover type</u> within **300 feet**[4] of a perennial, seasonal, or ephemeral stream reach that runs at the surface. **OR** <u>a forest landcover type</u> that is contiguous to the riparian corridor (starts within **300 feet**[5] but extends beyond)

[3] "Other water body" could include lakes, ponds, reservoirs, or manmade water feature that is not a water quality facility or farm pond.

[4] All upland forests, vegetation, and uncompacted topsoil help to moderate streamflow and store water. Staff used 300 feet here because some data layers for landcover types do not extend past 300 feet from a stream.

[5] Forest landcover is the only type that extends beyond 300 feet in the Metro database and thus excludes other types.

BANK STABILIZATION, SEDIMENT AND POLLUTION CONTROL

How does the function help fish and wildlife?	Contributing landscape features	Criteria for mapping the landscape features	
		Primary functional value	Secondary functional value
Riparian vegetation provides bank stabilization and sediment control. Wetlands or vegetated floodplains also help to remove sediment, excess nutrients, and chemical pollutants. • Sediment in streams originates from streambank erosion, from within the channel, from upland activities, and from natural disturbances. • Sediment occurs naturally in any stream, but changes in the amount and size of the sediment can have negative impacts on fish and other aquatic wildlife, as well as water quality. • Riparian vegetation helps trap pollutants that are attached to sediment particles. • Riparian vegetation helps to moderate streamflow by intercepting, absorbing, and storing rainfall. • Maintaining low structure vegetation and uncompacted topsoil rich in organic materials allows stormwater to infiltrate into the ground rather than flow over the surface (reduced surface erosion & filters pollutants). (Uncompacted topsoil does not include dirt roads, parking lots, etc.) *(See pages 6-7; 15-25; 39-40 in the April 2001 draft of the Aquatic and Riparian Habitat chapter in Metro's Science Literature Review.)*	<u>Default to maintain basic functions</u> This 50-foot band is specifically to prevent channelization and ensure future bank stability through allowing vegetation to propagate on stream banks. <u>Forest and woody vegetation</u> Range of widths recommended to maintain the function identified in the scientific literature: • Bank stabilization: ½ site potential tree height to 170 ft • Sediment control: 10 ft (sand) – 400 ft (clay) • Pollutant removal: 13-141 ft <u>Steep slopes</u> The scientific literature indicates that vegetated steep slopes adjacent to all streams provide bank stabilization, sediment and pollution control. <u>Wetlands and floodplains</u> The scientific literature has indicated that all riparian associated wetlands and floodplains play a critical role in sediment and pollution control.	The landscape feature has PRIMARY functional value if it is: <u>within **50 feet**</u> of a perennial, seasonal, or ephemeral stream reach that runs at the surface and is not a forest, woody vegetation, or low structure vegetation/uncompacted topsoil landcover type. **OR** <u>a forest, woody vegetation, or low structure vegetation/uncompacted topsoil landcover type</u> within **100 feet**[6] of a perennial, seasonal, or ephemeral stream reach that runs at the surface. **OR** a forest, woody vegetation, or low structure vegetation/uncompacted topsoil landcover type within **100-200 feet** of a perennial, seasonal, or ephemeral stream reach that runs at the surface <u>if the slope is greater than 25%.</u> **OR** within **100 feet** of a <u>hydrologically connected wetland</u> (title 3 wetland); or a forest, woody vegetation, or low structure vegetation/ uncompacted topsoil landcover type[7] within <u>an area subject to flooding</u> (approximately the 1996 flood inundation).	

[6] The Metro science paper indicates 100 feet as a suitable average distance for vegetation contributing to filtering.

[7] The woody vegetation and low structure vegetation/uncompacted topsoil landcover types are mapped to 300 feet, the forest landcover type is mapped to the edge of the floodplain.

	Steep slopes The scientific literature indicates that for slopes over 25 percent the buffer should be measured from the break in slope to reduce sediment loading from mass wasting events.		The landscape feature has **SECONDARY** functional value if it is: a forest, woody vegetation, or low structure vegetation/uncompacted topsoil landcover type located on a slope greater than 25%, that starts within 175 feet of a perennial, seasonal, or ephemeral stream reach that runs at the surface and runs to the first effective break in slope.

LARGE WOOD AND CHANNEL DYNAMICS

How does the function help fish and wildlife?	Contributing landscape features	Criteria for mapping the landscape features	
		Primary functional value	Secondary functional value
Large woody debris (LWD), such as branches, logs, uprooted trees, and root wads, is a key component of aquatic habitats in the Pacific Northwest. LWD enters streams either directly from the adjacent riparian area, from upland hillslopes through windthrow or debris avalanches, or from upstream sources. • LWD helps form important habitat for fish such as pools, riffles, eddies, side channels, meanders, and instream cover (overhanging vegetation). Stream complexity is critical for salmon because at various life stages they require different types of habitat. • LWD also controls the routing of water and sediment, dissipates stream energy, protects streambanks, stabilizes streambeds, helps retain organic matter, and acts as a surface for biological activity.	Forest → Range of widths recommended to maintain the function identified in the scientific literature: • Large woody debris: one site potential tree height; 150-262 ft	The landscape feature has **PRIMARY** functional value if it is: a forest landcover type within **150 feet** of a perennial, seasonal, or ephemeral stream reach that runs at the surface, or a hydrologically connected wetland. **OR**	
	1996 flood inundation areas → The scientific literature demonstrates that frequently flooded areas should be maintained to allow for the channel migration zone.	within an area subject to flooding (approximated by the 1996 flood inundation).	
Over time, streams move back and forth across the valley floor; this area is called the channel migration zone. Most streams have a channel migration zone, except when the channel is constrained by narrow valleys or ravines or altered by human development. • This area is frequently defined by the 100-year floodplain, and defines where aquatic or wetland habitat could exist in the future. • Flood events of varying size and frequency play a vital role in maintaining a diversity of riparian plant species and aquatic habitat. • Biological productivity is enhanced in the floodplains because sediment and nutrients are deposited during the advance and retreat of floodwaters. *(See pages 9-10; 15-25; 40; and 41 in the April 2001 draft of the Aquatic and Riparian Habitat chapter in Metro's Science Literature Review.)*	Default to maintain basic functions → The channel migration zone is basically defined by the floodplain, but where there is no mapped floodplain a default of 50 feet was selected to allow for the channel migration zone.		The landscape feature has **SECONDARY** functional value if it is: within 50 feet of a perennial, seasonal, or ephemeral stream reach that runs at the surface. **OR**
	Forest → As indicated above, the range of widths for large woody debris is 150-262 feet. The outer range is given a secondary value for large wood contribution.		a forest landcover type within **150 to 262 feet** of a perennial, seasonal, or ephemeral stream reach that runs at the surface. **OR**
	100-year floodplain → As indicated above, the floodplain allows space for the channel migration zone. The 100-year floodplain is given secondary functional value because this is a projection of where a flood may occur.		within the 100-year floodplain surrounding a perennial, seasonal, or ephemeral stream reach that runs at the surface.

ORGANIC MATERIAL SOURCES			
How does the function help fish and wildlife?	**Contributing landscape features**	**Criteria for mapping the landscape features**	
		Primary functional value	**Secondary functional value**
Riparian vegetation provides a majority of the energy and hydrocarbons in aquatic food webs. • Leaves, fruit, cones, insects, and other organic matter fall directly into the stream channel from the riparian area, or move by wind, erosion, or as dissolved materials in groundwater. • In smaller streams, most of the organic matter used by aquatic communities comes from the adjacent forest, while in larger streams and rivers organic matter may come from aquatic plants and upstream sources. • Fallen insects from riparian vegetation can make up 40-50% of the diet of trout and juvenile salmon during the summer months. *(See pages 8; 15-25; and 40 in the April 2001 draft of the Aquatic and Riparian Habitat chapter in Metro's Science Literature Review.)*	Vegetation → Range of widths recommended to maintain the function identified in the scientific literature: • Small woody debris: 100 ft • Organic litterfall: ½ site potential tree height; 100-170 ft 1996 flood inundation areas → Organic material can enter the aquatic environment when the stream floods and carries away organic material from a vegetated area.	The landscape feature has **PRIMARY** functional value if it is: a forest or woody vegetation landcover type within **100 feet** of a perennial, seasonal, or ephemeral stream reach that runs at the surface, or a hydrologically connected wetland. **OR** a forest or woody vegetation landcover type within an area subject to flooding (approximated by the 1996 flood inundation)	
	Vegetation → As indicated above, the range of widths for organic material sources is 100-170 feet. The outer range is given a secondary value for organic material source contribution. 100-year floodplain → As indicated above, the floodplain can provide organic material to the aquatic environment. The 100-year floodplain is given secondary functional value because this is a projection of where a flood may occur.		The landscape feature has **SECONDARY** functional value if it is: a forest or woody vegetation landcover type within **100 to 170 feet** of a perennial, seasonal, or ephemeral stream reach that runs at the surface. **OR** a forest or woody vegetation landcover type within the 100-year floodplain.

RIPARIAN WILDLIFE HABITAT AND CONNECTIVITY

	How does the function help fish and wildlife?	Contributing landscape features	Primary functior
Wildlife are attracted to riparian areas because of the abundance of food sources, cover, and proximity of drinking water. • Natural riparian areas provide a complex and highly productive food web. • Riparian vegetation in the form of grasses, shrubs, trees and other plants provides wildlife habitat for reproduction, nesting, roosting, foraging and protection from the weather and from competitive and predatory species. • Structural complexity exists when there is a diversity of plant species, multiple canopy layers, and snags and downed woody material. Much of the biodiversity found in riparian areas depends on this structural complexity. • Riparian corridors, due to their linear shape, enable wildlife movement between habitat patches. • In the summer, the specialized microclimate in riparian corridors creates diverse habitat characteristics desirable to many species, such as amphibians. • Most wildlife species (92% of non-fish wildlife in this region) utilize riparian areas at some point in their life history for water, food, and shelter. Since riparian areas frequently serve as corridors through the urbanized landscape, they also provide movement and dispersal routes. *(See pages 10; 15-25; 41-42 in the April 2001 draft of the Aquatic and Riparian Habitat chapter in Metro's Science Literature Review.)*	Forest and vegetative cover → Range of widths recommended to maintain the function identified in the scientific literature: • Edge effect: 20 ft (noise) - 2,000 ft (minimize predation) • Terrestrial LWD and structural complexity: 1 site potential tree height outside a buffer to 650 ft • Movement corridors: 328 ft • Specific wildlife needs: 100 ft (e.g. frogs & salamanders) – 656 ft (Rufous-sided towhee breeding populations) 1996 flood inundation areas → The entire width of the floodplain provides essential spawning and rearing habitat for fish and important year round habitat for birds, turtles, beavers, muskrats and other wildlife.	The landscape feature has **PRIMARY** functional value if it is: a forest or woody vegetation landcover type within **328 feet**[8] of a perennial, seasonal, or ephemeral stream reach that runs at the surface, or a hydrologically connected wetland[9]. **OR** a forest, woody vegetation, or low structure vegetation/uncompacted topsoil landcover type within an area subject to flooding (approximated by the 1996 flood inundation)[10].	
	Forest cover → All forest cover between 328 and 2,000 feet is given secondary functional value based on the needs of wildlife identified above.		The landscape feature has **SECONDARY** functional value if it is: a forest landcover type within **328 to 2,000 feet** of a perennial, seasonal, or ephemeral stream reach that runs at the surface, or a hydrologically connected wetland.

[8] Staff recommends 328 feet, the width identified for wildlife movement corridors in the scientific literature, as the most appropriate minimum width for wildlife habitat.
[9] Data on woody vegetation is limited to within 300 feet of a stream, therefore wetlands outside of this boundary would only receive a primary functional value for the forest landcover type within 328 feet.
[10] The woody vegetation and low structure vegetation/uncompacted topsoil landcover types are mapped to 300 feet, the forest landcover type is mapped to the edge of the floodplain.

An Approach for Rating the Ecological Functions and Identifying Significant Riparian Corridors

Determining resource significance requires the application of ecological functional values to landscape features and the subsequent rating of those features. The table on the following page is an example of an evaluation tool that assigns a numerical score to riparian corridors based on the ecological functions (benefits provided by resources for fish and wildlife) occurring at any given site. It is a science-based framework for identifying significant riparian corridors from a regional perspective.

The following steps must be taken in determining regional resource significance:

1. **Delineating Resource Features (Goal 5 Inventory).** Using year 2000 aerial photos and other data sources, landscape features such as stands of trees, woody vegetation, meadows, wetlands, steep slopes and flood areas are delineated along the region's streams and rivers. This information, collected as part of Metro's Geographic Information System (GIS), can be displayed on maps to graphically illustrate the condition of riparian corridors across the landscape. (This step provides some information about location, quality and quantity of the resources, more information will be included in Metro's Final Goal 5 Inventory Analysis. Step 2 provides additional data on quality).

2. **Assigning Functional Values (Attachment A).** After delineation, the resource features are given either a primary functional value or a secondary functional value based on the importance of the feature relative to the function (benefit) it provides for fish and wildlife. The importance of the feature is determined by applying criteria derived from, and substantiated by, the scientific literature review. The features are then mapped.

3. **Rating Landscape Features (table on following page).** A rating system allows landscape features to be evaluated for the ecological functions they are currently providing. Landscape features that make a critical contribution get a primary value; others get a secondary value. A numerical score can be assigned to each of the primary and secondary functional values for a given landscape feature (for example: 6 points to each primary functional value and 1 point to each secondary functional value). The scores would be additive for any given landscape features and reflect a relative scale of current ecological function.

4. **Determining Significant Riparian Corridors.** A threshold score must be identified for determining resource significance. A rating table, as described in Step 3, is one method that could be used. A determination of significance could range from including all mapped areas receiving any rating value to a subset of those areas. ***The Metro Council would determine the significance threshold.***

5. **Classifying Significant Riparian Corridors.** After determining resource significance, all significant resource sites could be classified and given a letter ranking. This ranking would indicate relative significance for use in the economic, social, environment and energy (ESEE) analysis. For example, if using the letters A, B, and C, Class A resource sites might receive a higher score in the environment portion of the analysis than Class C sites.

Example: Numerical scoring for ecological functions of landscape features

Primary functional value		Secondary functional value		Numeric score
6		0		36
5		1		31
5		0		30
4		2		26
4		1		25
4		0		24
3		3		21
3		2		20
3		1		19
3		0		18
2		4		16
2		3		15
2	AND	2	EQUALS	14
2		1		13
2		0		12
1		5		11
1		4		10
1		3		9
1		2		8
1		1		7
1		0		6
0		6		6
0		5		5
0		4		4
0		3		3
0		2		2
0		1		1

Notes:
1. There are 6 primary functions and 6 secondary functions.
2. In this example, each primary function is assigned 6 points and each secondary function is assigned 1 point.

Range of recommended buffer widths

While studies result in a variety of recommended buffer widths for the riparian area, all recommend some level of protection for this important resource for fish and wildlife. If riparian buffers of sufficient width are maintained along streams in the urban area they can provide good quality habitat within an altered landscape (Knutson and Naef 1997). Table 5 below summarizes the range of riparian area widths recommended in the scientific literature to protect fish and wildlife habitat. In an urban area restoration is likely to play an important role in addition to protection of habitat that is currently in good condition (May 2000).

Table 5: Range of riparian area widths for fish and wildlife habitat

AQUATIC HABITAT			
Function		**Reference**	Minimum width *(each side of stream)*
Temperature regulation and shade	Shade	FEMAT 1993	100 ft
	Shade	Castelle et al. 1994	50-100 ft
	Shade	Spence et al. 1996	98 ft
	Shade	May 2000	98 ft
	Shade	Osborne and Kovacic 1993	33-98 ft
	Shade/reduce solar radiation	Brosofske et al. 1997	250 ft
	Control temperature by shading	Johnson and Ryba 1992	39-141 ft
Bank stabilization and sediment control	Bank stabilization	Spence et al. 1996	170 ft
	Sediment removal and erosion control	May 2000	98 ft
	Ephemeral streams	Clinnick et al. 1985	66 ft
	Bank stabilization	FEMAT 1993	½ SPTH
	Sediment control	Erman et al. 1977	100 ft
	Sediment control	Moring 1982	98 ft
	Sediment removal	Johnson and Ryba 1992	10 ft (sand) – 400 ft (clay)
	High mass wasting area	Cederholm 1994	125 ft
Pollutant removal	Nitrogen	Wenger 1999	50-100 ft
	General pollutant removal	May 2000	98 ft
	Filter metals and nutrients	Castelle et al. 1994	100 ft
	Pesticides	Wenger 1999	>49 ft
	Nutrient removal	Johnson and Ryba 1992*	13 – 141 ft
Large woody debris and organic litter	Large woody debris	FEMAT 1993	1 SPTH
	Large woody debris	Spence et al. 1996	1 SPTH
	Large woody debris	Wenger 1999	1 SPTH
	Large woody debris	May 2000*	262 ft
	Large woody debris	McDade et al. 1990	150 ft
	Small woody debris	Pollock and Kennard 1998	100 ft
	Organic litterfall	FEMAT 1993	½ SPTH
	Organic litterfall	Erman et al. 1977	100 ft
	Organic litterfall	Spence et al. 1996	170 ft
Aquatic wildlife	Cutthroat trout	Hickman and Raleigh 1982	98 ft
	Brook trout	Raleigh 1982	98 ft
	Chinook salmon	Raleigh et al. 1986	98 ft
	Rainbow trout	Raleigh et al. 1984	98 ft
	Cutthroat trout, rainbow trout and steelhead	Knutson and Naef 1997	50 – 200 ft
	Maintenance of benthic communities (aquatic insects)	Erman et al. 1977	100 ft
	Shannon index of macroinvertebrate diversity.	Gregory et al. 1987	100 ft
	Trout and salmon influence zone (Western Washington)	Castelle et al. 1992	200 ft

TERRESTRIAL HABITAT

Function		Reference	Minimum width *(each side of stream)*
Wildlife needs	Willow flycatcher nesting	Knutson and Naef 1997	123 ft
	Frogs and salamanders	NRCS 1995	100 ft
	Full complement of herpetofauna	Rudolph and Dickson 1990	>100 ft
	Belted Kingfisher roosts	USFWS HEP Model	100 – 200 ft
	Deer	NRCS 1995	200 ft
	Smaller mammals	Allen 1983	214 – 297 ft
	Birds	Jones et al. 1988	246 – 656 ft
	Beaver	NRCS 1995	300 ft
	Minimum distance needed to support area-sensitive neotropical migratory birds	Hodges and Krementz 1996	328 ft
	Western pond turtle nests	Knutson and Naef 1997	330 ft
	Pileated woodpecker	Castelle et al. 1992	450 ft
	Bald eagle nest, roost, perch Nesting ducks, heron rookery and sandhill cranes	Castelle et al. 1992	600 ft
	Pileated woodpecker nesting	Small 1982	328 ft
	Mule deer fawning	Knutson and Naef 1997	600 ft
	Rufous-sided towhee breeding populations	Knutson and Naef 1997	656 ft
	Fish and Wildlife	FEMAT 1993	Two-site potential tree heights; 300 ft
	General wildlife habitat	May 2000	328 ft
Edge effect	Interior bird species	Tassone 1981	164 ft
	Neotropical migrants	Keller et al. 1993	328 ft
	Effect of increased predation	Wilcove et al. 1986	2,000 ft
	Noise reduction of a mature evergreen buffer	Harris 1985	20 ft
	Reduce commercial noise	Groffman et al. 1990	100 ft
LWD and structural complexity	Snags and downed wood	FEMAT 1993	1 SPTH outside the buffer
	Width necessary to minimize non-native vegetation	Hennings 2001	650 ft
Movement corridors	Travel corridor for red fox and marten	Small 1982	328 ft
	Minimum to allow for interior habitat species movement	Environment Canada 1998	328 ft
Microclimate	Maintain microclimate	May 2000	328 ft
	Prevent wind damage	Pollock and Kennard 1998	75 ft
	Approximate natural conditions	Brosofske et al. 1997	250 ft
	Maintain microclimate	Knutson and Naef 1997	200-525 ft
	Maintain humidity and soil temperature	Chen et al. 1995	98 – 787 ft
	Maintain microclimate	FEMAT 1993	3 SPTH

Acronyms:
SPTH: site potential tree height
NMFS: National Marine Fisheries Service
NRCS: National Resource Conservation Service
USFWS: U.S. Fish and Wildlife Service
FEMAT: Forest Ecosystem Management Assessment Team