

Filtering, niche partitioning, and riparian guilds

1 **Appendices**

2 Appendix A. Summary of the categorical, morphological and physical attributes by guild. Counts

3 of each attribute level are presented for each guild.

Life history and morphological attributes	Levels	Guild				
		Evergreen tree	Upland disturbance shrub	Mesic shrub	Meso-riparian tree and shrub	Understory shrub
Growth form	Multiple Stem	0	4	5	6	2
	Rhizomatous	0	3	1	1	3
	Single Stem	7	0	0	1	2
	Thicket Forming	0	2	3	0	2
Lifespan	Long	7	1	2	1	6
	Moderate	0	8	5	6	1
	Short	0	0	2	1	2
Adapted to coarse textured soils	No	2	0	4	1	5
	Yes	5	9	5	7	4
Adapted to fine textured soils	No	5	9	1	0	5
	Yes	2	0	8	8	4
Adapted to medium textured soils	No	0	0	0	0	2
	Yes	7	9	9	8	7
Anaerobic tolerance	High	0	3	1	1	1
	Low	3	3	5	1	3
	Medium	0	2	2	5	2
	None	4	1	1	1	3
Drought tolerance	High	1	0	0	0	2
	Low	5	0	7	6	6
	Medium	1	8	1	1	1
	None	0	1	1	1	0
Growth rate	Moderate	3	5	1	3	6
	Rapid	1	4	8	5	2
	Slow	3	0	0	0	1
Leaf retention	No	0	8	9	8	8
	Yes	7	1	0	0	1
Resprout ability	No	7	0	2	0	1
	Yes	0	9	7	8	8
Shade tolerance	Intermediate	2	5	6	1	1
	Intolerant	1	2	0	6	1

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	Tolerant	4	2	3	1	7
Vegetative spread rate	Moderate	0	6	3	4	2
	None	7	1	2	0	4
	Rapid	0	0	1	1	2
	Slow	0	2	3	3	1
Bloom period	ESpring	0	1	1	0	1
	ESummer	0	2	1	2	2
	LSpring	3	3	2	2	3
	MSpring	3	0	1	1	1
	MSummer	1	1	0	0	0
	Spring	0	0	4	1	1
	Summer	0	2	0	2	1
Fruit/seed abundance	High	4	4	4	6	0
	Low	0	1	3	1	2
	Medium	3	4	2	0	7
	None	0	0	0	1	0
Fruit/seed period begin	Spring	0	1	9	1	2
	Summer	7	8	0	7	7
Fruit /seed persistence	No	6	9	7	8	3
	Yes	1	0	2	0	6
C:N ratio	High	7	7	3	4	2
	Low	0	0	0	1	1
	Medium	0	2	6	3	6
Moisture use	High	0	4	8	7	4
	Low	0	4	1	0	0
	Medium	7	1	0	1	5
Live staking	Excellent	0	0	0	2	0
	Fair	0	2	2	2	5
	Fair Good	0	1	0	2	0
	Good	0	1	0	0	1
	None	7	5	5	0	3
	Very Good	0	0	2	2	0
Nitrogen fixation	Medium	0	1	1	0	0
	None	7	8	8	8	9
Fire tolerance	High	2	6	9	4	3
	Low	5	2	0	0	1
	Medium	0	1	0	4	5

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- 5 Appendix B. Correlations between species' life history traits and the principal coordinate
 6 analysis ordination.

Primary trait group	Trait	R ²	P
Life form	Growth Form	0.32	0.0001
	Lifespan	0.27	0.0001
Persistence and growth	Adapted Coarse Textured Soils	0.16	0.0001
	Adapted Fine Textured Soils	0.21	0.0001
	Adapted Medium Textured Soils	0.08	0.0235
	Anaerobic Tolerance	0.15	0.0289
	Drought Tolerance	0.24	0.0003
	Fire Tolerance	0.28	0.0001
	Growth Rate	0.32	0.0001
	C:N Ratio	0.21	0.0001
	Height at Maturity	0.70	0.0001
	Leaf Retention	0.36	0.0001
	Resprout Ability	0.25	0.0001
	Shade Tolerance	0.16	0.0032
	Vegetative Spread Rate	0.27	0.0001
Reproduction	Bloom Period	0.26	0.1950
	Fruit Seed Abundance	0.14	0.0367
	Fruit Seed Period Begin	0.12	0.0031
	Fruit Seed Persistence	0.09	0.0102
	Live staking	0.23	0.0160
Resource use	Moisture Use	0.36	0.0001
	Root Depth	0.45	0.0001
	Nitrogen Fixation	0.03	0.3175

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8 Appendix C. Goodness-of-fit statistics for environmental filters and riparian guilds fit to the
 9 NMDS ordination solution for guild assemblages. These filters and guilds are plotted to the
 10 ordination solution in figure three. Filters followed by ^ were not used in conditional inference
 11 trees or generalized linear models due to collinearity with other variables or a lack of initial
 12 hypotheses on how the filter would correlate to riparian guild distributions.

Scale	Variable	R^2	P
Landscape -scale filters	AnnPrecip	0.04	0.0001
	AvgPrecip^	0.05	0.0001
	AvgTemp	0.03	0.0001
	MeanElev^	0.08	0.0001
	MinElev	0.12	0.0001
	MaxElev^	0.08	0.0001
Watershed - and buffer- scale filters	StreamDens^	0.01	0.1793
	BufRoads	0.03	0.0004
	BufForested	0.06	0.0001
	BufSlope	0.15	0.0001
	BufGrazed	0.04	0.0001
	Watershed Area	0.03	0.0003
	Watershed Burned	<0.01	0.6537
	AvgWaterTable	0.01	0.0221
	AvgSoilThick	0.01	0.0480
Stream- scale filters	BankStability^	0.02	0.0078
	Gradient	0.08	0.0001
	Sinuosity	0.09	0.0001
	BFWidth	0.04	0.0001
	Hydraulic Radius	0.02	0.0041
	Bank Angle	0.02	0.0123
	WetWDRatio	0.02	0.0053
	UndercutBank	0.01	0.0174
Riparian guilds	Evergreen tree	0.06	0.0001
	Upland disturbance	0.35	0.0001
	Mesic shrub	0.09	0.0001
	Understory shrub	0.32	0.0001
	Mesoriparian shrub and tree	0.33	0.0001

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15 Appendix D. Alternative plausible generalized linear models as determined by AIC.

Guild (short guild name)	Final model terms (effect)	AIC	Δ AIC	Log- like- lihood	Pseudo R^2	
					Cragg and Uhler	Max. like- lihood
Long-lived, deeply-rooted, tall, shade tolerant, evergreen trees (evergreen tree guild)	WatershedArea (-0.01) AvgTemp (-0.10) AnnPrecip (1.04) BufForested (0.06) WatershedBurned (-0.01) BufRoads (0.17) BufSlope (-0.05) WetWDRatio (0.03) Sinuosity (-0.95) Gradient (0.18) AvgWaterTable (-0.97) UD (0.61) US (0.88) MR (-0.51)	591.59	3.83	-280.80	0.42	0.28
	WatershedArea (-) AvgTemp (-) AnnPrecip (+) MinElev (-) BufForested (+) WatershedBurned (-) BufRoads (+) BufSlope (-) WetWDRatio (+) Sinuosity (-) Gradient (+) AvgWaterTable (-) UD (+) US (+) MR (-)	593.06	5.3	-280.53	0.42	0.28
	WatershedArea (-) AvgTemp (+) AnnPrecip (+) MinElev (-) BufForested (+) WatershedBurned (-) BufRoads (+) BufSlope (-) WetWDRatio (+) Sinuosity (-) Gradient (+) AvgWaterTable (-) UD (+) US (+) MR (-) AvgTemp:AnnPrecip (-) AvgTemp:MinElev (+) AnnPrecip:MinElev (+) AvgTemp:MinElev:AnnPrecip (-)	589.31	1.55	-274.65	0.44	0.30
	WatershedArea (-) AvgTemp (-) AnnPrecip (-) MinElev (-) BufForested (+) WatershedBurned (-) BufRoads (+) BufSlope (-) WetWDRatio (+) Sinuosity (+) Gradient (+) AvgWaterTable (-) UD (+) US (+) MR (-) AnnPrecip:MinElev (+)	587.76	0	-276.88	0.43	0.29
Rapidly growing, multi-stemmed, rhizomatous and thicket-forming, drought-plastic, shrub guild	WatershedArea (-0.00) AvgTemp (0.11) BufForested (0.01) BufSlope (-0.10) BankAngle (-0.05) BfWidth (0.20) WetWDRatio (0.02) Gradient (0.40) AvgWaterTable (-0.83) BufSlope:BankAngle (0.00)	760.70	0	-367.34	0.23	0.16

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(upland disturbance guild)	BfWidth:WetWDRatio (-0.00) ET (0.57)	760.70	0	-367.34	0.23	0.16
	WatershedArea (-) AvgTemp (+) BufForested (+) BufSlope (-) BankAngle (-) BfWidth (+) WetWDRatio (+) Gradient (+) AvgWaterTable (-) BufSlope:BankAngle (+) BfWidth:WetWDRatio (-) ET (+) MR (+)	760.77	0.07	-366.39	0.24	0.17
	WatershedArea (-) AvgTemp (+) BufForested (+) BufSlope (-) BankAngle (-) BfWidth (+) WetWDRatio (+) Gradient (+) AvgWaterTable (-) BufSlope:BankAngle (+) BfWidth:WetWDRatio (-) ET (+) AvgSoilThick (+)	761.43	0.73	-366.72	0.23	0.17
Low-stature, hydrophytic, multi-stemmed thicket forming shrubs (mesic shrub guild)	WatershedArea (-0.00) AvgTemp (-0.39) AnnPrecip (-0.80) MinElev (-0.00) BufSlope (0.28) BankAngle (0.04) BfWidth (0.17) WetWDRatio (-0.00) Sinuosity (-0.56) BfWidth:WetWDRatio (-0.00) BufSlope:BankAngle (-0.00) US (0.63) MR (0.74)	376.25	0	-174.13	0.31	0.15
	WatershedArea (-) AvgTemp (-) AnnPrecip (-) MinElev (-) BufSlope (+) BankAngle (+) BfWidth (+) WetWDRatio (-) Sinuosity (-) BfWidth:WetWDRatio (-) BufSlope:BankAngle (-) US (+) MR (+) AvgWaterTable (+) AvgSoilThick (-)	377.16	1.96	-173.02	0.31	0.15
	WatershedArea (-) AvgTemp (-) AnnPrecip (-) MinElev (-) BufSlope (+) BankAngle (+) BfWidth (+) WetWDRatio (-) Sinuosity (-) BfWidth:WetWDRatio (-) BufSlope:BankAngle (-) US (+) MR (+) AvgWaterTable: AvgSoilThick (+)	379.12	2.87	-172.56	0.31	0.15
Medium-deeply rooted, vegetatively reproducing	AvgTemp (-0.43) AnnPrecip (-0.66) MinElev (-0.00) BufGrazing (0.01) BufRoads (0.12) BufSlope (0.05) BfWidth (0.12) Gradient (0.18)	657.50	0	-315.73	0.26	0.17

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shrubs and trees (mesoriparian shrub and tree guild)	AvgSoilThick (1.73) ET (-0.51) MS (0.67) US (0.68)	657.50	0	-315.73	0.26	0.17
	AvgTemp (-) AnnPrecip (-) MinElev (-) BufGrazing (+) BufRoads (+) BufSlope (+) BfWidth (+) Gradient (+) AvgSoilThick (+) ET (-) MS (+) US (+) AvgWaterTable (+)	659.31	1.81	-315.65	0.26	0.17
	AvgTemp (-) AnnPrecip (-) MinElev (-) BufGrazing (+) BufRoads (+) BufSlope (+) BfWidth (+) Gradient (+) AvgSoilThick (+) ET (-) MS (+) US (+) Sinuosity (-)	659.42	1.92	-315.72	0.26	0.17
Short-statured, shade-tolerant, water stress and flooding intolerant understory shrubs (understory guild)	WatershedArea (-0.00) AvgTemp (-0.23) AnnPrecip (-4.12) MinElev (-0.01) BufForested (-0.01) BufRoads (0.16) BufSlope (0.04) BankAngle (-0.01) Gradient (0.48) AnnPrecip:Elev (0.00) ET (0.87) MS (0.68) MR (0.83)	581.67	0	-276.83	0.33	0.21
	WatershedArea (-) AvgTemp (-) AnnPrecip (-) MinElev (-) BufForested (-) BufRoads (+) BufSlope (+) BankAngle (-) Gradient (+) AnnPrecip:Elev (+) ET (+) MS (+) MR (+) AvgSoilThick (+)	583.31	1.64	-276.65	0.33	0.22
	WatershedArea (-) AvgTemp (-) AnnPrecip (-) MinElev (-) BufForested (-) BufRoads (+) BufSlope (+) BankAngle (-) Gradient (+) AnnPrecip:Elev (+) ET (+) MS (+) MR (+) AvgWaterTable (-)	583.63	1.96	-276.81	0.33	0.21

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17 **Figures**

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19 Appendix E. Map of combinations of guild assemblages across the Columbia and Missouri River
20 basins showed that a majority of reaches contained all possible guilds. Only a few reaches were
21 absent of all woody guilds. Map labels consist of guild initials and “P” for guild presence and
22 “A” for guild absence. For example, UDP corresponds to *upland disturbance present* while ETA
23 corresponds to *evergreen tree absent*, etc.

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