

	Pixels (n)	Acres	Percentage of area
Global area*	16,631,457	2,568,566	84.75% of total province land area
Owl presence	14,257	2,202	0.09% of modeled area

*area that is being modeled

Ecological niche factor analysis results

Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
qmdcc(0.55)	qmdcc(0.76)	qmdcc(0.64)	cc(-0.64)	bdlf(-0.63)	variety(-0.66)
qmd(0.54)	qmd(-0.60)	cc(-0.59)	qmdcc(0.60)	qmdcc(0.48)	bdlf(0.57)
cc(0.38)	cc(-0.23)	qmd(-0.42)	elev(-0.33)	cc(-0.43)	qmdcc(0.45)
variety(0.30)	bdlf(0.02)	elev(0.20)	variety(0.27)	variety(-0.32)	qmd(0.15)
elev(0.29)	variety(0.00)	bdlf(-0.17)	qmd(-0.18)	elev(-0.21)	elev(0.13)
bdlf(-0.29)	elev(0.00)	variety(-0.01)	bdlf(-0.11)	qmd(-0.21)	cc(-0.01)

Factors used

Factor	Eigen values	Explains variation
1	8.725	32.50%
2	10.525	39.30%
3	3.609	13.50%
4	1.895	7.10%
5	1.238	4.60%

Total variation explained = 97.0%

Model Indices

Model quality	Absolute validation	Contrast validation
2.10	0.81	0.42
2.00	0.80	0.42
1.90	0.80	0.41
2.00	0.81	0.42
2.20	0.81	0.42

k-fold cross-validations of habitat suitability (Rs = Spearman rank correlation)

Replicate	0–10	10–20	20–30	30–40	40–50	50–60	60–70	70–80	80–90	90–100	Rs	Prob(Rs=0)
1	0.12	0.086	0.41	0.75	1.4	1.4	2.8	1.4	2.5	2.5	0.84	0.0022000
2	0.12	0.07	0.41	0.81	1.4	1.6	2.8	1.2	2.6	2.4	0.84	0.0022000
3	0.099	0.075	0.43	0.83	1.5	1.6	2.9	1.2	2.7	2.2	0.84	0.0022000
4	0.1	0.09	0.42	0.68	1.5	1.7	2.8	1.1	2.7	2.3	0.84	0.0022000
5	0.13	0.09	0.39	0.69	1.5	1.5	3.2	1.1	2.5	2.6	0.84	0.0022000
Mean	0.114	0.082	0.412	0.752	1.460	1.560	2.900	1.200	2.600	2.400		
Rank	9	10	8	7	5	4	1	6	2	3		

Total province acres = 3,030,862

Marginality: 0.838
Specialization: 2.114
Tolerance (1/S): 0.473

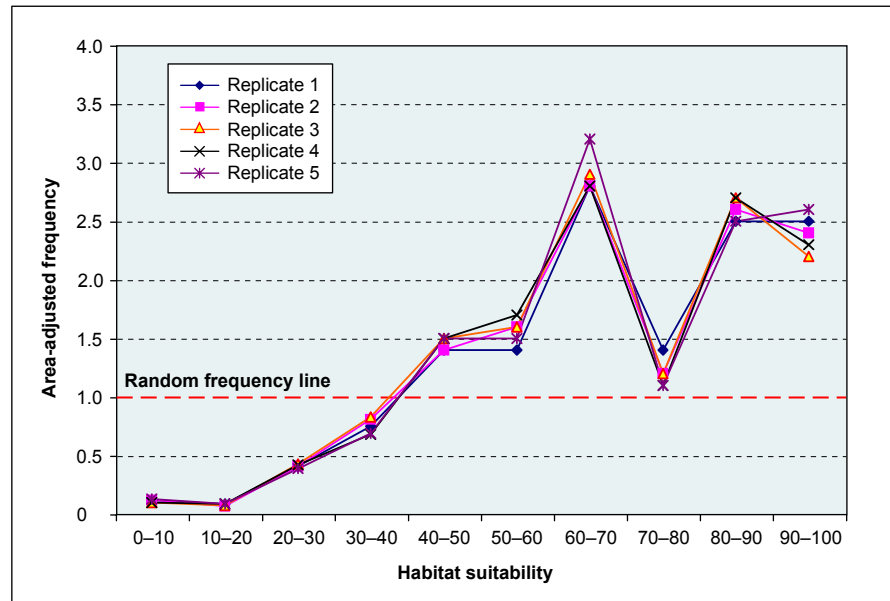


Figure E-1—BioMapper habitat model output statistics summary for the Olympic Peninsula province of Washington.

	Pixels (n)	Acres	Percentage of area
Global area*	34,568,980	5,338,840	86.81% of total province land area
Owl presence	9,931	1,534	0.03% of modeled area

*area that is being modeled

Ecological niche factor analysis results

Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
qmdcc(0.54)	qmdcc(-0.77)	cc(0.66)	cc(0.59)	bdlf(0.77)	variety(0.82)
cc(0.50)	qmd(0.56)	qmdcc(-0.49)	qmd(-0.58)	qmd(0.50)	qmdcc(-0.51)
qmd(0.49)	cc(0.31)	elev(-0.47)	elev(0.38)	cc(0.31)	bdlf(-0.20)
bdlf(-0.45)	bdlf(0.03)	bdlf(0.27)	bdlf(0.32)	elev(0.22)	cc(0.15)
variety(0.12)	elev(0.01)	qmd(0.15)	qmdcc(0.24)	qmdcc(-0.11)	elev(-0.03)
elev(0.01)	variety(0.00)	variety(-0.06)	variety(-0.03)	variety(0.06)	qmd(0.03)

Factors used

Factor	Eigen values	Explains variation
1	17.319	38.10%
2	17.713	39.00%
3	5.195	11.40%
4	2.684	5.90%
5	1.31	2.90%

Total variation explained = 97.3%

Model Indices

Model quality	Absolute validation	Contrast validation
2.10	0.76	0.39
2.00	0.78	0.41
2.30	0.79	0.42
2.30	0.78	0.41
2.20	0.76	0.39

k-fold cross-validations of habitat suitability (Rs = Spearman rank correlation)

Replicate	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100	Rs	Prob(Rs=0)
1	0.055	0.25	0.67	1.2	0.82	2	1.5	1.1	2.6	2.4	0.88	0.0008100
2	0.029	0.2	0.56	1.1	0.9	2.1	1.7	0.94	2.6	2.3	0.88	0.0008100
3	0.038	0.2	0.53	1.2	0.75	1.9	1.9	0.82	2.6	2.6	0.89	0.0005400
4	0.043	0.26	0.58	1.2	0.51	1.8	1.6	0.78	2.7	2.7	0.85	0.0016000
5	0.058	0.2	0.66	1.2	0.85	2	1.5	1	2.5	2.5	0.89	0.0005400
Mean	0.045	0.222	0.600	1.180	0.766	1.960	1.640	0.928	2.600	2.500		
Rank	10	9	8	5	7	3	4	6	1	2		

Total province acres = 6,149,917

Marginality: 0.791
Specialization: 2.752
Tolerance (1/S): 0.363

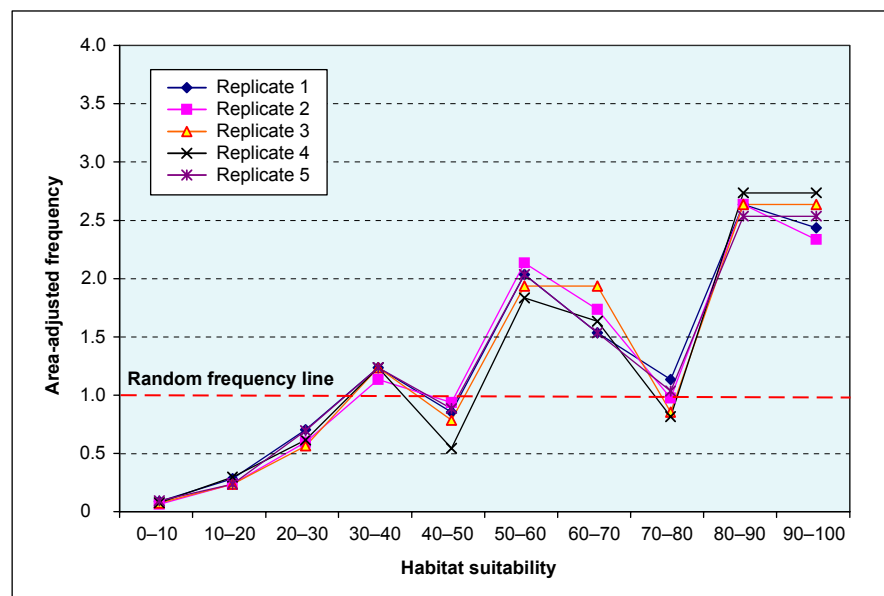


Figure E-2—BioMapper habitat model output statistics summary for the Western Cascades province of Washington.

	Pixels (n)	Acres	Percentage of area
Global area*	26,846,530	4,146,183	72.97% of total province land area
Owl presence	15,324	2,367	0.06% of modeled area

*area that is being modeled

Ecological niche factor analysis results

Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
qmdcc(0.52)	qmdcc(0.78)	qmdcc(-0.77)	cc(0.62)	qmdcc(0.80)	qmdcc(0.81)
qmd(0.50)	qmd(-0.60)	qmd(0.56)	qmdcc(-0.57)	cc(-0.47)	cc(-0.41)
cc-box(0.49)	cc(-0.16)	cc(0.28)	qmd(0.32)	qmd(-0.36)	qmd(-0.31)
variety(0.30)	elev(0.07)	elev(0.05)	variety(-0.32)	bdlf(-0.10)	bdlf(0.26)
elev(-0.30)	bdlf(0.03)	bdlf(0.02)	bdlf(0.30)	variety(-0.08)	elev(0.08)
bdlf(-0.24)	variety(0.00)	variety(0.01)	elev(0.01)	elev(0.01)	variety(0.07)

Factors used

Factor	Eigen values	Explains variation
1	11.625	46.70%
2	6.136	24.70%
3	3.999	16.10%
4	1.333	5.40%
5	1.008	4.10%

Total variation explained = 97.0%

Model Indices

Factor	Model quality	Absolute validation	Contrast validation
1	2.80	0.74	0.37
2	2.80	0.72	0.36
3	2.80	0.74	0.37
4	2.80	0.74	0.37
5	2.80	0.73	0.36

k-fold cross-validations of habitat suitability (Rs = Spearman rank correlation)

Replicate	0–10	10–20	20–30	30–40	40–50	50–60	60–70	70–80	80–90	90–100	Rs	Prob(Rs=0)
1	0.081	0.27	0.71	0.83	0.81	1.3	0.61	3	1.1	3.5	0.82	0.0038000
2	0.065	0.27	0.76	0.84	1	1.5	0.54	2.8	1.2	3.4	0.83	0.0029000
3	0.078	0.31	0.66	0.87	0.77	1.7	0.72	3.1	1.1	3.2	0.87	0.0012000
4	0.062	0.29	0.71	0.86	0.79	1.4	0.67	2.9	1.2	3.4	0.82	0.0038000
5	0.071	0.3	0.71	0.84	0.94	1.4	0.77	3	1.1	3.2	0.88	0.0008100
Mean	0.071	0.288	0.710	0.848	0.862	1.460	0.662	2.960	1.140	3.340		
Rank	10	9	7	6	5	3	8	2	4	1		

Total province acres = 5,682,385

Marginality: 0.748
Specialization: 2.036
Tolerance (1/S): 0.491

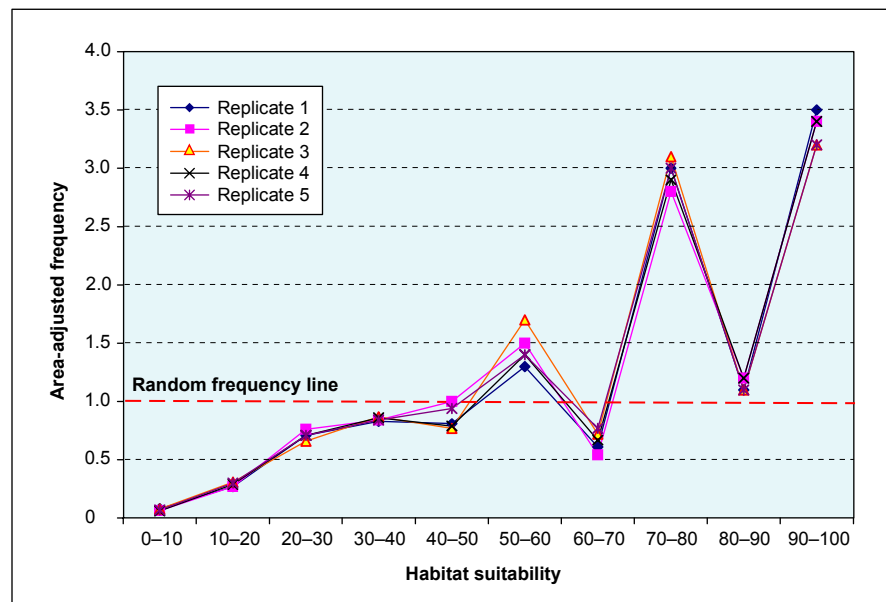


Figure E-3—BioMapper habitat model output statistics summary for the Eastern Cascades province of Washington.

	Pixels (n)	Acres	Percentage of area
Global area*	33,876,170	5,231,842	90.32% of total province land area
Owl presence	34,073	5,262	0.10% of modeled area

*area that is being modeled

Ecological niche factor analysis results

Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
qmdcc(0.57)	qmdcc(-0.77)	cc(-0.67)	elev(-0.78)	bdlf(0.86)	qmdcc(-0.70)
qmd(0.56)	qmd(0.55)	qmdcc(0.62)	cc(0.47)	qmdcc(0.32)	variety(0.62)
cc(0.40)	cc(0.33)	qmd(-0.33)	qmdcc(-0.36)	cc(-0.28)	cc(0.33)
variety(0.36)	bdlf(0.01)	bdlf(-0.23)	qmd(0.14)	qmd(0.25)	qmd(0.08)
bdlf(-0.27)	variety(0.01)	variety(0.09)	bdlf(0.12)	elev(0.13)	elev(0.00)
elev(0.01)	elev(0.00)	elev(-0.03)	variety(-0.07)	variety(0.06)	bdlf(0.00)

Factors used

Factor	Eigen values	Explains variation
1	11.482	34.97%
2	11.914	36.29%
3	4.748	14.46%
4	2.795	8.51%
5	1.056	3.22%

Total variation explained = 97.5%

Model Indices

Factor	Model quality	Absolute validation	Contrast validation
1	2.70	0.74	0.39
2	2.70	0.75	0.41
3	2.70	0.74	0.40
4	2.80	0.76	0.41
5	2.80	0.74	0.40

k-fold cross-validations of habitat suitability (Rs = Spearman rank correlation)

Replicate	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100	Rs	Prob(Rs=0)
1	0.038	0.18	0.27	0.57	0.88	1.7	1.6	2.4	2.5	2.7	0.99	0.0000001
2	0.064	0.13	0.29	0.51	0.87	1.7	1.7	2.5	2.4	2.8	0.98	0.0000015
3	0.049	0.15	0.3	0.53	0.87	1.8	1.7	2.4	2.4	2.7	0.99	0.0000001
4	0.041	0.15	0.28	0.54	0.79	1.8	1.7	2.3	2.5	2.8	0.99	0.0000001
5	0.048	0.15	0.31	0.55	0.84	1.7	1.8	2.3	2.4	2.8	1	0.0000000
Mean	0.048	0.152	0.290	0.540	0.850	1.740	1.700	2.380	2.440	2.760		
Rank	10	9	8	7	6	4	5	3	2	1		

Total province acres = 5,792,309

Marginality: 0.916
Specialization: 2.339
Tolerance (1/S): 0.427

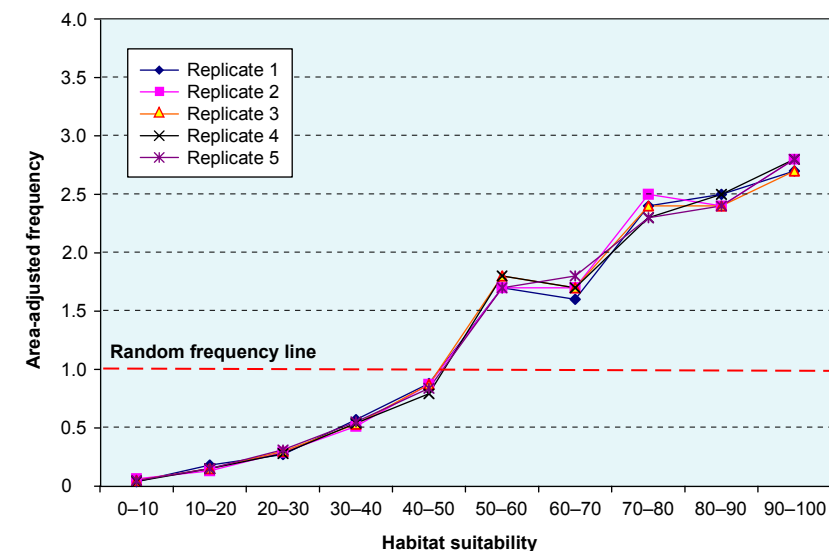


Figure E-4—BioMapper habitat model output statistics summary for the Coast Range province of Oregon.

	Pixels (n)	Acres	Percentage of area
Global area*	33,276,259	5,139,192	91.77% of total province land area
Owl presence	49,106	7,584	0.15% of modeled area

*area that is being modeled

Ecological niche factor analysis results

Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
qmdcc(0.58)	qmdcc(0.75)	cc(-0.74)	elev(-0.69)	variety(0.71)	bdlf(0.78)
qmd(0.54)	qmd(-0.63)	qmdcc(0.55)	qmdcc(0.50)	qmdcc(-0.56)	cc(0.46)
cc(0.44)	cc(-0.21)	bdlf(-0.31)	cc(-0.42)	qmd(0.33)	qmd(0.39)
bdlf(-0.40)	bdlf(-0.01)	qmd(-0.23)	qmd(-0.23)	cc(0.23)	qmdcc(-0.17)
variety(0.12)	elev(0.00)	variety(0.08)	bdlf(-0.20)	bdlf(0.09)	variety(-0.05)
elev(0.07)	variety(0.00)	elev(0.05)	variety(-0.07)	elev(-0.07)	elev(0.03)

Factors used

Factor	Eigen values	Explains variation
1	9.394	28.50%
2	16.64	50.50%
3	3.18	9.60%
4	1.671	5.10%
5	1.146	3.50%

Total variation explained = 97.2%

Model Indices

Model quality	Absolute validation	Contrast validation
2.10	0.82	0.41
2.00	0.81	0.40
1.80	0.81	0.41
2.00	0.81	0.41
1.90	0.81	0.41

k-fold cross-validations of habitat suitability (Rs = Spearman rank correlation)

Replicate	0–10	10–20	20–30	30–40	40–50	50–60	60–70	70–80	80–90	90–100	Rs	Prob(Rs=0)
1	0.065	0.25	0.088	0.34	0.96	1.2	2.1	1.1	2.3	2.2	0.94	0.0000550
2	0.069	0.23	0.089	0.41	0.93	1.4	2.2	0.94	2.2	2.2	0.94	0.0000550
3	0.072	0.25	0.1	0.33	0.97	1.4	2.3	0.84	2.2	2.1	0.84	0.0022000
4	0.067	0.23	0.13	0.33	0.98	1.3	2.2	1.2	2.2	2.2	0.9	0.0003400
5	0.068	0.19	0.13	0.36	0.94	1.3	2.3	1.1	2.2	2.2	0.88	0.0008100
Mean	0.068	0.230	0.107	0.354	0.956	1.320	2.220	1.036	2.220	2.180		
Rank	10	8	9	7	6	4	1	5	1	3		

Total province acres = 5,600,270

Marginality: 0.809
Specialization: 2.344
Tolerance (1/S): 0.427

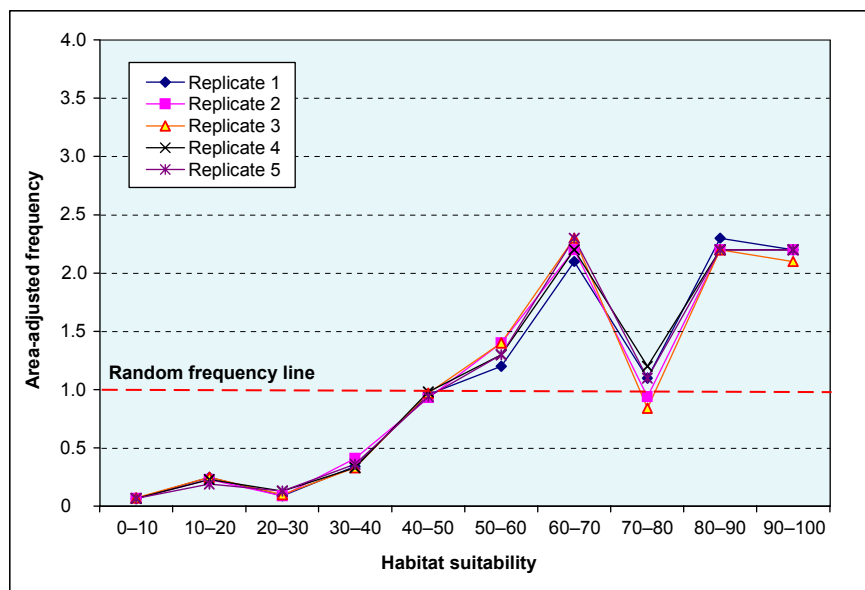


Figure E-5—BioMapper habitat model output statistics summary for the Western Cascades province of Oregon.

	Pixels (n)	Acres	Percentage of area
Global area*	19,806,907	3,058,983	90.98% of total province land area
Owl presence	12,955	2,001	0.07% of modeled area

*area that is being modeled

Ecological niche factor analysis results

Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
qmdcc(0.58)	qmdcc(0.77)	cc(-0.76)	variety(0.92)	bdlf(0.87)	cc(-0.69)
qmd(-0.52)	qmd(-0.53)	qmdcc(0.52)	qmdcc(-0.24)	qmdcc(0.43)	qmdcc(0.64)
cc(0.45)	cc(-0.37)	bdlf(-0.29)	bdlf(-0.19)	cc(0.20)	elev(0.24)
bdlf(-0.40)	bdlf(0.02)	qmd(-0.20)	qmd(-0.18)	variety(0.15)	qmd(-0.17)
elev(-0.15)	elev(0.00)	elev(-0.17)	cc-box(0.13)	elev(-0.04)	bdlf(-0.16)
variety(0.11)	variety(0.00)	variety(0.01)	elev(0.04)	qmd(-0.02)	variety(0.01)

Factors used

Factor	Eigen values	Explains variation
1	5.935	18.30%
2	20.189	62.40%
3	2.989	9.20%
4	1.241	3.80%
5	1.209	3.70%

Total variation explained = 97.4%

Model Indices

Model quality	Absolute validation	Contrast validation
2.30	0.84	0.39
2.10	0.82	0.37
2.30	0.84	0.38
2.10	0.84	0.38
2.20	0.82	0.37

k-fold cross-validations of habitat suitability (Rs = Spearman rank correlation)

Replicate	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100	Rs	Prob(Rs=0)
1	0.082	0.11	0.3	0.17	0.61	1	2.1	1.3	2.8	2.4	0.96	0.0000073
2	0.063	0.22	0.19	0.21	0.7	1.1	2.1	1.4	2.7	2.2	0.94	0.0000550
3	0.066	0.16	0.42	0.17	0.64	1	2	1.4	2.7	2.4	0.96	0.0000073
4	0.089	0.25	0.31	0.14	0.62	1.1	2.2	1.2	2.8	2.2	0.94	0.0000550
5	0.058	0.13	0.38	0.24	0.71	1.1	1.9	1.3	2.7	2.3	0.96	0.0000073
Mean	0.072	0.174	0.320	0.186	0.656	1.060	2.060	1.320	2.740	2.300		
Rank	10	9	7	8	6	5	3	4	1	2		

Total province acres = 3,362,271

Marginality: 0.849
Specialization: 2.322
Tolerance (1/S): 0.431

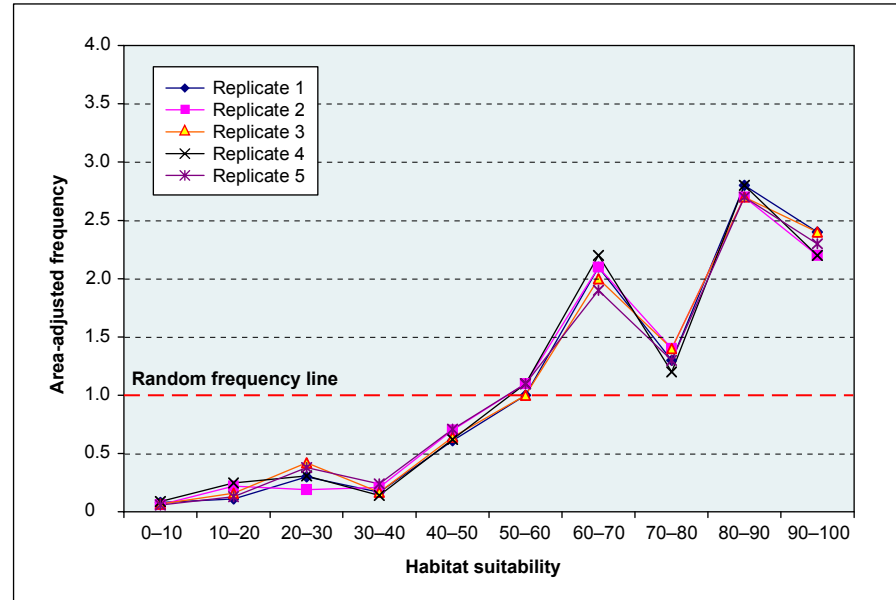


Figure E-6—BioMapper habitat model output statistics summary for the Eastern Cascades province of Oregon.

	Pixels (n)	Acres	Percentage of area
Global area*	22,518,397	3,477,746	86.90% of total province land area
Owl presence	16,572	2,559	0.07% of modeled area

*area that is being modeled

Ecological niche factor analysis results

Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
qmdcc(0.54)	qmdcc(-0.78)	cc(0.73)	elev(0.87)	qmdcc(-0.66)	qmdcc(0.72)
qmd(0.51)	qmd(0.52)	qmdcc(-0.57)	bdlf(0.46)	cc(0.53)	variety(-0.60)
cc(0.46)	cc(0.35)	bdlf(0.27)	variety(0.12)	bdlf(-0.42)	cc(-0.31)
bdlf(-0.39)	bdlf(0.02)	qmd(0.23)	qmdcc(0.08)	variety(-0.27)	bdlf(0.12)
variety(0.26)	variety(0.01)	variety(-0.13)	cc(-0.08)	elev(0.20)	qmd(-0.10)
elev(0.13)	elev(0.00)	elev(-0.03)	qmd(0.05)	qmd(-0.01)	elev(0.02)

Factors used

Factor	Eigen values	Explains variation
1	19.206	38.60%
2	23.356	47.00%
3	3.155	6.30%
4	1.654	3.30%
5	1.295	2.60%

Total variation explained = 97.8%

Model Indices

Factor	Model quality	Absolute validation	Contrast validation
1	3.00	0.80	0.44
2	3.10	0.79	0.43
3	3.10	0.79	0.43
4	3.10	0.79	0.43
5	3.00	0.81	0.44

k-fold cross-validations of habitat suitability (Rs = Spearman rank correlation)

Replicate	0–10	10–20	20–30	30–40	40–50	50–60	60–70	70–80	80–90	90–100	Rs	Prob(Rs=0)
1	0.051	0.081	0.11	0.56	0.88	1.9	2	2.2	1.9	3.1	0.96	0.0000073
2	0.061	0.087	0.16	0.6	0.87	1.8	1.8	2	2	3.2	0.98	0.0000015
3	0.053	0.056	0.14	0.63	0.82	1.8	1.9	2.2	2	3.2	0.99	0.0000001
4	0.053	0.1	0.15	0.63	0.81	1.7	2	1.9	2	3.1	0.99	0.0000001
5	0.046	0.13	0.12	0.54	0.85	1.6	2	2.4	1.9	3.2	0.95	0.0000230
Mean	0.053	0.091	0.136	0.592	0.846	1.760	1.940	2.140	1.960	3.160		
Rank	10	9	8	7	6	5	4	2	3	1		

Total province acres = 4,001,997

Marginality: 0.963
Specialization: 2.879
Tolerance (1/S): 0.347

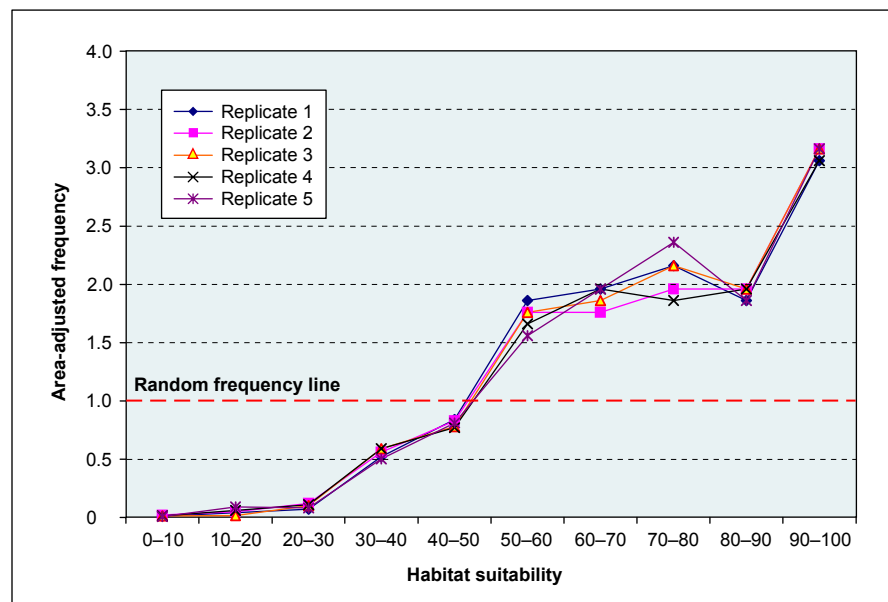


Figure E-7—BioMapper habitat model output statistics summary for the Klamath province of Oregon.

	Pixels (n)	Acres	Percentage of area
Global area*	8,331,740	1,852,929	74.06% of total province land area
Owl presence	1,890	420	0.02% of modeled area

*area that is being modeled

Ecological niche factor analysis results

Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
qmdcc(0.53)	qmdcc(-0.77)	qmdcc(0.79)	bdlf(0.69)	struct(-0.63)	qmdcc(0.73)
cc(0.50)	cc(0.47)	qmd(-0.41)	elev(0.53)	cc(0.59)	cc(-0.67)
qmd(0.43)	qmd(0.42)	cc(-0.37)	cc(0.42)	qmd(0.35)	struct(-0.12)
struct(0.41)	bdlf(0.02)	bdlf(0.24)	struct(-0.24)	elev(-0.27)	qmd(-0.04)
bdlf(-0.27)	struct(0.01)	elev(-0.12)	qmdcc(-0.09)	qmdcc(-0.22)	elev(0.04)
elev(0.19)	elev(-0.01)	struct(0.06)	qmd(0.07)	bdlf(0.06)	bdlf(0.00)

Factors used

Factor	Eigen values	Explains variation
1	4.768	24.70%
2	8.66	44.80%
3	2.347	12.10%
4	1.494	7.70%
5	1.221	6.30%

Total variation explained = 95.6%

Model Indices

Model quality	Absolute validation	Contrast validation
2.70	0.76	0.38
2.30	0.70	0.33
2.50	0.78	0.40
2.60	0.77	0.39
2.40	0.74	0.37

k-fold cross-validations of habitat suitability (Rs = Spearman rank correlation)

Replicate	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100	Rs	Prob(Rs=0)
1	0	0.12	0.8	0.55	0.68	1	1.4	2	2.8	2.8	0.96	0.000073
2	0.03	0.16	0.68	0.6	1.4	1.1	1.2	2.1	2.1	2.4	0.94	0.0000550
3	0	0.11	0.76	0.37	0.87	1	2.2	2.1	2.2	2.6	0.98	0.000015
4	0	0.09	0.51	0.64	0.89	0.86	1.3	2.3	2.6	2.6	0.98	0.000015
5	0	0.2	0.69	0.46	0.97	1.4	1.2	2.3	1.8	2.5	0.96	0.000073
Mean	0.006	0.136	0.688	0.524	0.962	1.072	1.460	2.160	2.300	2.580		
Rank	10	9	7	8	6	5	4	3	2	1		

Total province acres = 2,502,094

Marginality: 0.842
Specialization: 1.795
Tolerance (1/S): 0.557

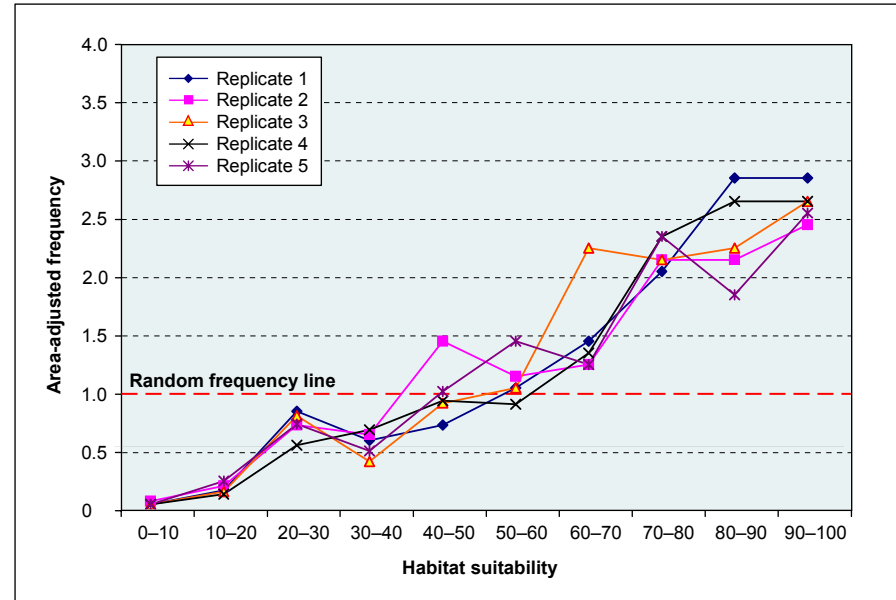


Figure E-8—BioMapper habitat model output statistics summary for the Cascades province of California.

	Pixels (n)	Acres	Percentage of area
Global area*	23,788,141	5,290,340	87.01% of total province land area
Owl presence	21,380	4,755	0.09% of modeled area

*area that is being modeled

Ecological niche factor analysis results

Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
qmdcc(0.52)	qmdcc(-0.68)	struct(-0.63)	qmdcc(0.78)	qmdcc(0.79)	qmdcc(0.76)
qmd(0.51)	cc(0.59)	cc(0.57)	qmd(-0.51)	cc(-0.51)	cc(-0.52)
struct(0.47)	qmd(0.37)	bdlf(0.38)	cc(-0.34)	bdlf(0.25)	struct(-0.31)
cc(0.42)	elev(0.15)	elev(-0.35)	bdlf(0.06)	struct(-0.16)	bdlf(-0.21)
elev(-0.26)	bdlf(0.12)	qmd(0.01)	elev(0.04)	qmd(-0.14)	qmd(-0.11)
bdlf(-0.09)	struct(-0.07)	qmdcc(-0.01)	struct(0.03)	elev(0.11)	elev(-0.02)

Factors used

Factor	Eigen values	Explains variation
1	1.843	22.40%
2	1.711	20.80%
3	1.574	19.10%
4	1.09	13.20%
5	1.077	13.10%

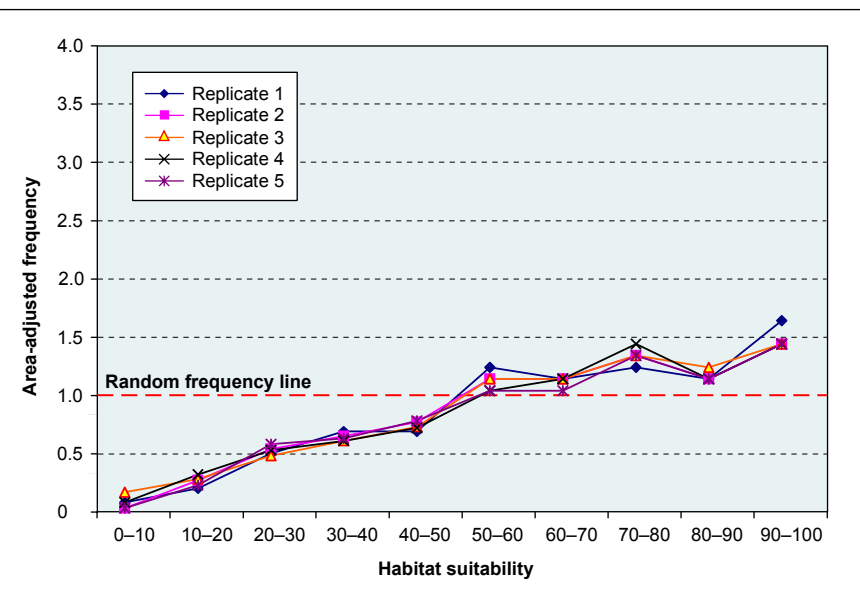
Total variation explained = 88.6%

Model Indices

Model quality	Absolute validation	Contrast validation
1.60	0.72	0.17
1.40	0.71	0.15
1.50	0.73	0.17
1.40	0.72	0.16
1.50	0.71	0.15

Total province acres = 6,080,289

Marginality: 0.406
Specialization: 1.171
Tolerance (1/S): 0.854

**k-fold cross-validations of habitat suitability (Rs = Spearman rank correlation)**

Replicate	0–10	10–20	20–30	30–40	40–50	50–60	60–70	70–80	80–90	90–100	Rs	Prob(Rs=0)
1	0.14	0.26	0.56	0.75	0.75	1.3	1.2	1.3	1.2	1.7	0.92	0.0002000
2	0.091	0.33	0.6	0.71	0.83	1.2	1.2	1.4	1.2	1.5	0.99	0.0000001
3	0.23	0.34	0.54	0.67	0.79	1.2	1.2	1.4	1.3	1.5	0.98	0.0000015
4	0.14	0.38	0.59	0.67	0.78	1.1	1.2	1.5	1.2	1.5	0.94	0.0000550
5	0.091	0.29	0.64	0.69	0.84	1.1	1.1	1.4	1.2	1.5	0.98	0.0000015
Mean	0.138	0.320	0.586	0.698	0.798	1.180	1.180	1.400	1.220	1.540		
Rank	10	9	8	7	6	4	4	2	3	1		

Figure E-9—BioMapper habitat model output statistics summary for the Klamath province of California.

	Pixels (n)	Acres	Percentage of area
Global area*	17,810,943	3,961,047	69.61% of total province land area
Owl presence	25,731	5,722	0.14% of modeled area

*area that is being modeled

Ecological niche factor analysis results

Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
qmdcc(0.50)	qmdcc(-0.75)	cc(-0.82)	struct(-0.69)	qmdcc(0.77)	cc(0.74)
cc(0.45)	cc(0.62)	qmdcc(0.48)	qmdcc(0.47)	cc(-0.59)	qmdcc(-0.49)
qmd(0.40)	qmd(0.25)	bdlf(-0.19)	cc(-0.46)	bdlf(0.25)	bdlf(0.35)
elev(-0.38)	bdlf(0.02)	elev(-0.18)	bdlf(-0.23)	struct(-0.07)	elev(-0.26)
bdlf(-0.37)	elev(-0.01)	qmd(-0.11)	elev(-0.18)	qmd(-0.01)	qmd(-0.14)
struct(0.33)	struct(0.00)	struct(0.10)	qmd(0.11)	elev(-0.01)	struct(-0.01)

Factors used

Factor	Eigen values	Explains variation
1	2.494	23.90%
2	3.347	32.10%
3	1.543	14.80%
4	1.181	11.30%
5	1.031	9.90%

Total variation explained = 92.0%

Model Indices

Factor	Model quality	Absolute validation	Contrast validation
1	2.00	0.72	0.28
2	2.10	0.73	0.28
3	2.00	0.71	0.27
4	2.00	0.73	0.28
5	1.90	0.73	0.28

k-fold cross-validations of habitat suitability (Rs = Spearman rank correlation)

Replicate	0–10	10–20	20–30	30–40	40–50	50–60	60–70	70–80	80–90	90–100	Rs	Prob(Rs=0)
1	0.15	0.26	0.39	0.99	0.79	1.3	1.4	1.7	1.9	2	0.99	0.0000001
2	0.049	0.27	0.36	0.85	0.87	1.3	1.5	1.7	1.9	2.1	1	0.0000000
3	0.049	0.28	0.4	0.95	0.9	1.3	1.3	1.7	1.8	2	0.99	0.0000001
4	0.1	0.27	0.38	0.87	0.84	1.3	1.4	1.7	1.9	2	0.99	0.0000001
5	0.05	0.28	0.35	0.87	0.87	1.3	1.4	1.8	1.8	1.9	0.98	0.0000015
Mean	0.080	0.272	0.376	0.906	0.854	1.300	1.400	1.720	1.860	2.000		
Rank	10	9	8	6	7	5	4	3	2	1		

Total province acres = 5,690,268

Marginality: 0.718
Specialization: 1.318
Tolerance (1/S): 0.759

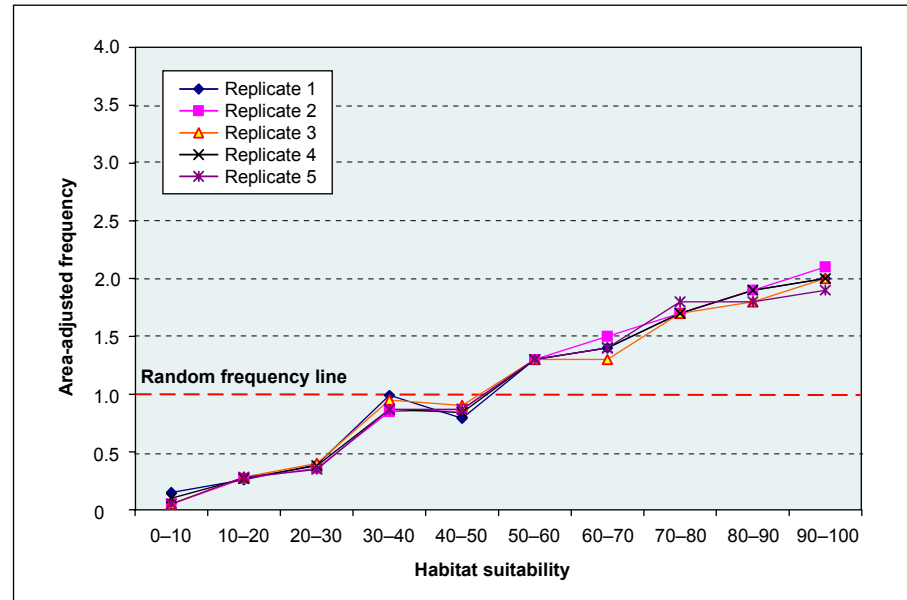


Figure E-10—BioMapper habitat model output statistics summary for the Coast province of California.

Appendix F—Model Validation with Independent Data Sets

Twenty-three independent data sets were used to validate habitat suitability maps for three physiographic provinces. These data sets consisted of radio telemetry data (Rock 2004) and were not used to train the habitat models.

Telemetry locations were separated into data sets for each owl pair with a minimum of 100 recorded locations. One percent of owl telemetry location outliers were removed by using the harmonic mean methodology of Dixon and Chapman (1980). A minimum convex polygon (MCP) was created for the remaining 99 percent by using the Animal Movement (v2.0) extension for ArcView Spatial Analyst (Hooge and Eichenlaub 2000). Area-adjusted frequencies (AAF) were generated for each MCP by dividing the percentage of telemetry points within a habitat suitability category or bin (e.g., 0 to 20, 21 to 40, etc.) by the percentage of the MCP with habitat suitability values in that bin. A Spearman rank correlation (Boyce et al. 2002) was performed for the AAF within each MCP and then averaged for the province in which they occurred.

Area 1 is located west of Eugene, Oregon, within the Oregon Coast Range province. Data were collected from 1999 to 2004.

Table F-1—Correlation of owl telemetry locations (n) with habitat suitability for area 1

Validation sites	n	r_s	P
Cedar Creek	452	0.92	<0.001
Eames Creek	645	.85	<.001
Wolf Creek	325	.99	<.001
Salt Creek	497	.82	<.001
Pittenger Creek	463	.97	<.001
Luyne Creek	101	.93	<.001
Grenshaw Creek	413	.96	<.001
Average*		.99	<.001

*Average Spearman rank correlations are based on the rank of the averaged area-adjusted frequencies for all sites and are not an average of the Spearman rankings for each site.

Area 2 is located east of Eugene, Oregon, within the Oregon Western Cascades province. Data were collected from 1999 to 2004.

Table F-2—Correlation of owl telemetry locations (n) with habitat suitability for area 2

Validation sites	n	r_s	P
Anthony Creek	405	0.48	<0.001
Boundary	421	.64	<.001
Drury Creek	289	.78	<.001
Brush Creek	402	.87	<.001
Eagles Rest	354	.76	<.001
Horne Butte	287	.75	<.001
Lost Creek	338	.77	<.001
Shotgun Creek	247	.67	<.001
East Brush Creek	101	.96	<.001
Average		.93	<.001

Area 9 is located in the southern portion of the Oregon Eastern Cascades province. Data were collected from 1999 to 2004.

Table F-3—Correlation of owl telemetry locations (n) with habitat suitability for area 9

Validation sites	n	r_s	P
Long Prairie	224	-0.15	<0.001
Topsy	217	.88	<.001
Miners Creek	223	.93	<.001
Edge Creek	133	.79	<.001
Buck Mountain	103	.72	<.001
Johnson Too	191	.78	<.001
Lower Horse	145	.27	<.02
Average		.94	<.001

Overall, most correlations showed significant positive relationships between owl locations and habitat suitability. Two sites (one in area 2 and one in area 9) did not show significant positive correlations, with Spearman rank correlations of 0.48 and 0.27, respectively. One site in area 9 had a nonsignificant, negative correlation. However, when MCPs were pooled and averaged across the province, correlations improved significantly (fig. F-1).

Telemetry data used was collected during both day and night and throughout the entire year. Nesting season (March–July) data was not separated from nonnesting season data so the correlations represent year-round use by owl pairs in these three provinces.

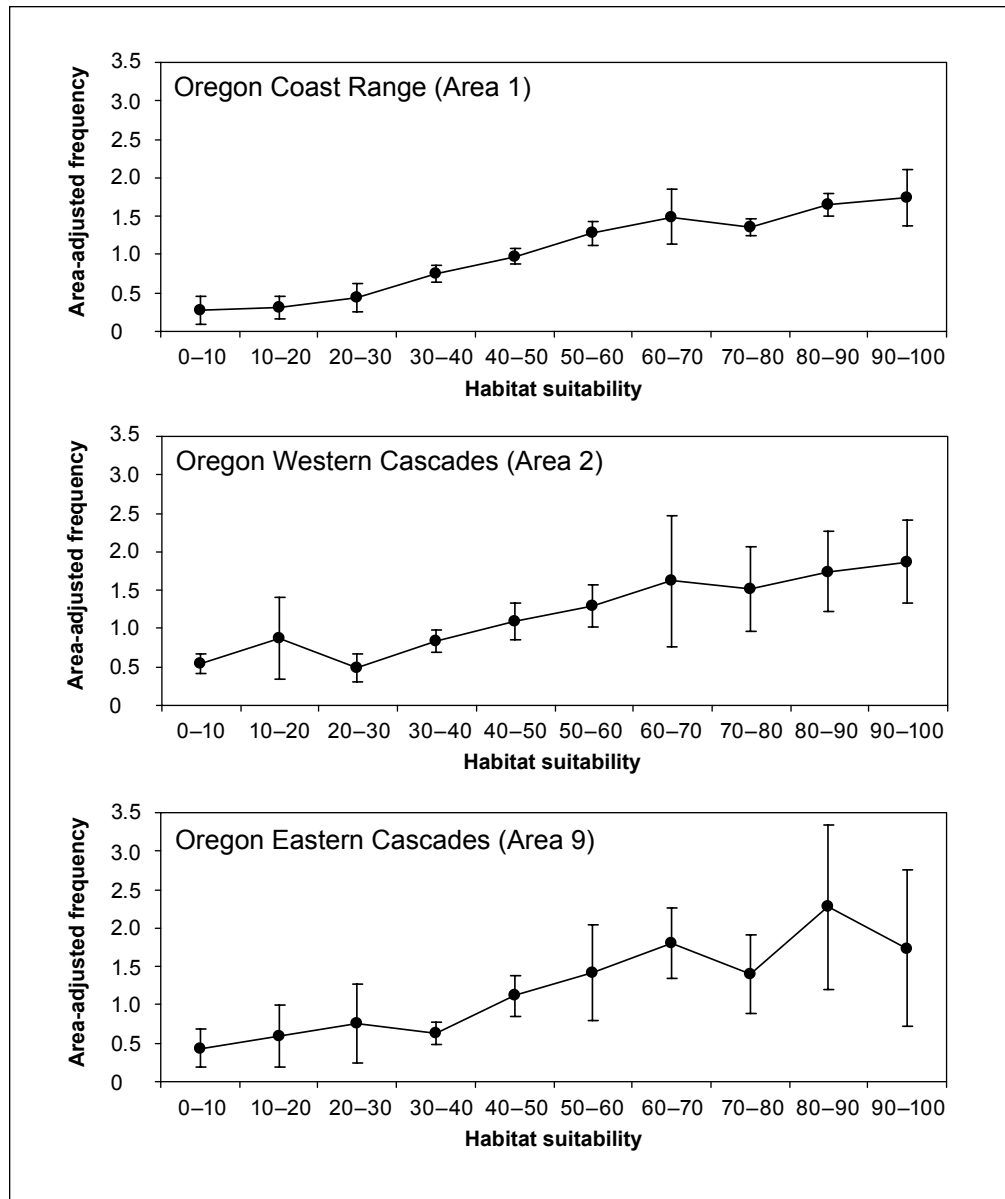


Figure F-1—Spearman-rank correlations for mean (\pm SD) area-adjusted frequencies from independent owl use locations of three physiographic provinces indicate these three models predicted spotted owl use locations well.

References

- Boyce M.S.; Vernier P.R.; Nielsen, S.E.; Schmiegelow, F.K.A. 2002.** Evaluating resource selection functions. *Ecological Modelling*. 157: 281–300.
- Dixon, K.R.; Chapman, J.A. 1980.** Harmonic mean measure of animal activity areas. *Ecology*. 61: 1040–1044.
- Hooge P.N.; Eichenlaub, B. 2000.** Animal movement extension to ArcView, 2.0., Anchorage, AK: Alaska Science Center—Biological Science Office, U.S. Geological Survey.
- Rock, D. 2004.** Personal communication. Wildlife biologist. National Council for Air and Stream Improvement, 43613 NE 309th Avenue, Amboy, WA 98601.

Appendix G—Spotted Owl Habitat Suitability Histograms

Explanation of codes used in the tables:

- **CR**, congressionally-reserved
- **LSR**, late-successional reserves
- **AMR**, adaptive management areas in reserves (an allocation designed to display the areas' acres in late-successional reserves)
- **MLSA**, managed late-successional areas
- **AW**, administratively withdrawn
- **LSR-3**, marbled murrelet reserved areas
- **LSR-4**, 100-acre spotted owl cores
- **AMA**, adaptive management areas
- **MATRIX/RR**, matrix (which contains riparian reserves that were not mapped)

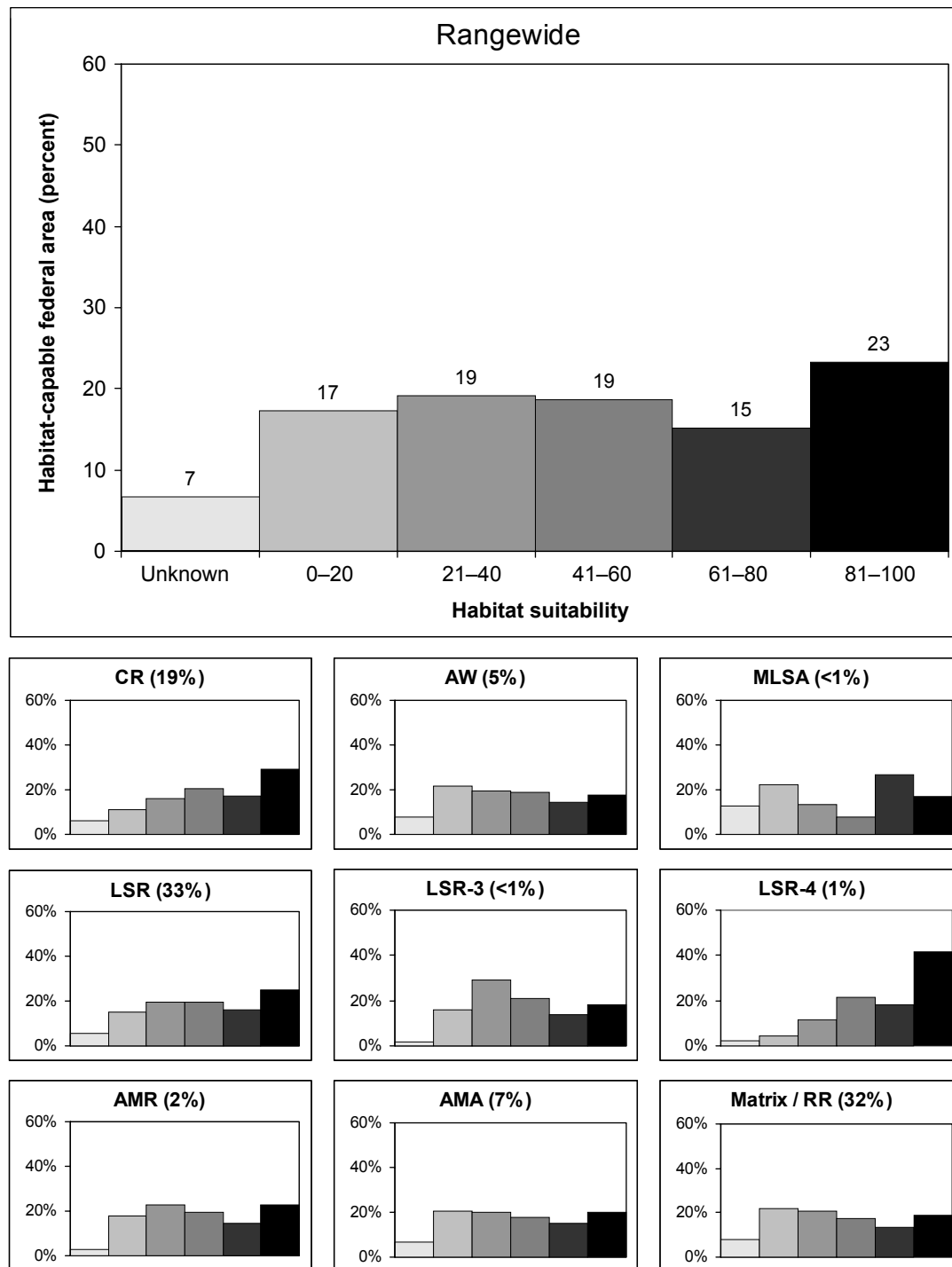


Figure G-1—Habitat suitability histograms for the range of the northern spotted owl. Top histogram shows percentage of habitat-capable area in the range by habitat suitability bin (category). The nine smaller histograms show the percentage of habitat-capable area in each land use allocation in the range by habitat suitability bin. Number in parentheses shows percentage of habitat-capable area in the range in that land use allocation.

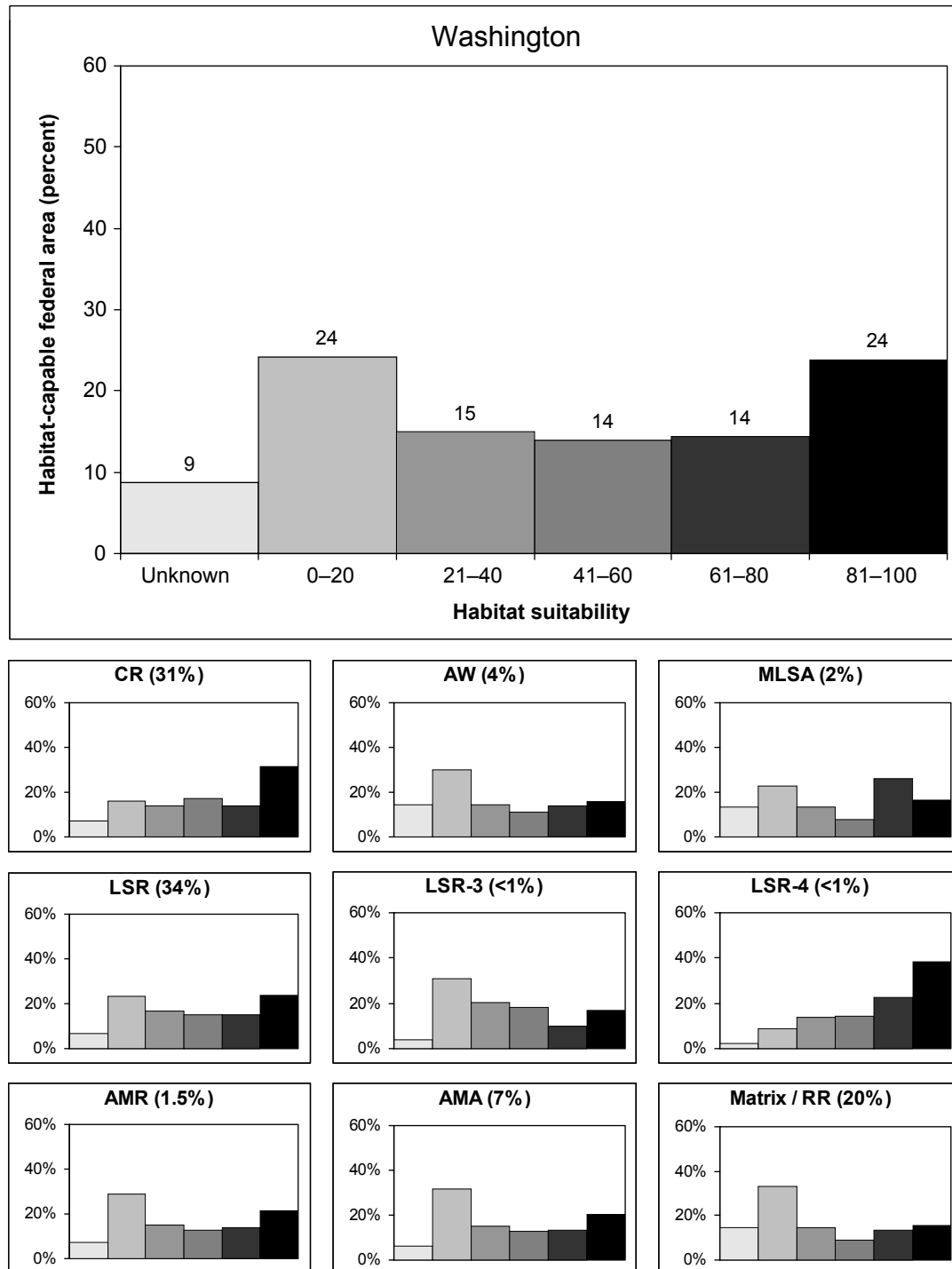


Figure G-2—Habitat suitability histograms for Washington. Top histogram shows percentage of habitat-capable area in the state by habitat suitability bin (category). The nine smaller histograms show the percentage of habitat-capable area in each land use allocation in the state by habitat suitability bin. Number in parentheses shows percentage of habitat-capable area in the state in that land use allocation.

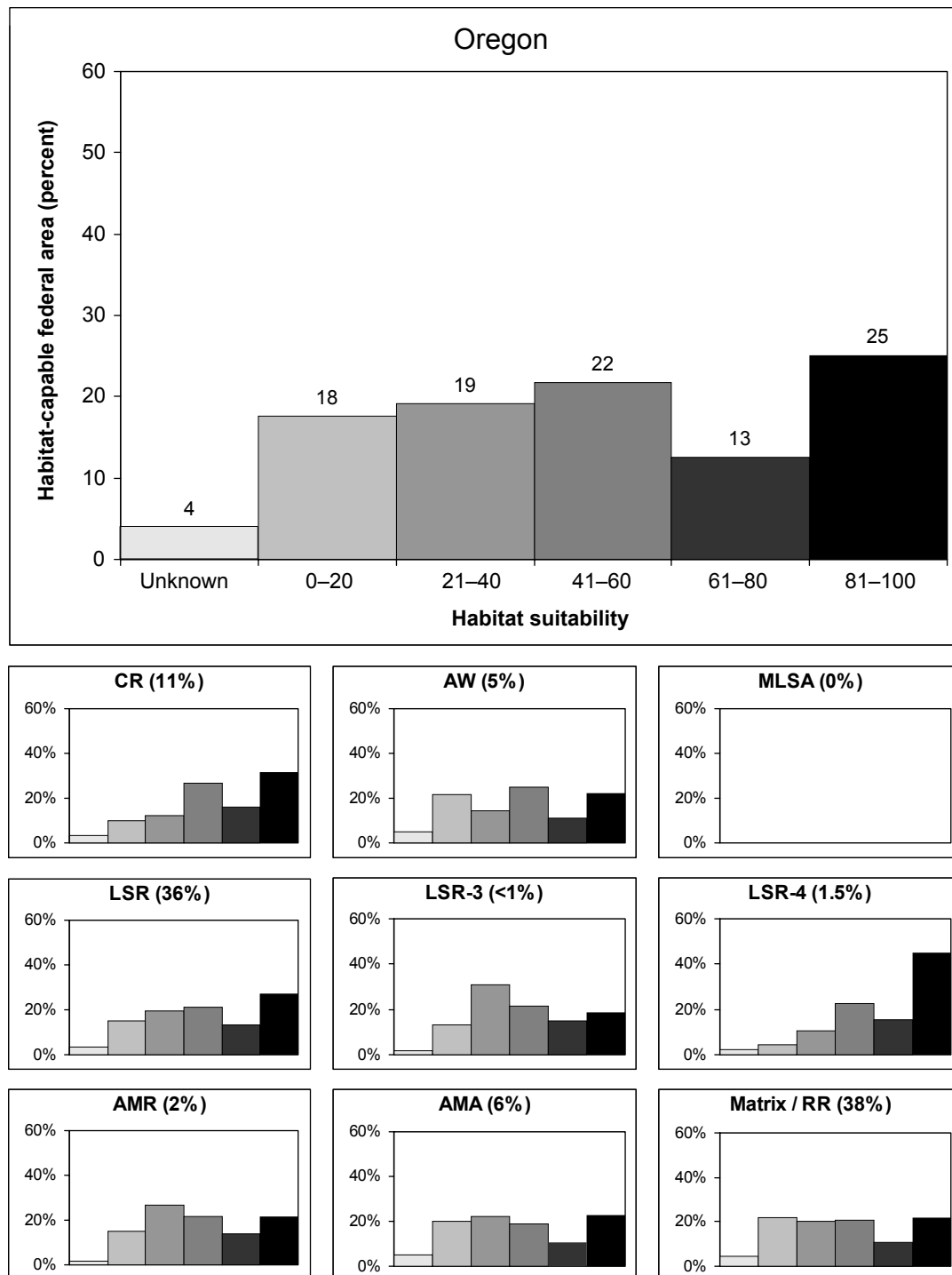


Figure G-3—Habitat suitability histograms for Oregon. Top histogram shows percentage of habitat-capable area in the state by habitat suitability bin (category). The nine smaller histograms show the percentage of habitat-capable area in each land use allocation in the state by habitat suitability bin. Number in parentheses shows percentage of habitat-capable area in the state in that land use allocation.

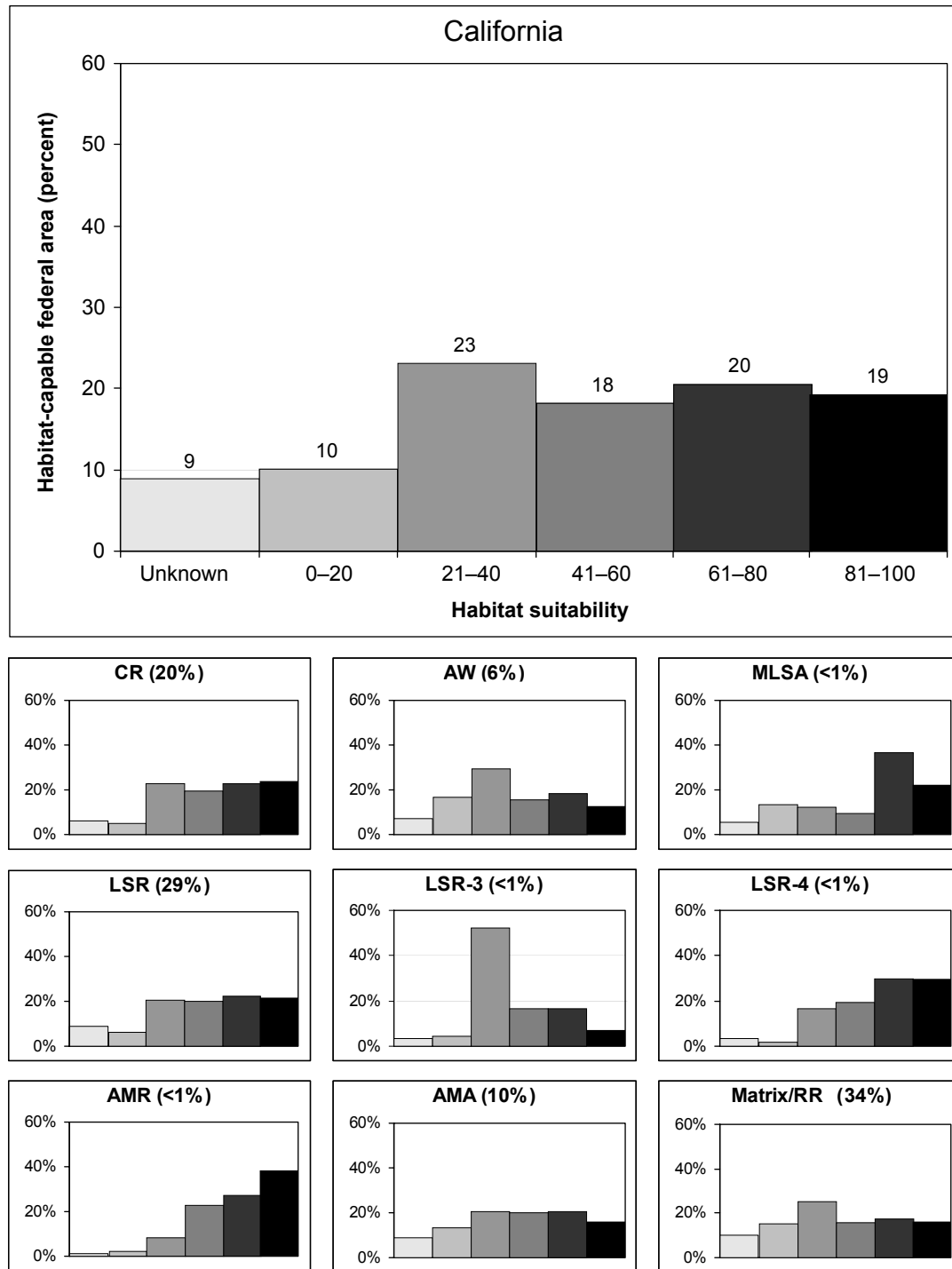


Figure G-4—Habitat suitability histograms for California. Top histogram shows percentage of habitat-capable area in the state by habitat suitability bin (category). The nine smaller histograms show the percentage of habitat-capable area in each land use allocation in the state by habitat suitability bin. Number in parentheses shows percentage of habitat-capable area in the state in that land use allocation.

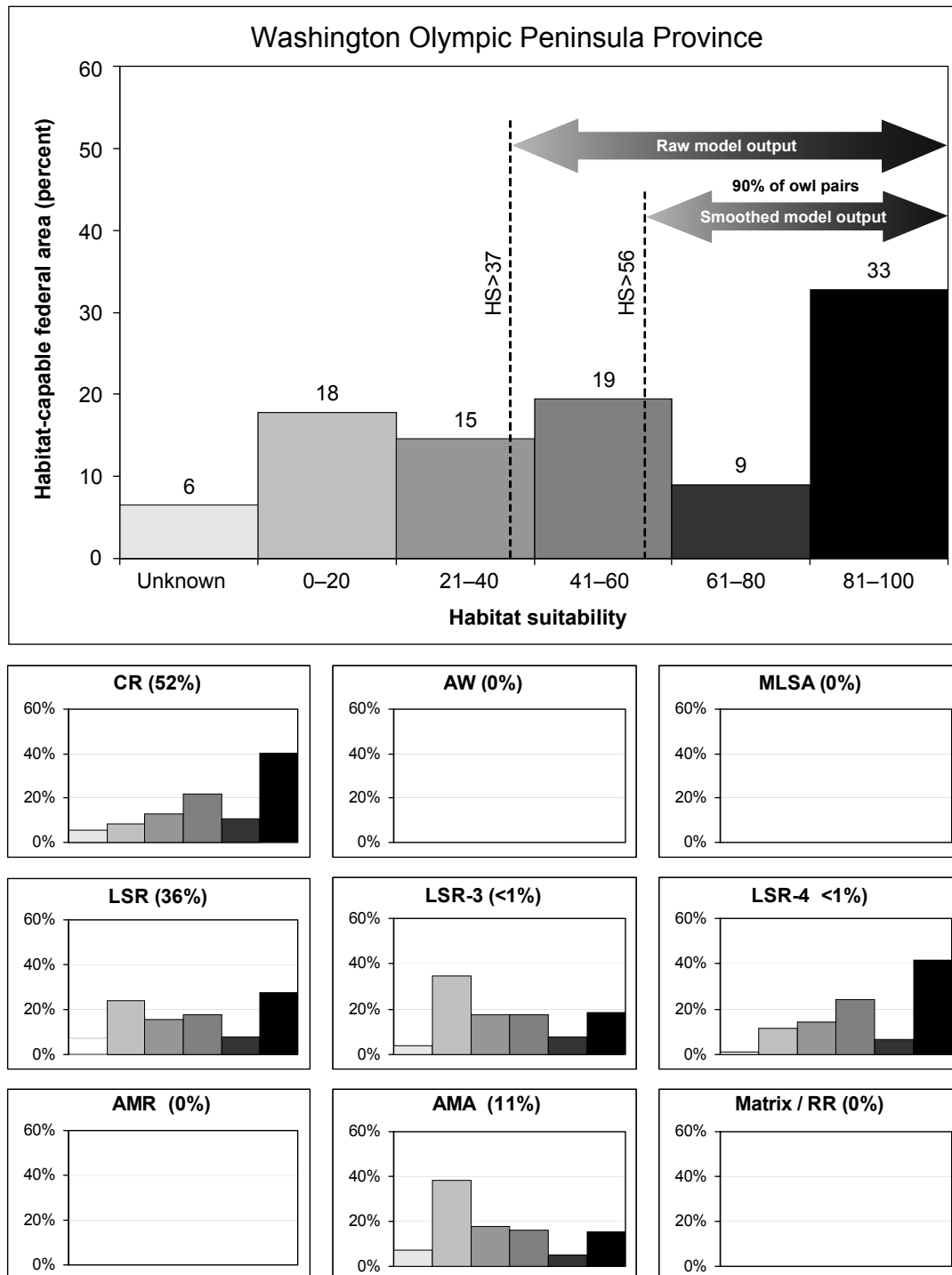


Figure G-5—Habitat suitability histograms for the Olympic Peninsula province in Washington. Top histogram shows percentage of habitat-capable area in the province by habitat suitability bin (category). Arrows show where 90 percent of the owl-pair location points occurred in relation to the raw and smoothed (mean habitat suitability within the 5×5 window) model outputs. The nine smaller histograms show the percentage of habitat-capable area in each land use allocation in the province by habitat suitability bin. Number in parentheses shows percentage of habitat-capable area in the province in that land use allocation.

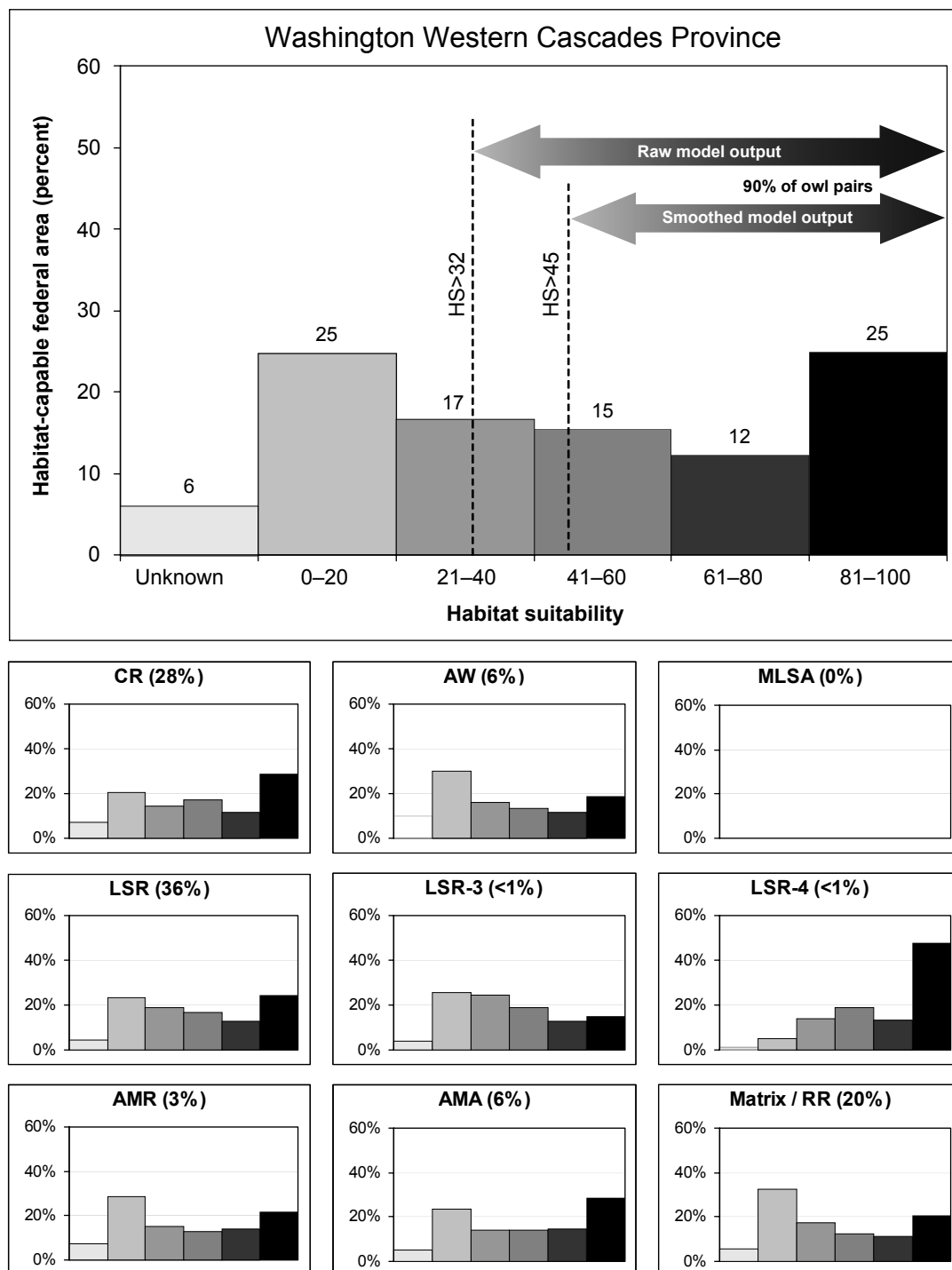


Figure G-6—Habitat suitability histograms for the Western Cascades province in Washington. Top histogram shows percentage of habitat-capable area in the province by habitat suitability bin (category). Arrows show where 90 percent of the owl-pair location points occurred in relation to the raw and smoothed (mean habitat suitability within the 5×5 window) model outputs. The nine smaller histograms show the percentage of habitat-capable area in each land use allocation in the province by habitat suitability bin. Number in parentheses shows percentage of habitat-capable area in the province in that land use allocation.

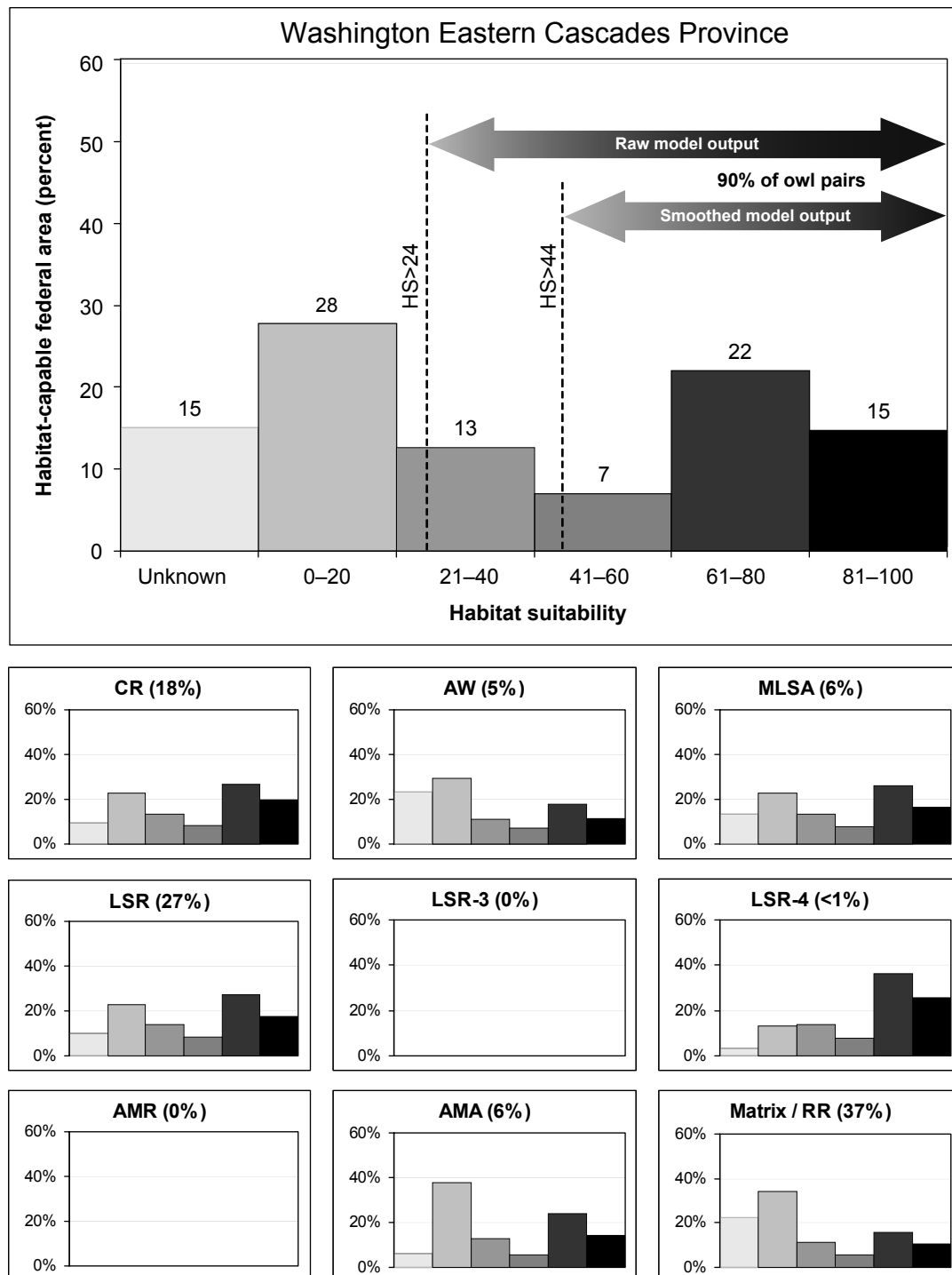


Figure G-7—Habitat suitability histograms for the Eastern Cascades province in Washington. Top histogram shows percentage of habitat-capable area in the province by habitat suitability bin (category). Arrows show where 90 percent of the owl-pair location points occurred in relation to the raw and smoothed (mean habitat suitability within the 5×5 window) model outputs. The nine smaller histograms show the percentage of habitat-capable area in each land use allocation in the province by habitat suitability bin. Number in parentheses shows percentage of habitat-capable area in the province in that land use allocation.

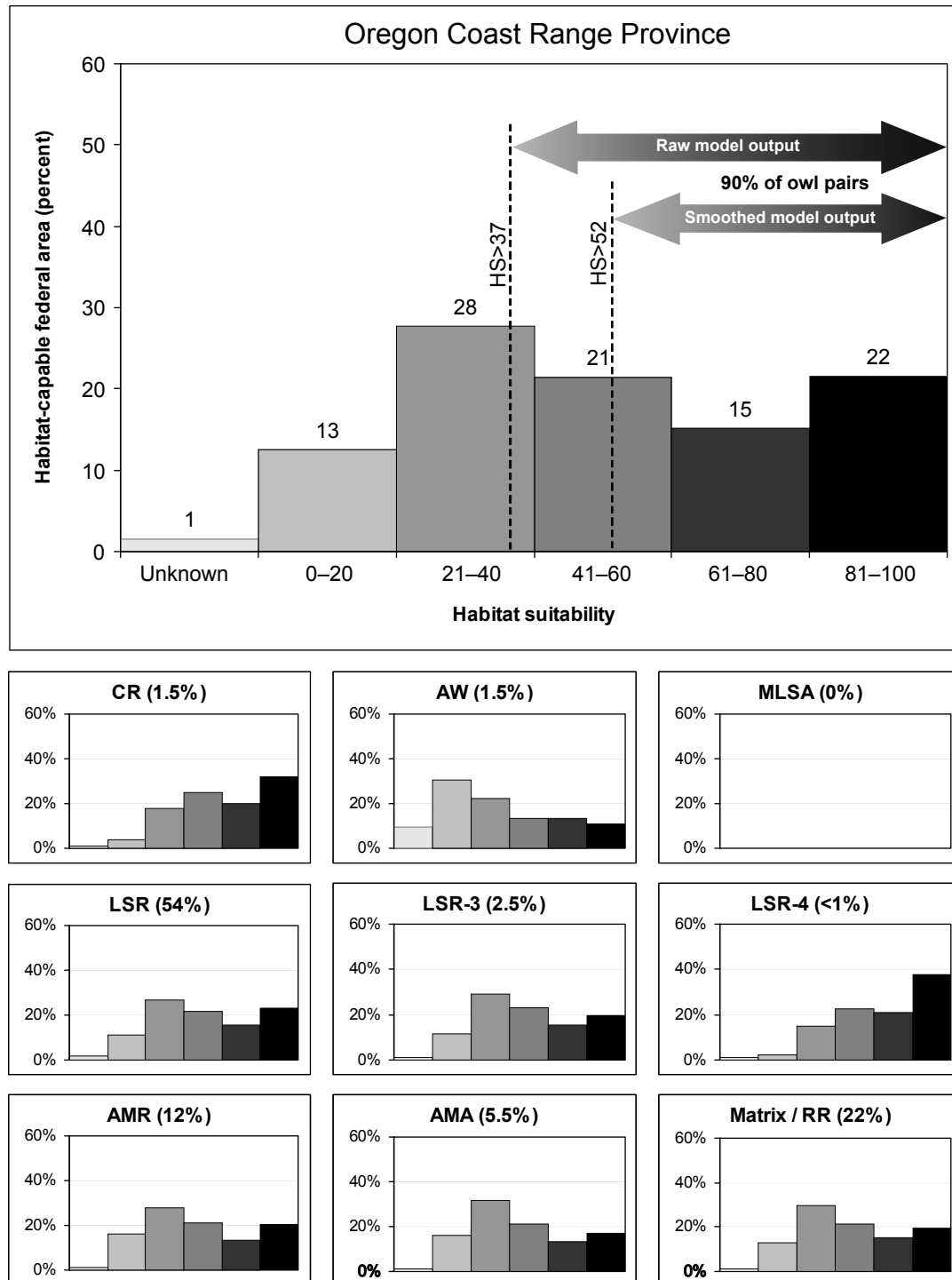


Figure G-8—Habitat suitability histograms for the Coast Range province in Oregon. Top histogram shows percentage of habitat-capable area in the province by habitat suitability bin (category). Arrows show where 90 percent of the owl-pair location points occurred in relation to the raw and smoothed (mean habitat suitability within the 5×5 window) model outputs. The nine smaller histograms show the percentage of habitat-capable area in each land use allocation in the province by habitat suitability bin. Number in parentheses shows percentage of habitat-capable area in the province in that land use allocation.

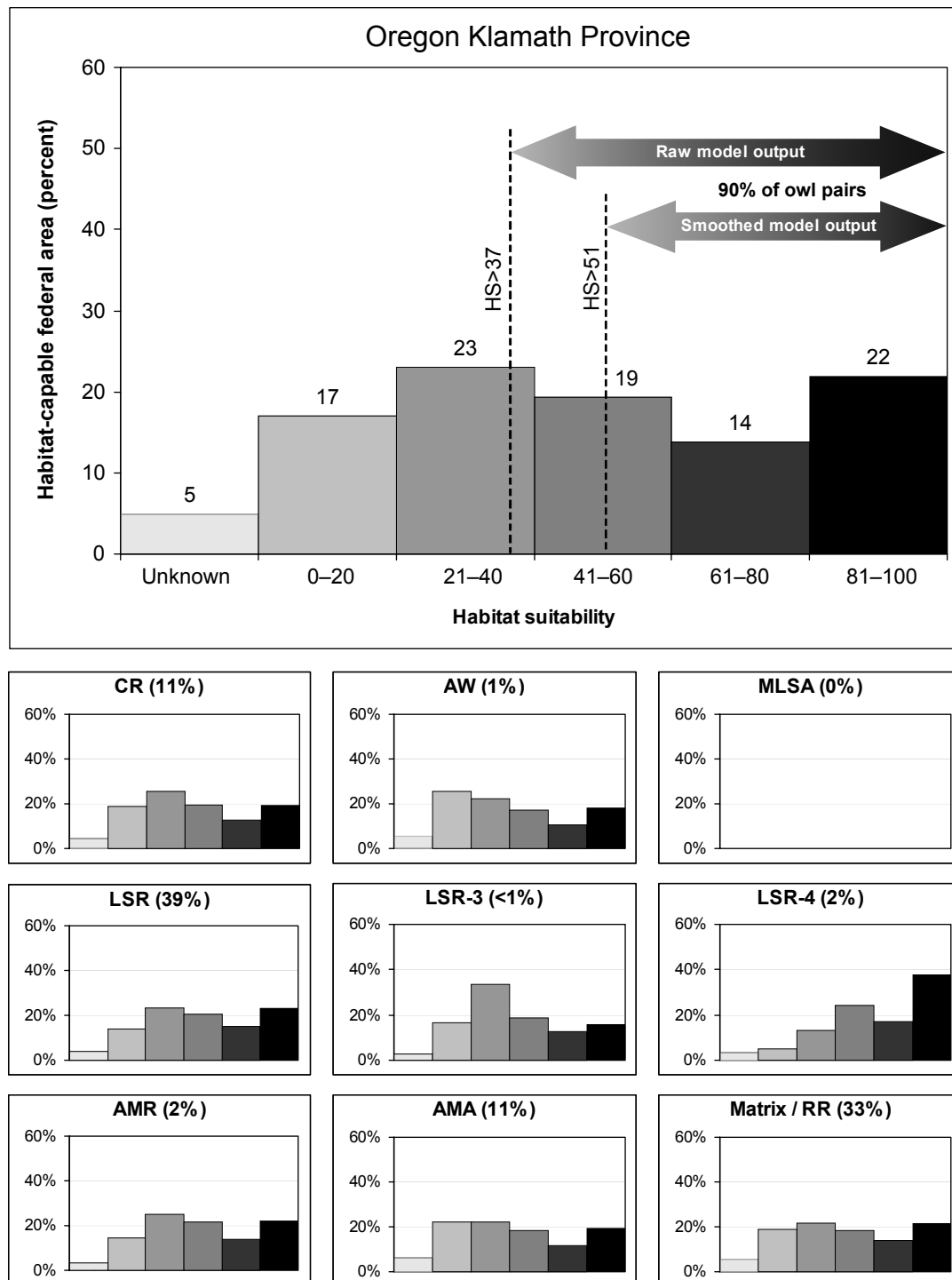


Figure G-9—Habitat suitability histograms for the Klamath province in Oregon. Top histogram shows percentage of habitat-capable area in the province by habitat suitability bin (category). Arrows show where 90 percent of the owl-pair location points occurred in relation to the raw and smoothed (mean habitat suitability within the 5×5 window) model outputs. The nine smaller histograms show the percentage of habitat-capable area in each land use allocation in the province by habitat suitability bin. Number in parentheses shows percentage of habitat-capable area in the province in that land use allocation.

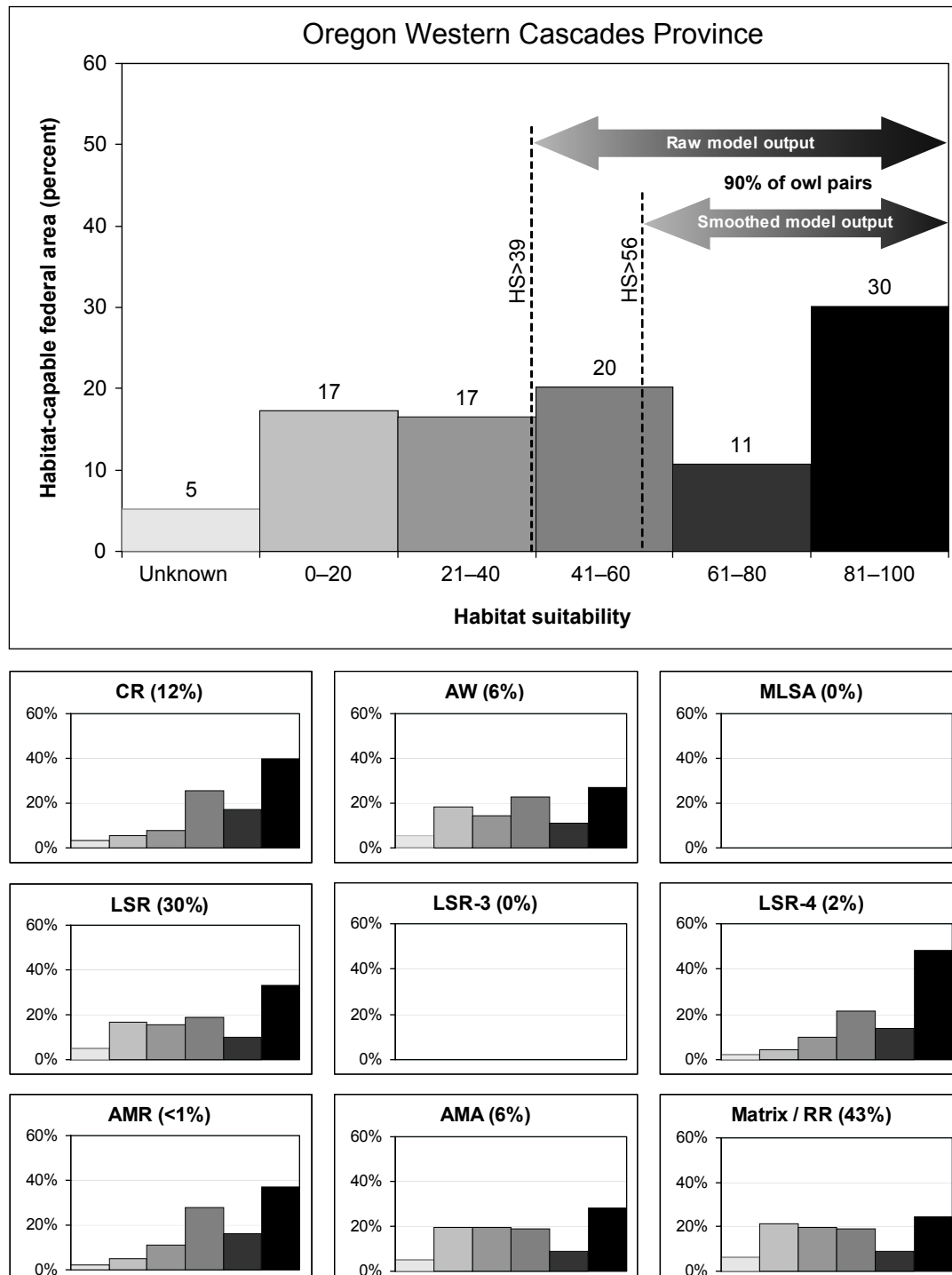


Figure G-10—Habitat suitability histograms for the Western Cascades province in Oregon. Top histogram shows percentage of habitat-capable area in the province by habitat suitability bin (category). Arrows show where 90 percent of the owl-pair location points occurred in relation to the raw and smoothed (mean habitat suitability within the 5×5 window) model outputs. The nine smaller histograms show the percentage of habitat-capable area in each land use allocation in the province by habitat suitability bin. Number in parentheses shows percentage of habitat-capable area in the province in that land use allocation.

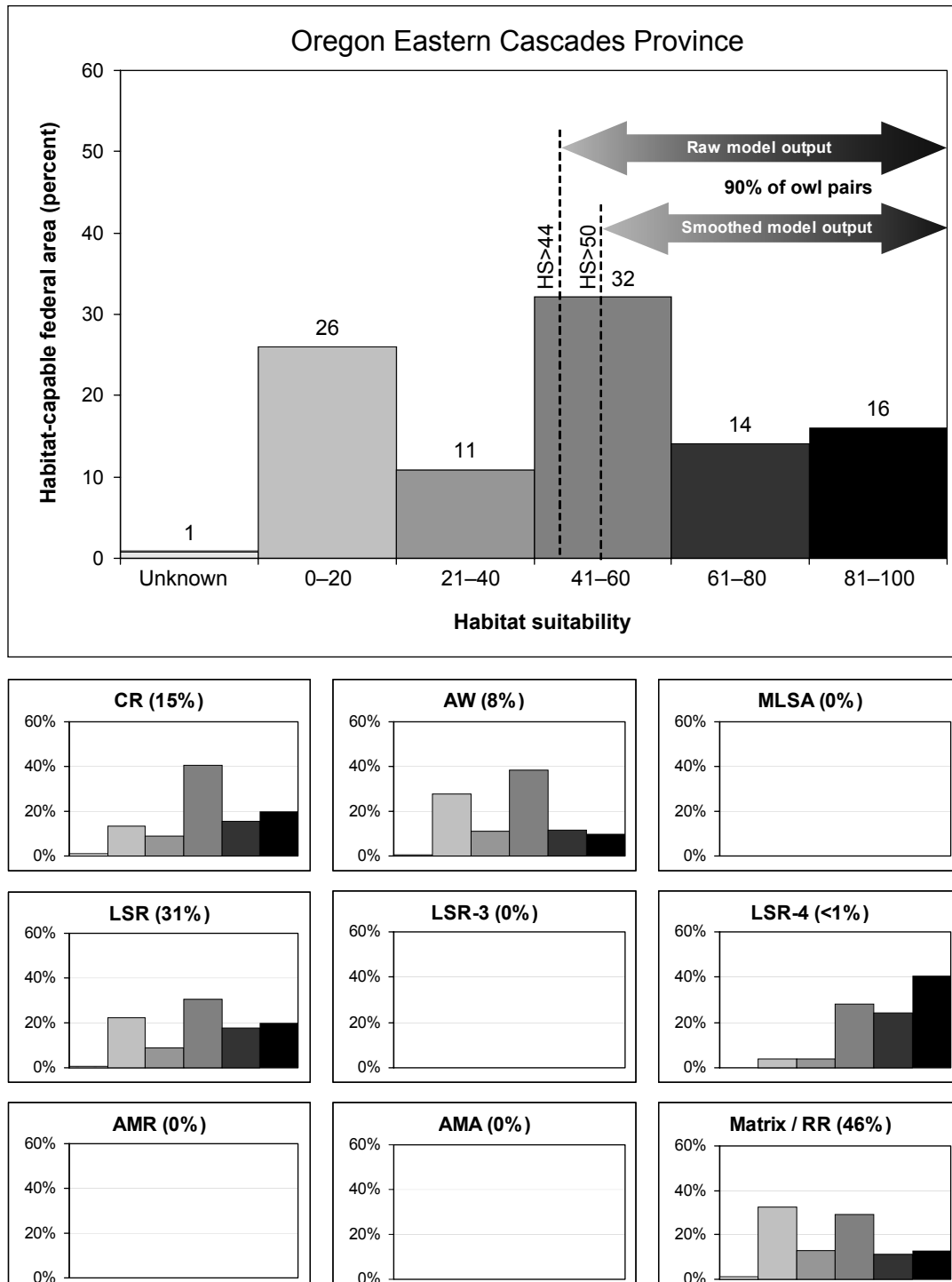


Figure G-11—Habitat suitability histograms for the Eastern Cascades province in Oregon. Top histogram shows percentage of habitat-capable area in the province by habitat suitability bin (category). Arrows show where 90 percent of the owl-pair location points occurred in relation to the raw and smoothed (mean habitat suitability within the 5×5 window) model outputs. The nine smaller histograms show the percentage of habitat-capable area in each land use allocation in the province by habitat suitability bin. Number in parentheses shows percentage of habitat-capable area in the province in that land use allocation.

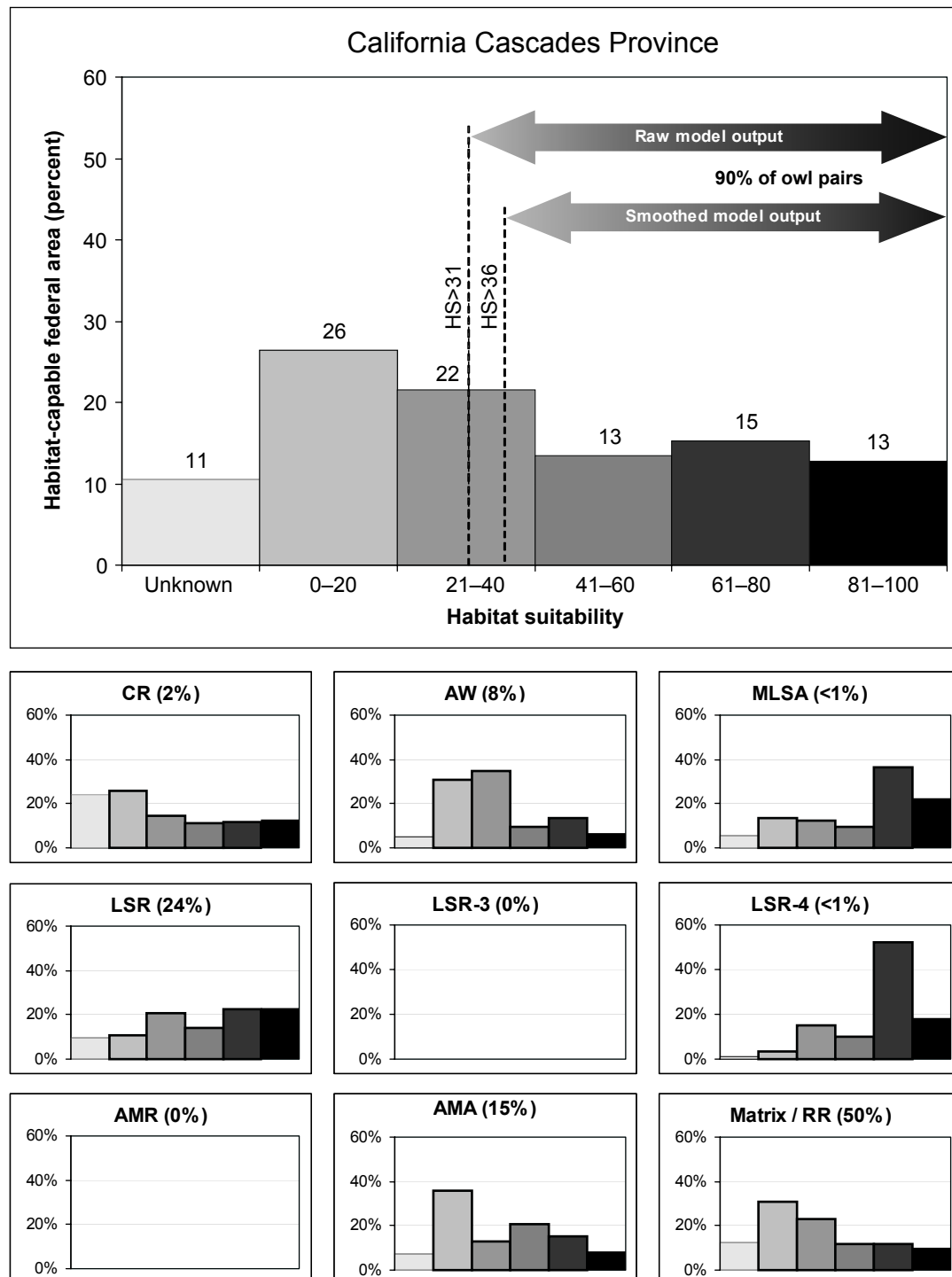


Figure G-12—Habitat suitability histograms for the Cascades province in California. Top histogram shows percentage of habitat-capable area in the province by habitat suitability bin (category). Arrows show where 90 percent of the owl-pair location points occurred in relation to the raw and smoothed (mean habitat suitability within the 5×5 window) model outputs. The nine smaller histograms show the percentage of habitat-capable area in each land use allocation in the province by habitat suitability bin. Number in parentheses shows percentage of habitat-capable area in the province in that land use allocation.

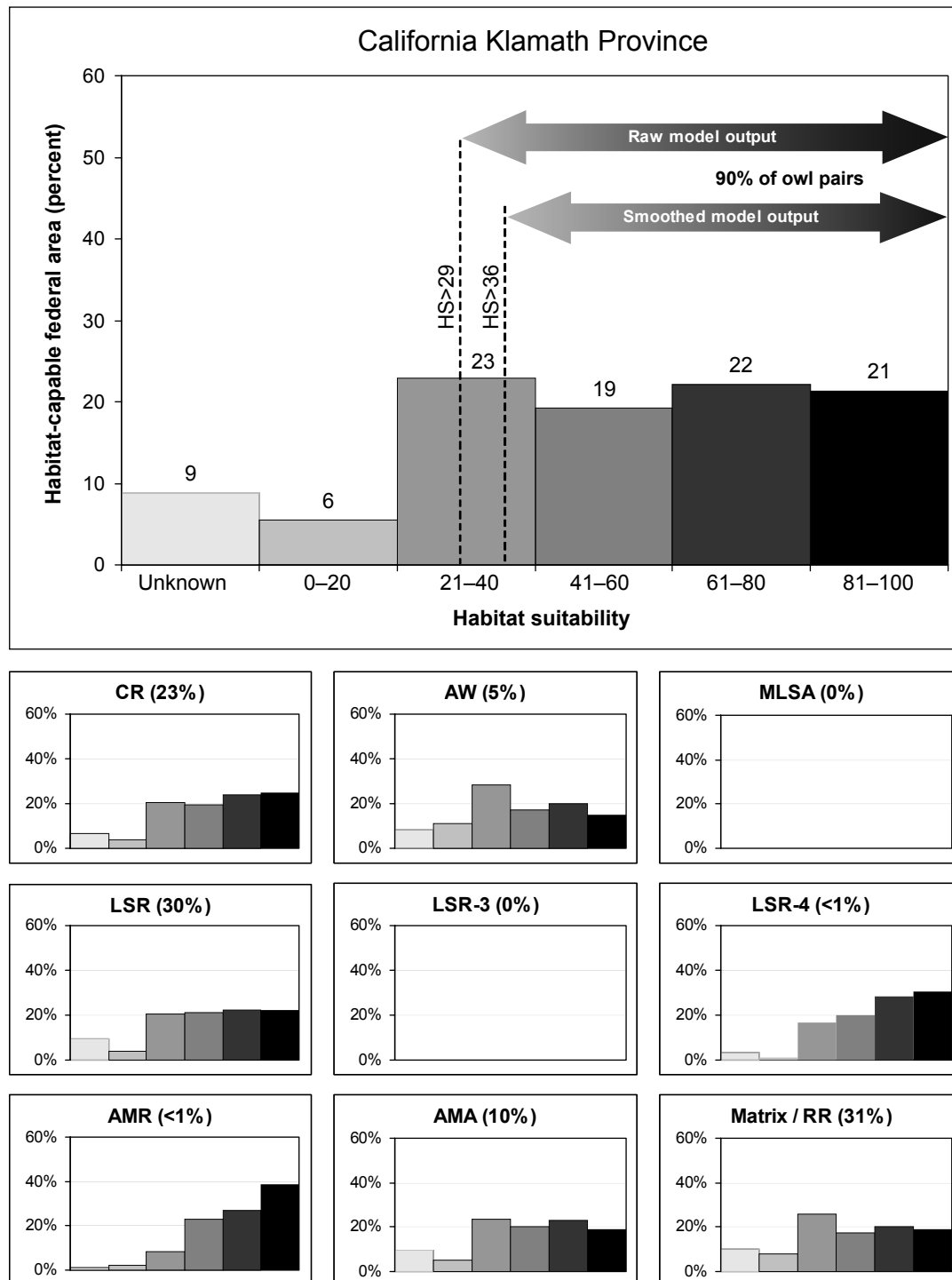


Figure G-13—Habitat suitability histograms for the Klamath province in California. Top histogram shows percentage of habitat-capable area in the province by habitat suitability bin (category). Arrows show where 90 percent of the owl-pair location points occurred in relation to the raw and smoothed (mean habitat suitability within the 5×5 window) model outputs. The nine smaller histograms show the percentage of habitat-capable area in each land use allocation in the province by habitat suitability bin. Number in parentheses shows percentage of habitat-capable area in the province in that land use allocation.

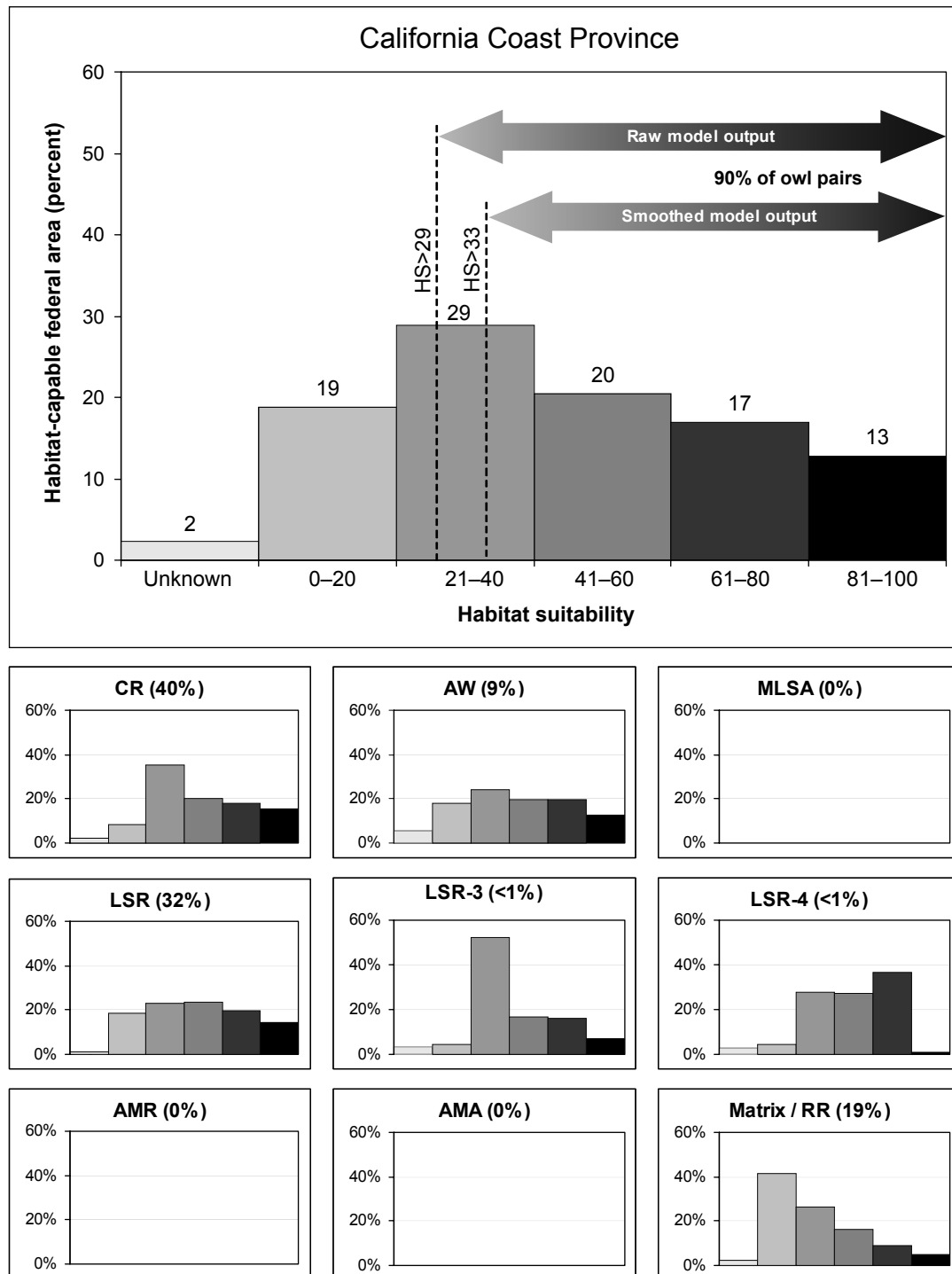


Figure G-14—Habitat suitability histograms for the Coast province in California. Top histogram shows percentage of habitat-capable area in the province by habitat suitability bin (category). Arrows show where 90 percent of the owl-pair location points occurred in relation to the raw and smoothed (mean habitat suitability within the 5×5 window) model outputs. The nine smaller histograms show the percentage of habitat-capable area in each land use allocation in the province by habitat suitability bin. Number in parentheses shows percentage of habitat-capable area in the province in that land use allocation.

Appendix H—Timber Harvest and Wildfire Change Histograms

Explanation of codes used in the tables:

- **CR**, congressionally-reserved
- **LSR**, late-successional reserves
- **AMR**, adaptive management areas in reserves (an allocation designed to display the areas' acres in late-successional reserves)
- **MLSA**, managed late-successional areas
- **AW**, administratively withdrawn
- **LSR-3**, marbled murrelet reserved areas
- **LSR-4**, 100-acre spotted owl cores
- **AMA**, adaptive management areas
- **MATRIX/RR**, matrix (which contains riparian reserves that were not mapped)
- **HS**, habitat suitability

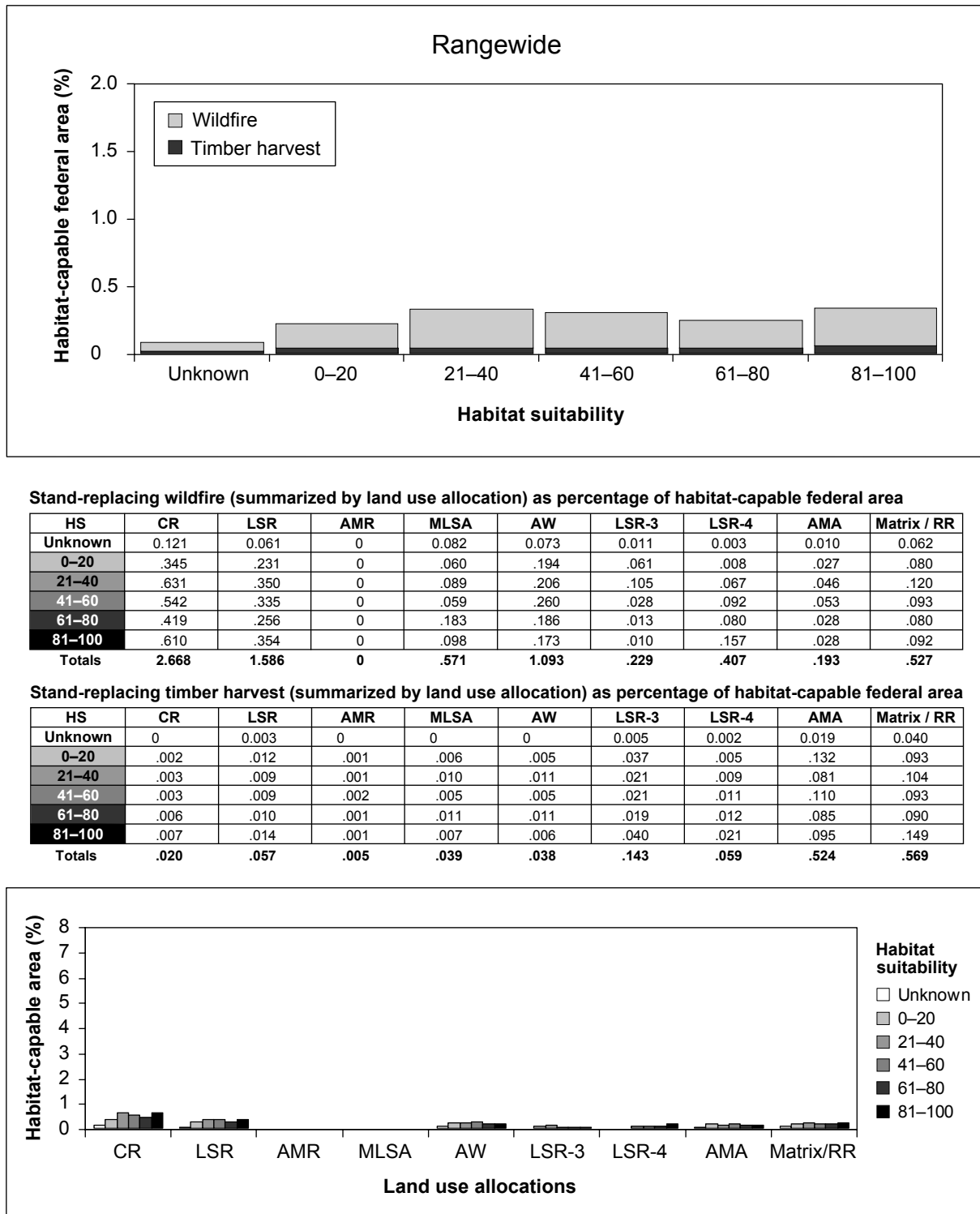


Figure H-1—Top histogram shows the percentage of habitat-capable area lost to stand-replacing timber harvest and wildfire in the range of the northern spotted owl during the first decade of the Plan implementation. The tables in the middle of the figure show the percentage of habitat-capable area lost to timber harvest and wildfire within a land use allocation. The histogram at the bottom shows the loss from timber harvest and wildfire within each land use allocation.

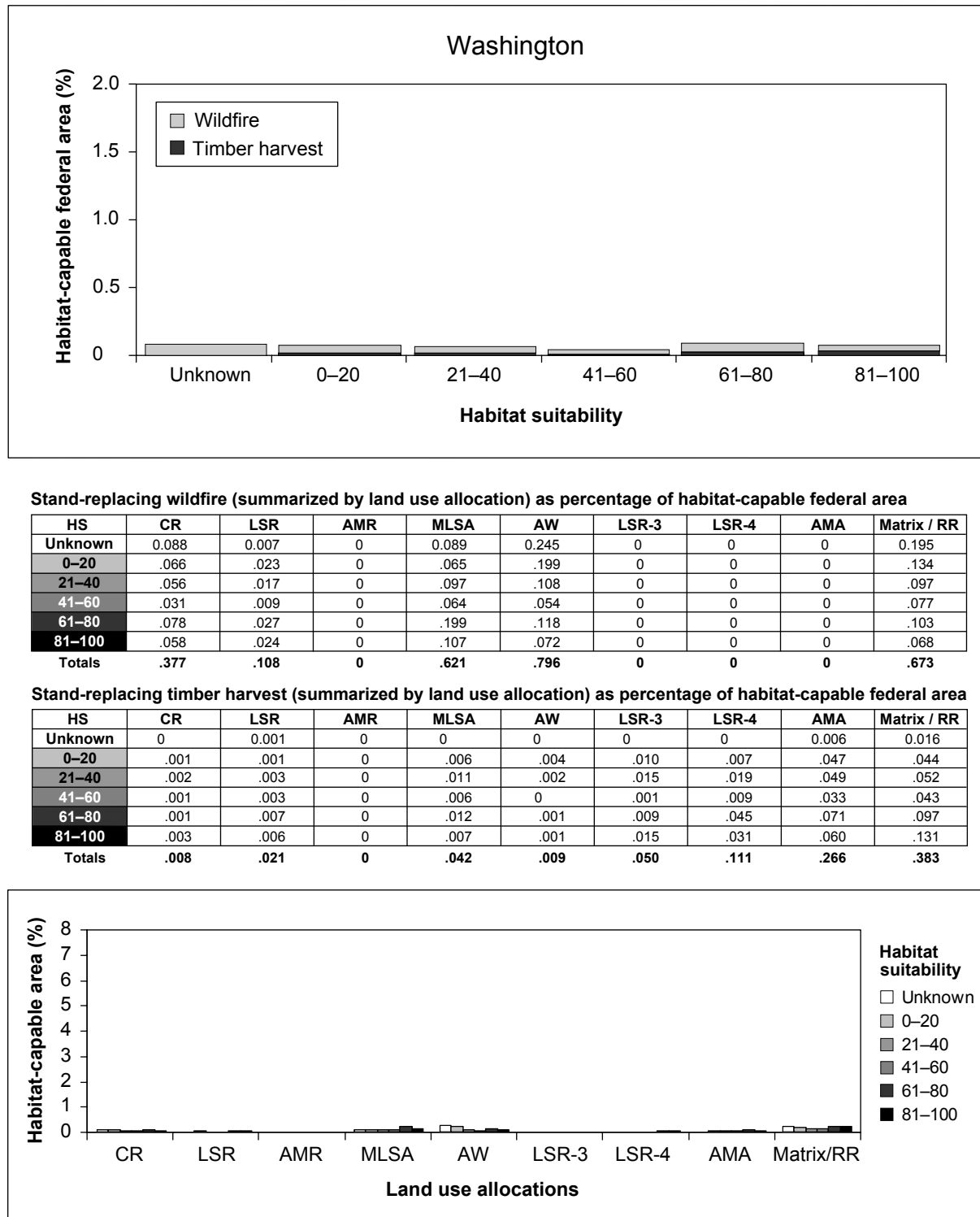


Figure H-2—Top histogram shows the percentage of habitat-capable area lost to stand-replacing timber harvest and wildfire in Washington during the first decade of Plan implementation. The tables in the middle of the figure show the percentage of habitat-capable area lost to timber harvest and wildfire within a land use allocation. The histogram at the bottom shows the loss from timber harvest and wildfire within each land use allocation.

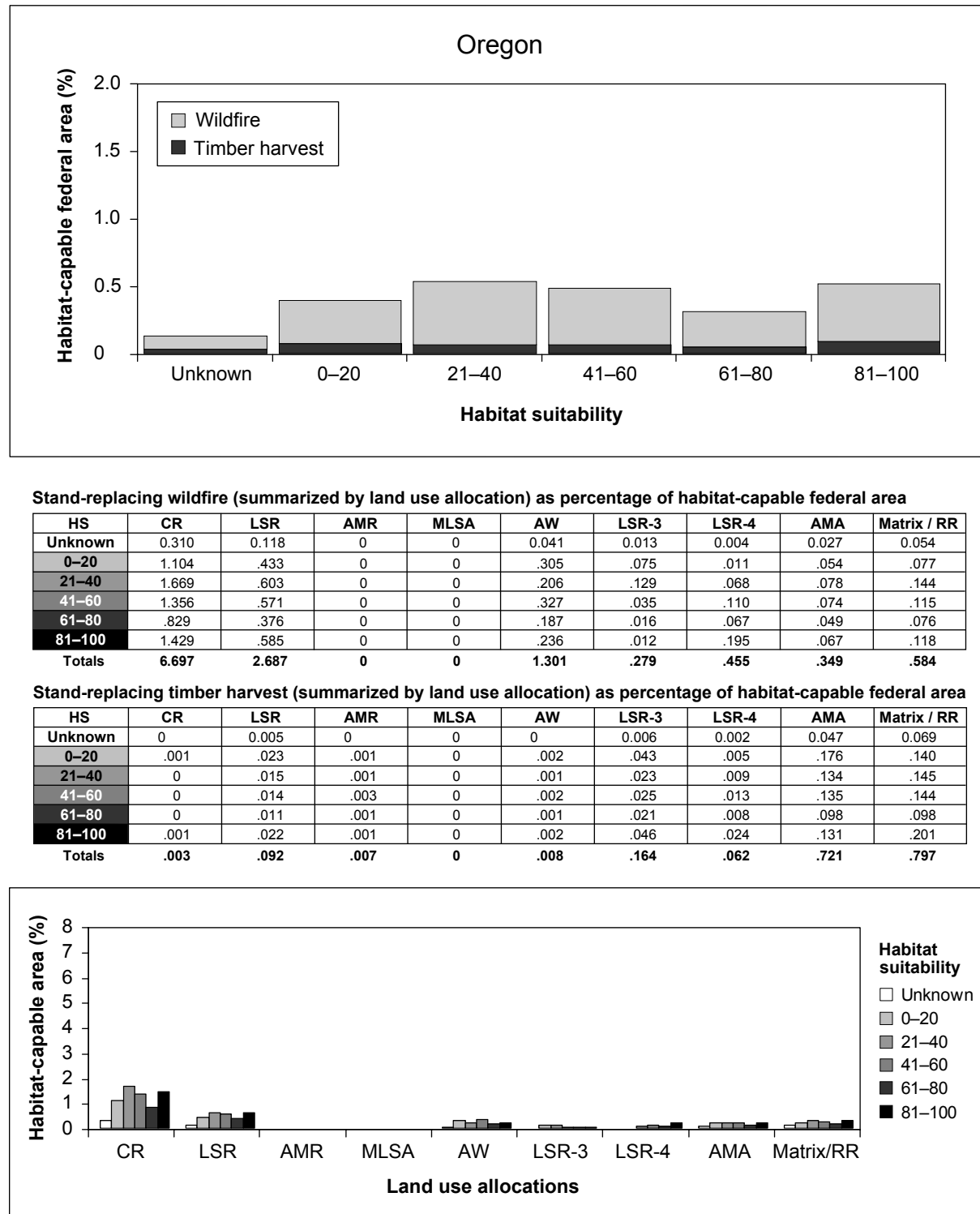


Figure H-3—Top histogram shows the percentage of habitat-capable area lost to stand-replacing timber harvest and wildfire in Oregon during the first decade of Plan implementation. The tables in the middle of the figure show the percentage of habitat-capable area lost to timber harvest and wildfire within a land use allocation. The histogram at the bottom shows the loss from timber harvest and wildfire within each land use allocation.

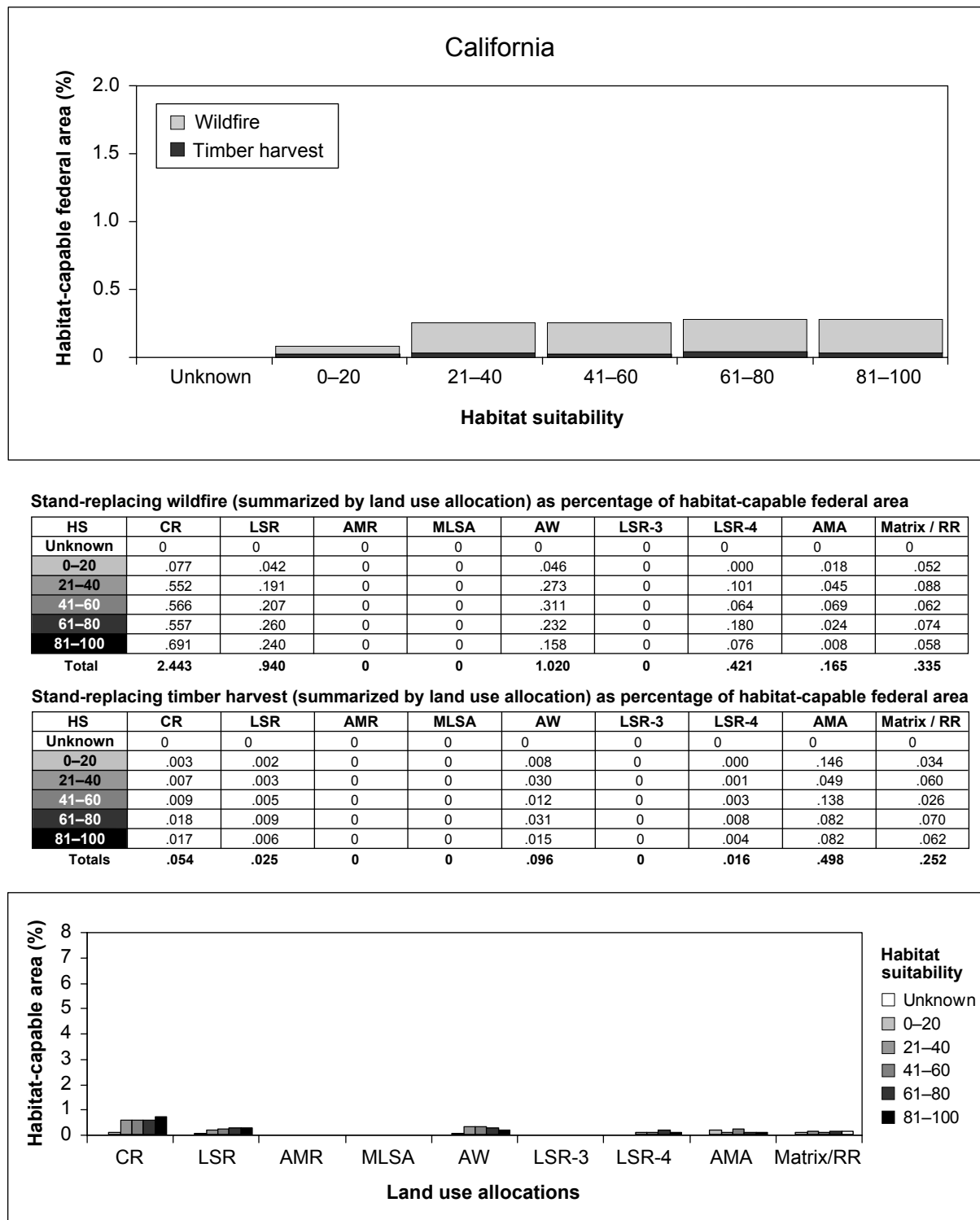


Figure H-4—Top histogram shows the percentage of habitat-capable area lost to stand-replacing timber harvest and wildfire in California during the first decade of Plan implementation. The tables in the middle of the figure show the percentage of habitat-capable area lost to timber harvest and wildfire within a land use allocation. The histogram at the bottom shows the loss from timber harvest and wildfire within each land use allocation.

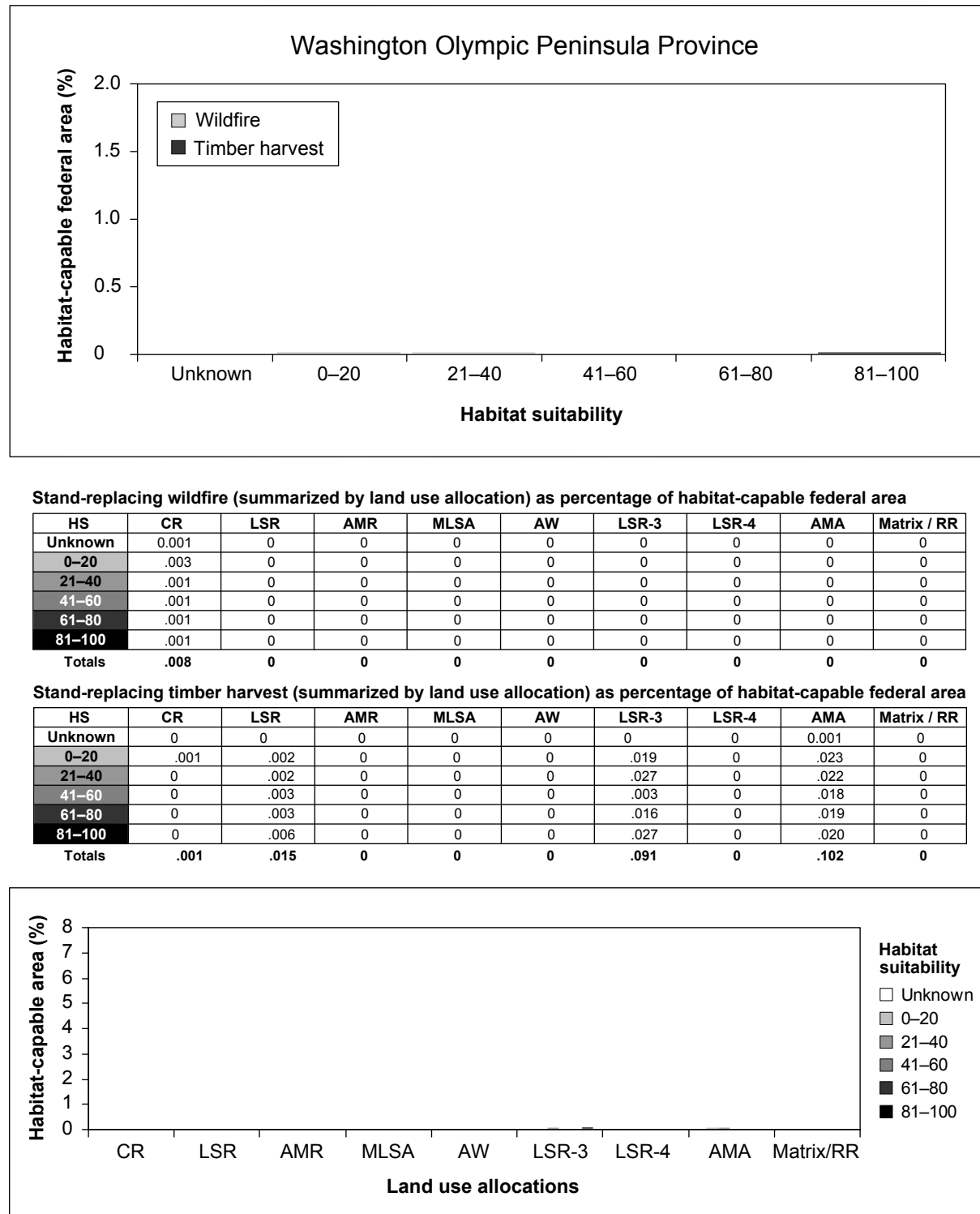


Figure H-5—Top histogram shows the percentage of habitat-capable area lost to stand-replacing timber harvest and wildfire in the Olympic Peninsula province of Washington during the first decade of Plan implementation. The tables in the middle of the figure show the percentage of habitat-capable area lost to timber harvest and wildfire within a land use allocation. The histogram at the bottom shows the loss from timber harvest and wildfire within each land use allocation.

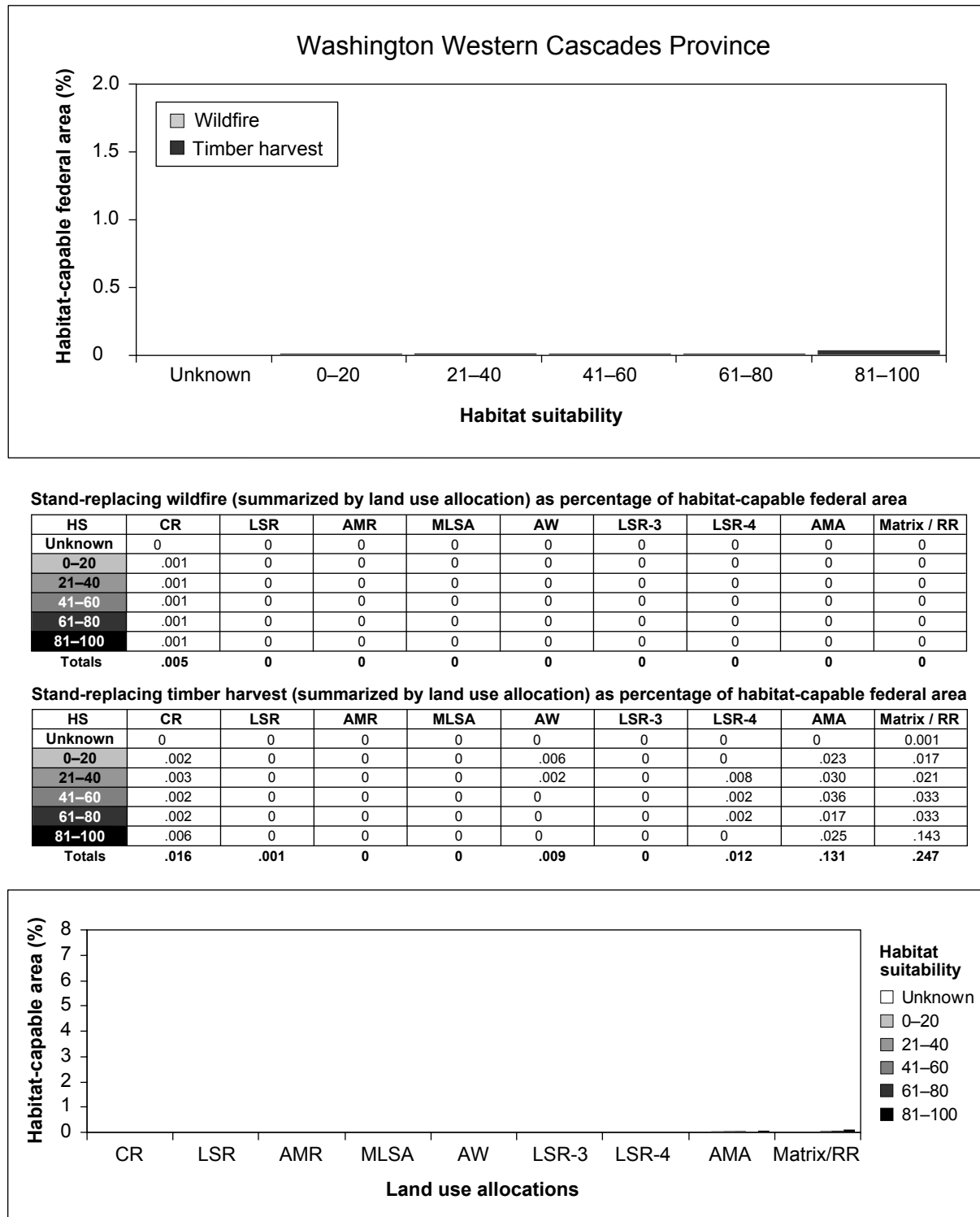


Figure H-6—Top histogram shows the percentage of habitat-capable area lost to stand-replacing timber harvest and wildfire in the Western Cascades province of Washington during the first decade of Plan implementation. The tables in the middle of the figure show the percentage of habitat-capable area lost to timber harvest and wildfire within a land use allocation. The histogram at the bottom shows the loss from timber harvest and wildfire within each land use allocation.

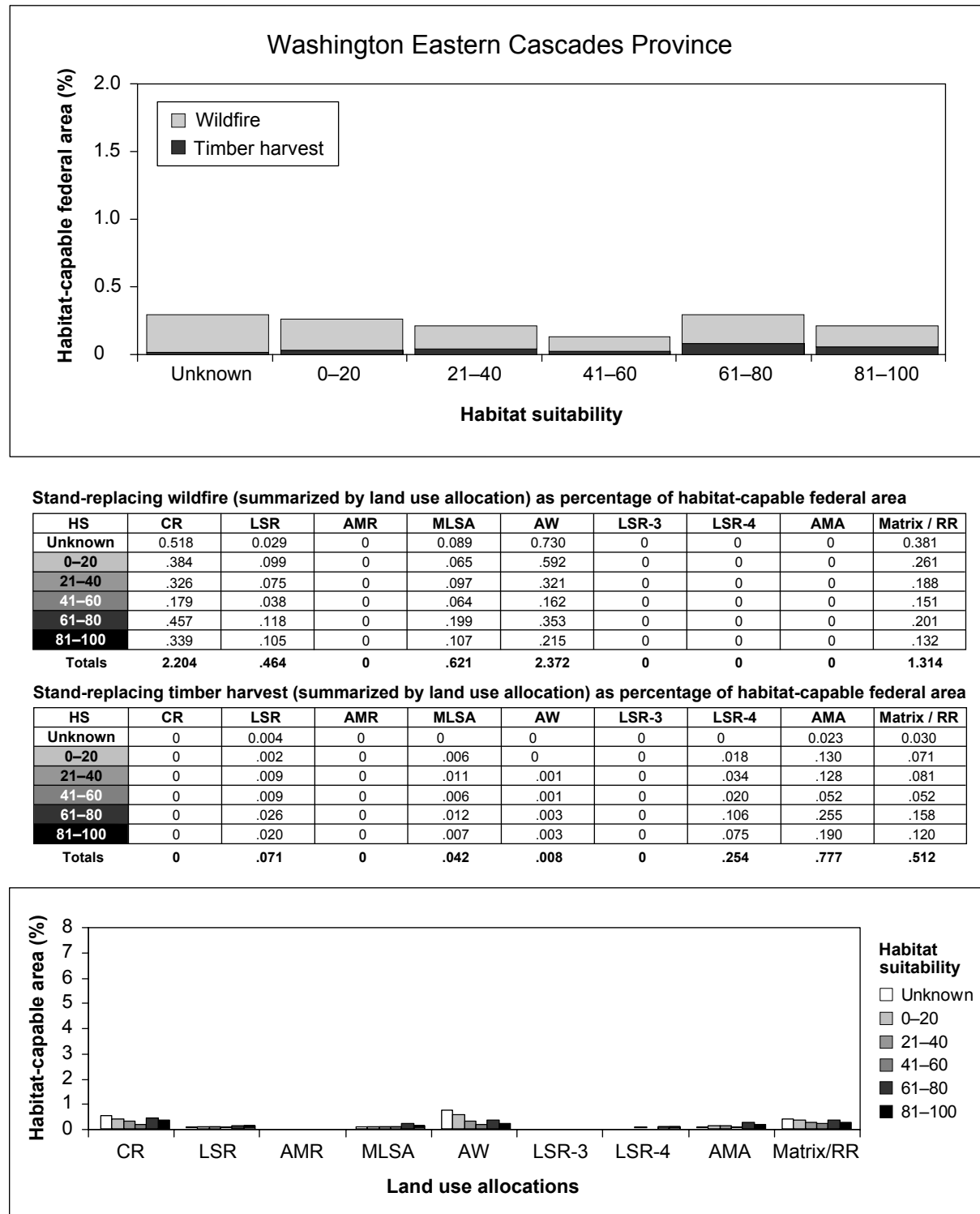


Figure H-7—Top histogram shows the percentage of habitat-capable area lost to stand-replacing timber harvest and wildfire in the Eastern Cascades province of Washington during the first decade of Plan implementation. The tables in the middle of the figure show the percentage of habitat-capable area lost to timber harvest and wildfire within a land use allocation. The histogram at the bottom shows the loss from timber harvest and wildfire within each land use allocation.

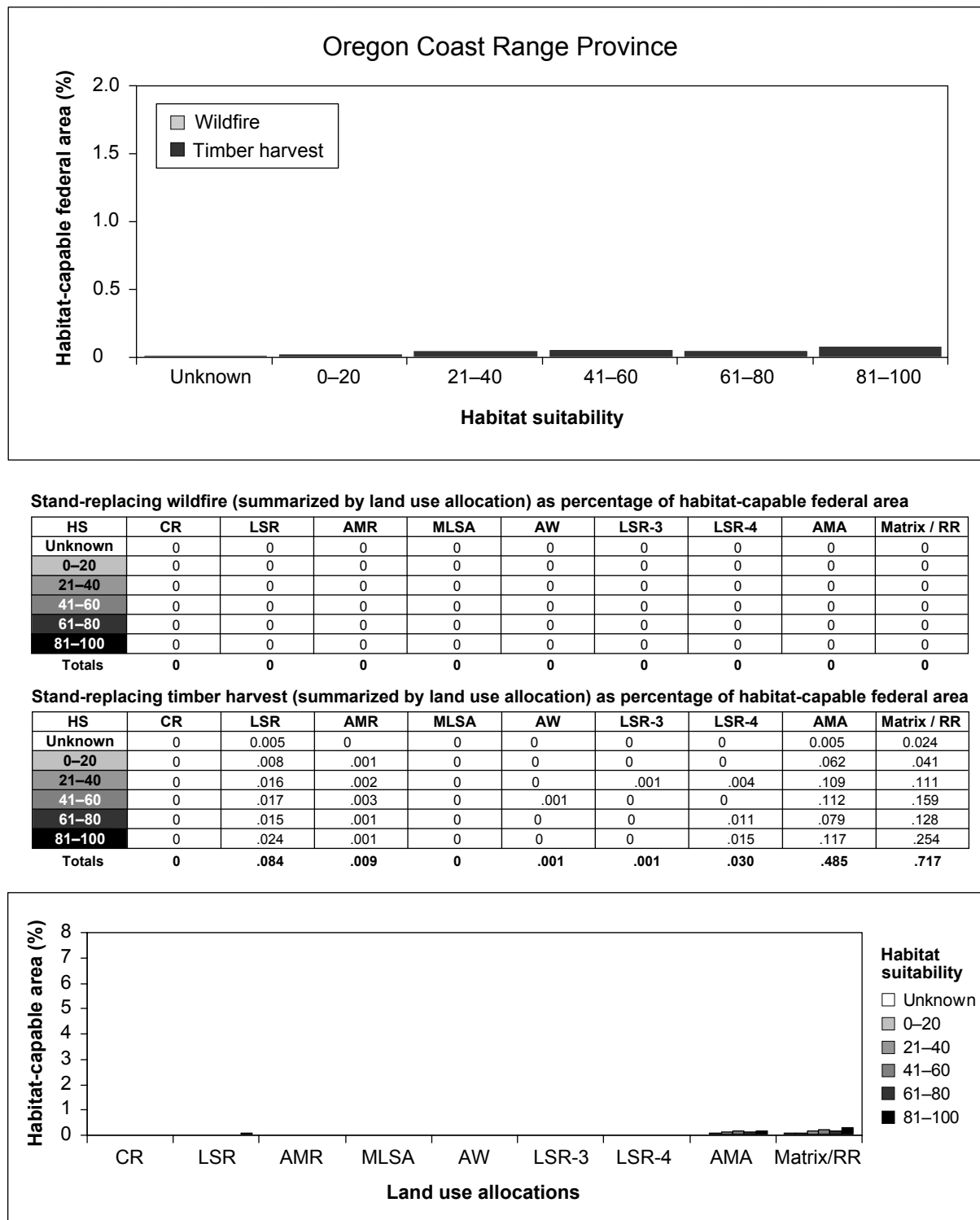


Figure H-8—Top histogram shows the percentage of habitat-capable area lost to stand-replacing timber harvest and wildfire the Coast Range province of Oregon during the first decade of Plan implementation. The tables in the middle of the figure show the percentage of habitat-capable area lost to timber harvest and wildfire within a land use allocation. The histogram at the bottom shows the loss from timber harvest and wildfire within each land use allocation.

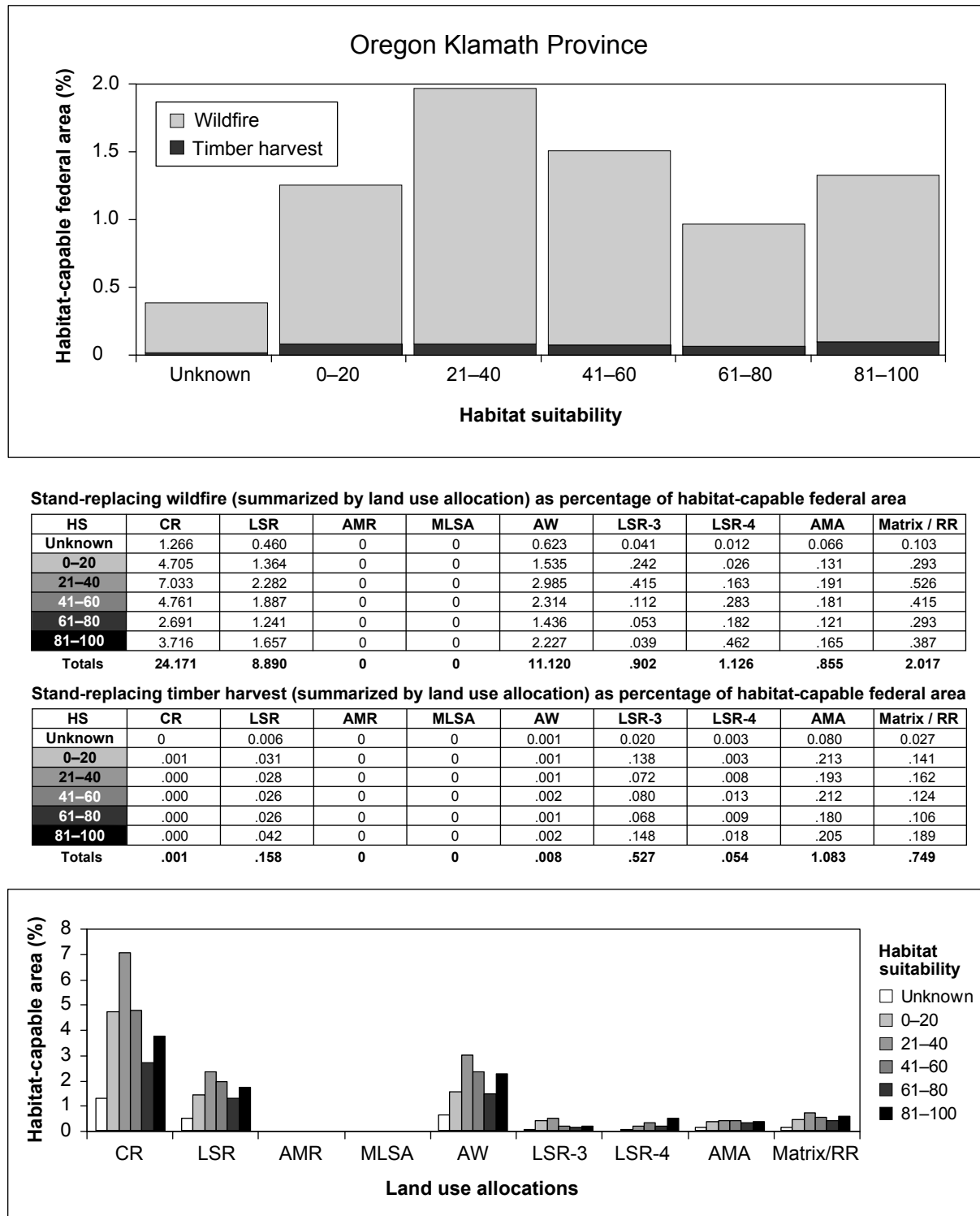


Figure H-9—Top histogram shows the percentage of habitat-capable area lost to stand-replacing timber harvest and wildfire in the Klamath province of Oregon during the first decade of Plan implementation. The tables in the middle of the figure show the percentage of habitat-capable area lost to timber harvest and wildfire within a land use allocation. The histogram at the bottom shows the loss from timber harvest and wildfire within each land use allocation.

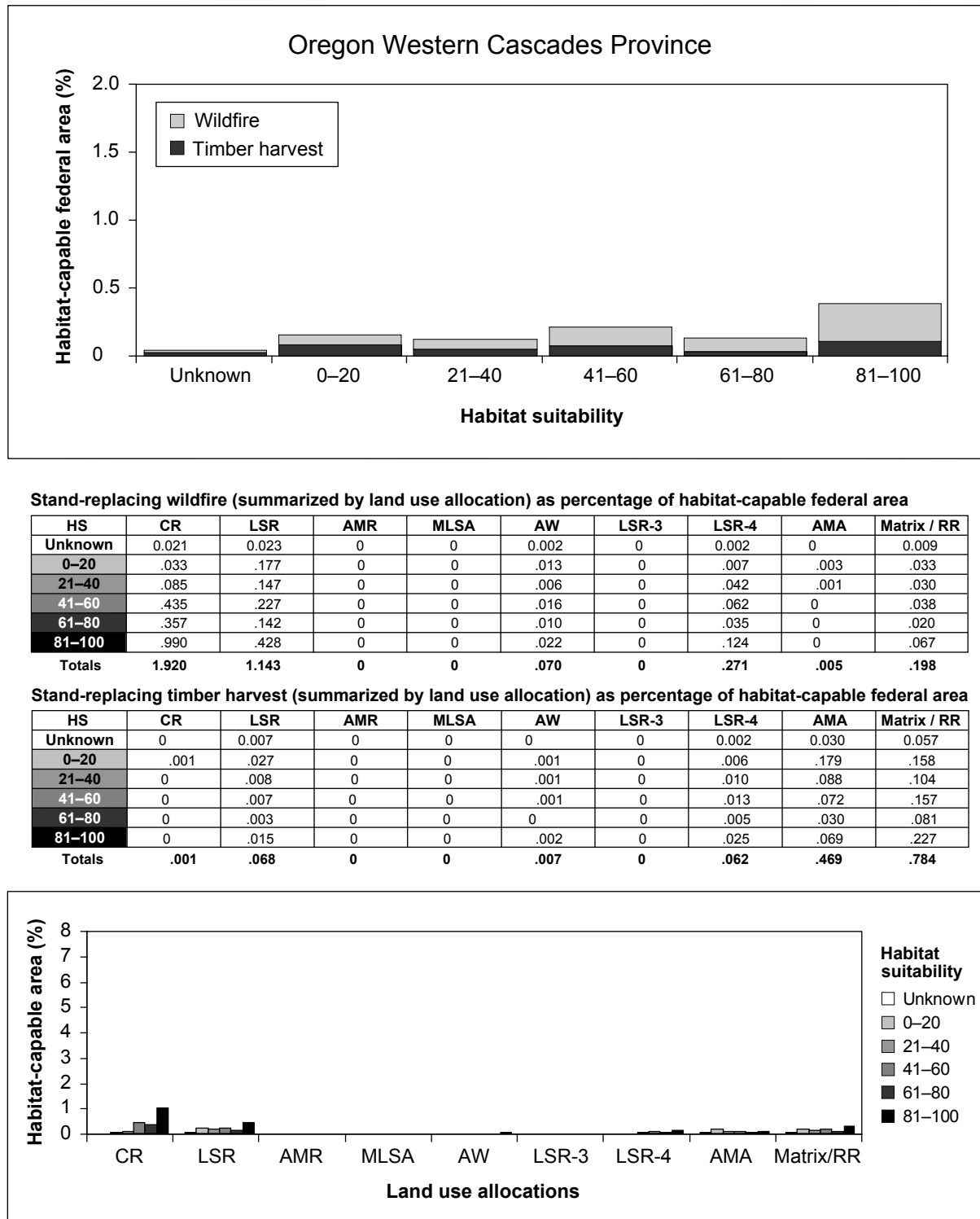


Figure H-10—Top histogram shows the percentage of habitat-capable area lost to stand-replacing timber harvest and wildfire in the Western Cascades province of Oregon during the first decade of Plan implementation. The tables in the middle of the figure show the percentage of habitat-capable area lost to timber harvest and wildfire within a land use allocation. The histogram at the bottom shows the loss from timber harvest and wildfire within each land use allocation.

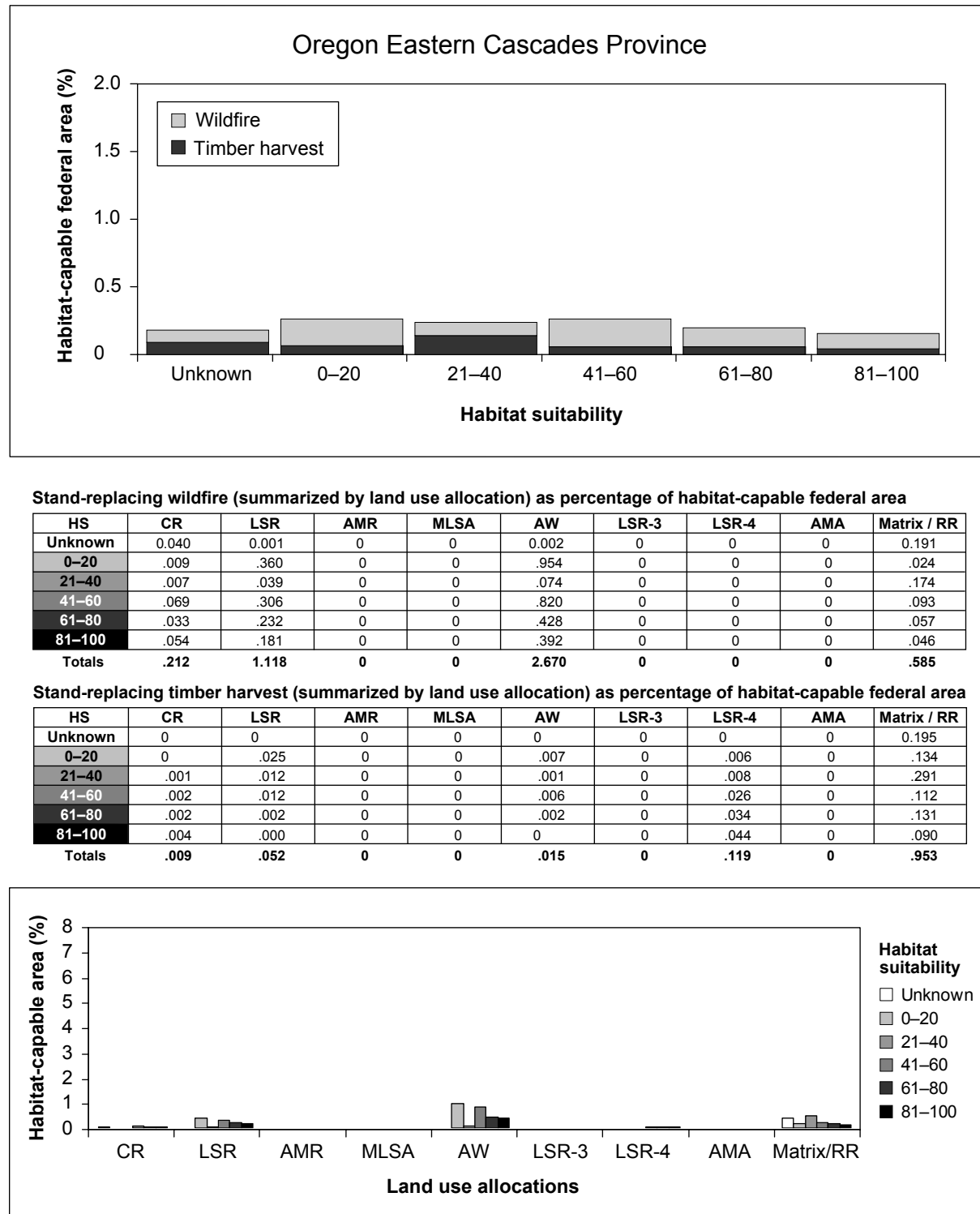


Figure H-11—Top histogram shows the percentage of habitat-capable area lost to stand-replacing timber harvest and wildfire in the Eastern Cascades province of Oregon during the first decade of Plan implementation. The tables in the middle of the figure show the percentage of habitat-capable area lost to timber harvest and wildfire within a land use allocation. The histogram at the bottom shows the loss from timber harvest and wildfire within each land use allocation.

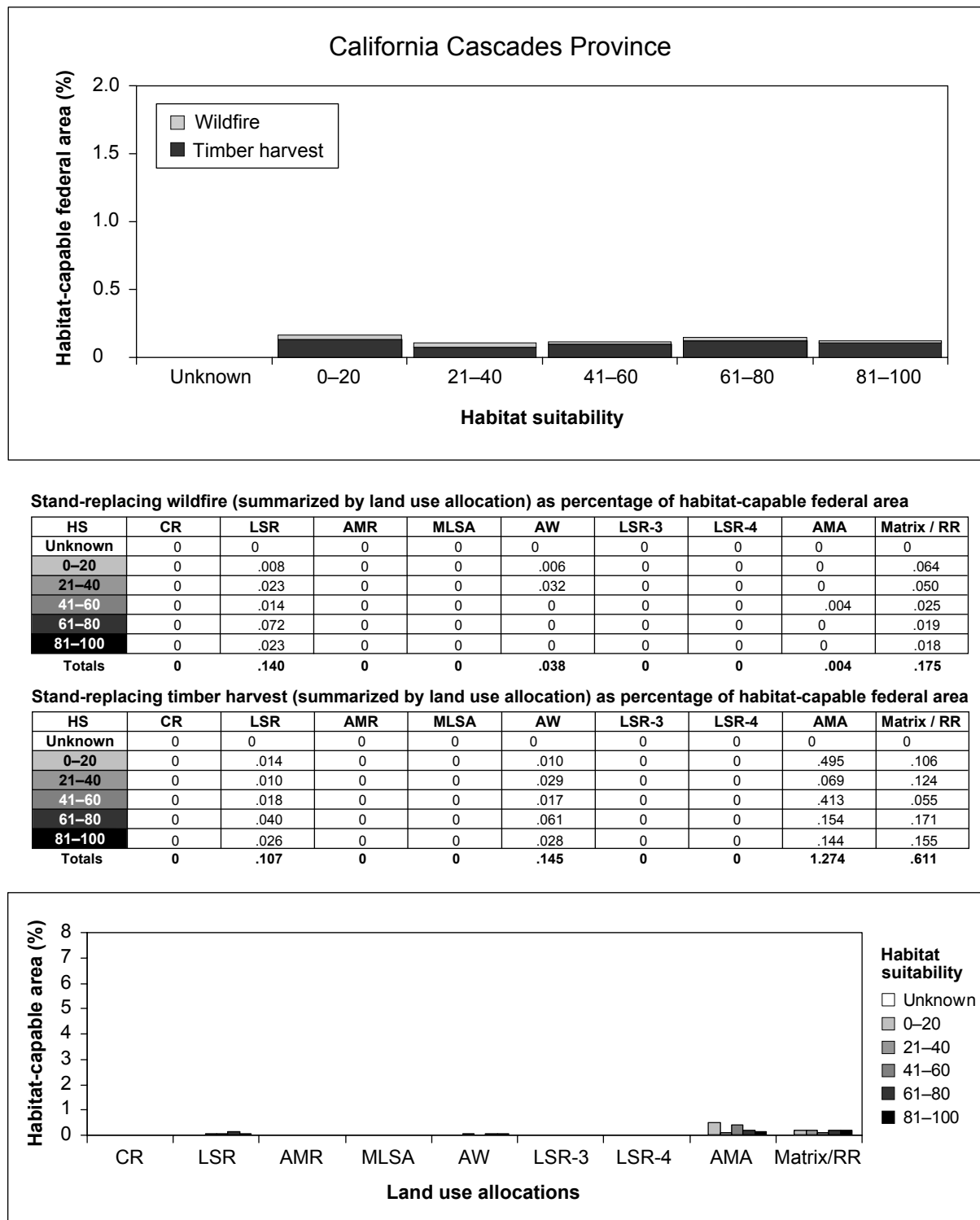


Figure H-12—Top histogram shows the percentage of habitat-capable area lost to stand-replacing timber harvest and wildfire in the Cascades province of California during the first decade of Plan implementation. The tables in the middle of the figure show the percentage of habitat-capable area lost to timber harvest and wildfire within a land use allocation. The histogram at the bottom shows the loss from timber harvest and wildfire within each land use allocation.

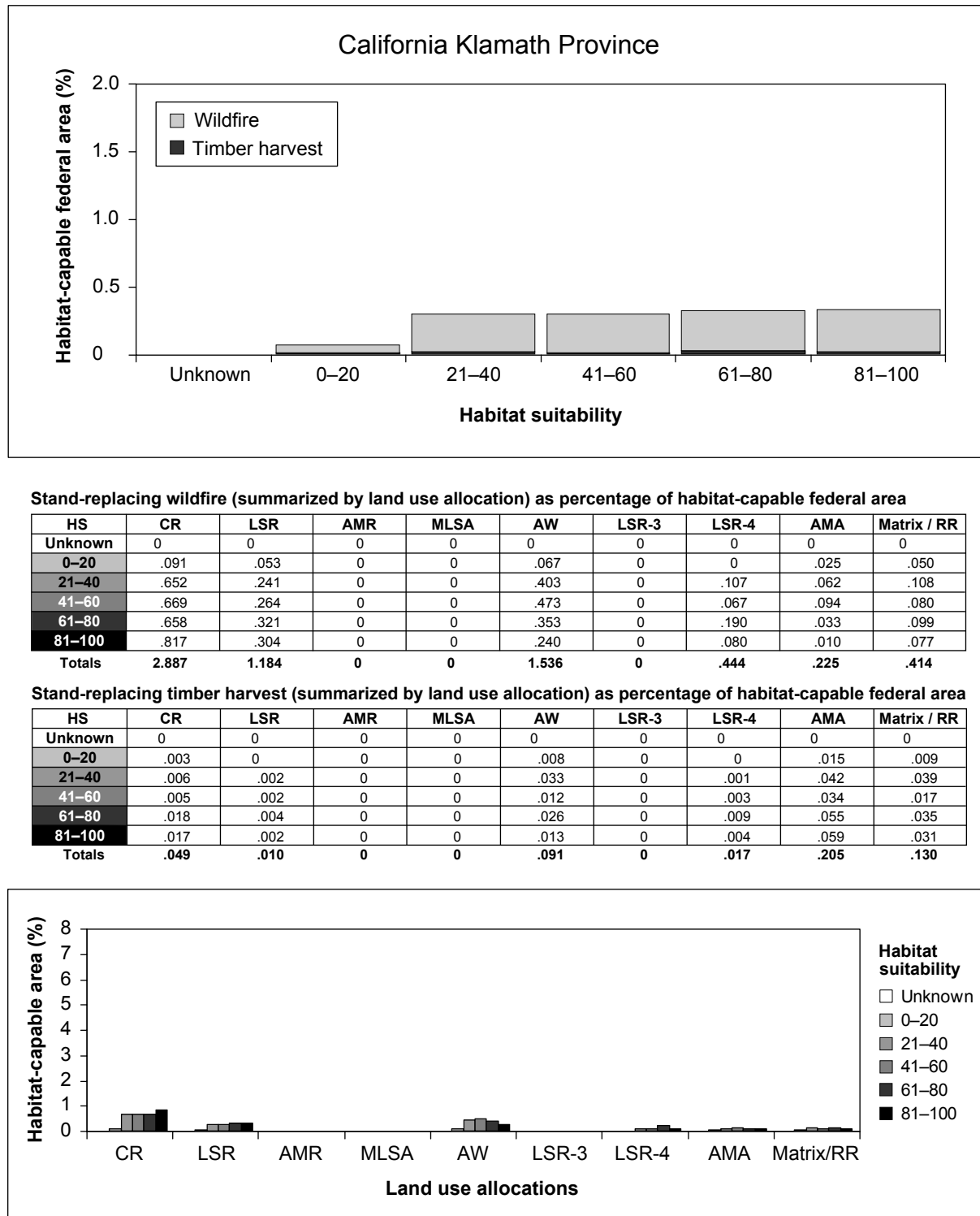


Figure H-13—Top histogram shows the percentage of habitat-capable area lost to stand-replacing timber harvest and wildfire in the Klamath province of California during the first decade of Plan implementation. The tables in the middle of the figure show the percentage of habitat-capable area lost to timber harvest and wildfire within a land use allocation. The histogram at the bottom shows the loss from timber harvest and wildfire within each land use allocation.

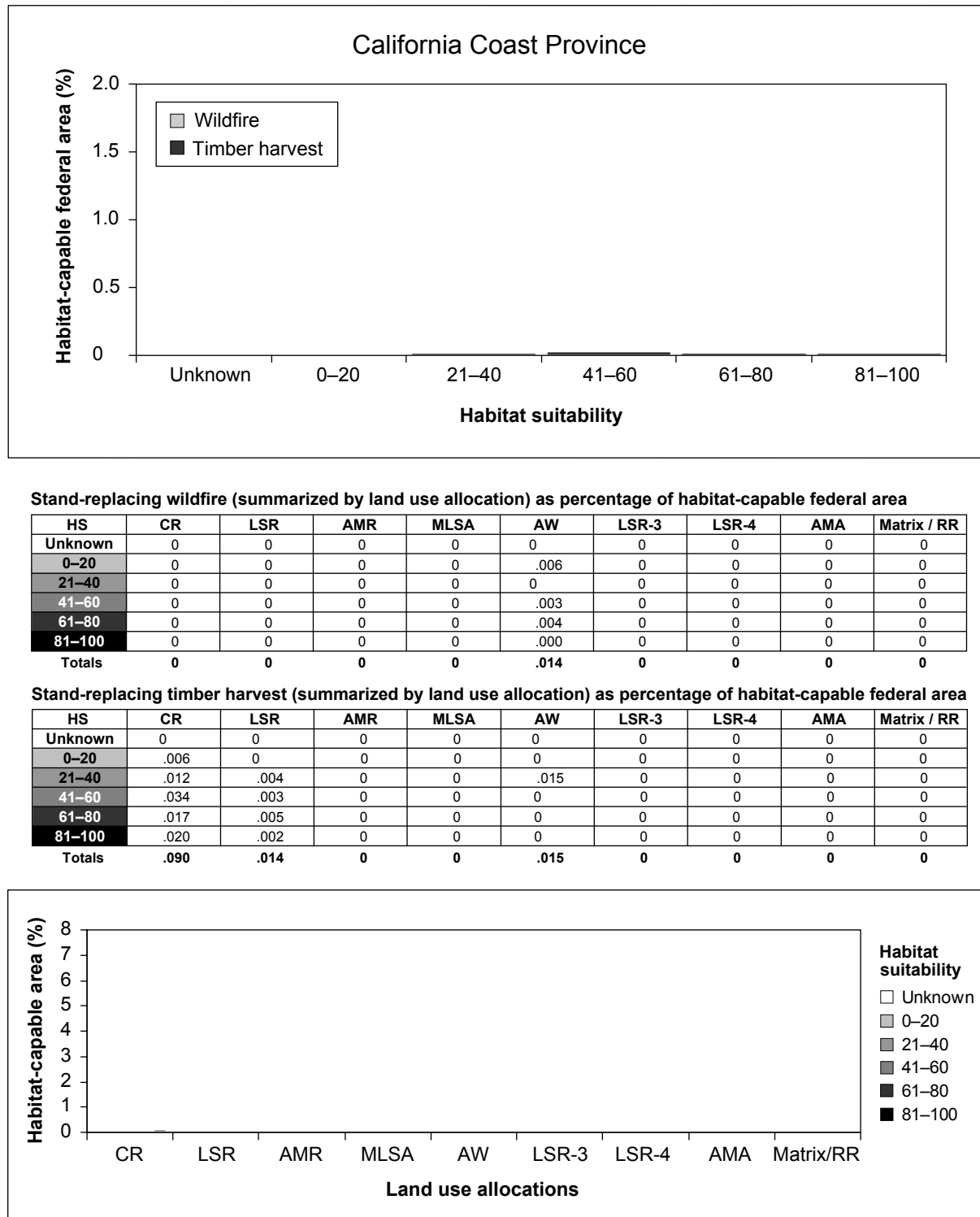


Figure H-14—Top histogram shows the percentage of habitat-capable area lost to stand-replacing timber harvest and wildfire in the Coast province of California during the first decade of Plan implementation. The tables in the middle of the figure show the percentage of habitat-capable area lost to timber harvest and wildfire within a land use allocation. The histogram at the bottom shows the loss from timber harvest and wildfire within each land use allocation.

Appendix I—Spotted Owl Dispersal Habitat Maps



Figure I-1—Spotted owl dispersal habitat for dispersal-capable federal land in the Olympic Peninsula province in Washington.



Figure I-2—Spotted owl dispersal habitat for dispersal-capable federal land in the Western Cascades province in Washington.

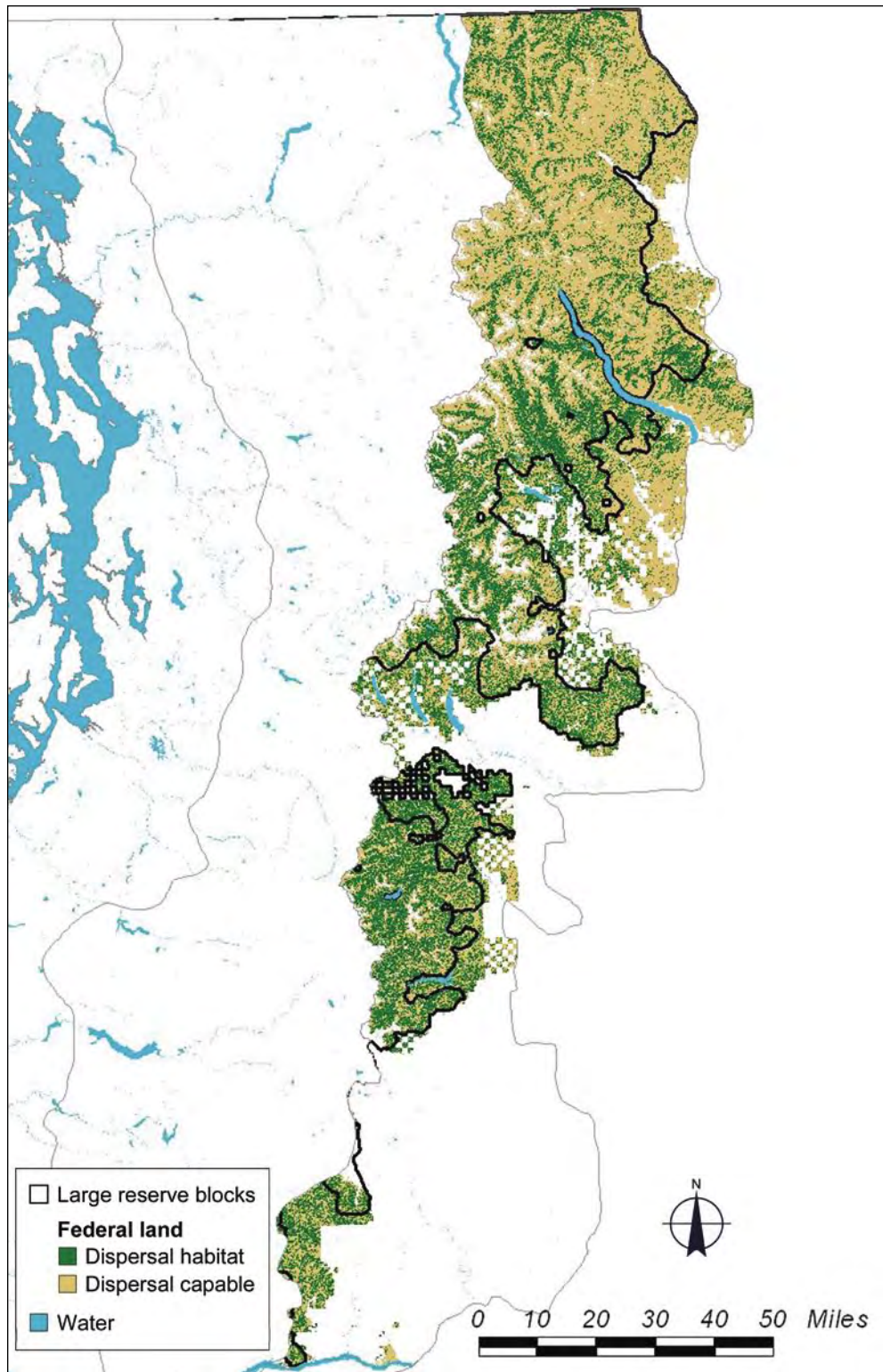


Figure I-3—Spotted owl dispersal habitat for dispersal-capable federal land in the Eastern Cascades province in Washington.

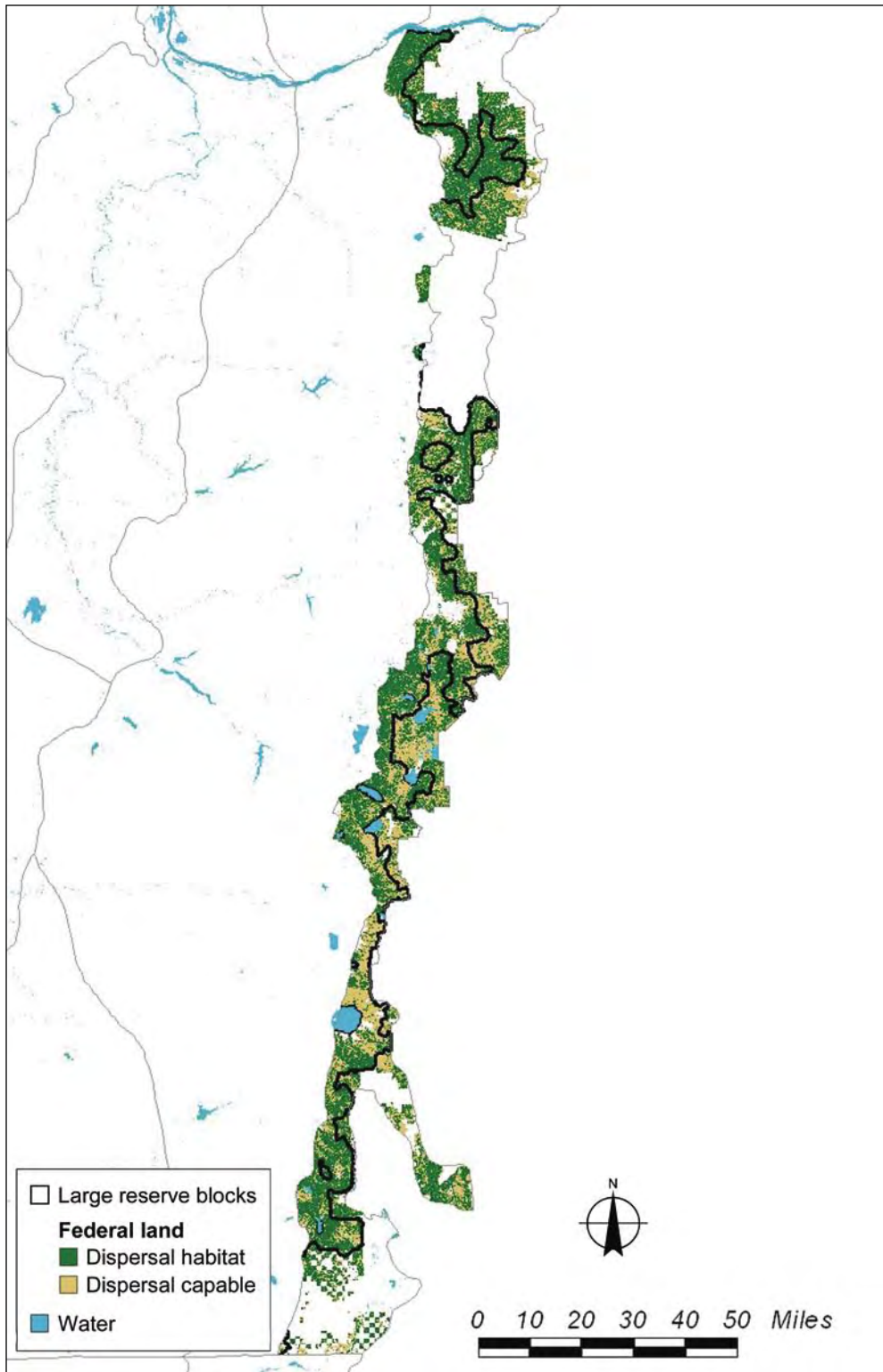


Figure I-4—Spotted owl dispersal habitat for dispersal-capable federal land in the Eastern Cascades province in Oregon.

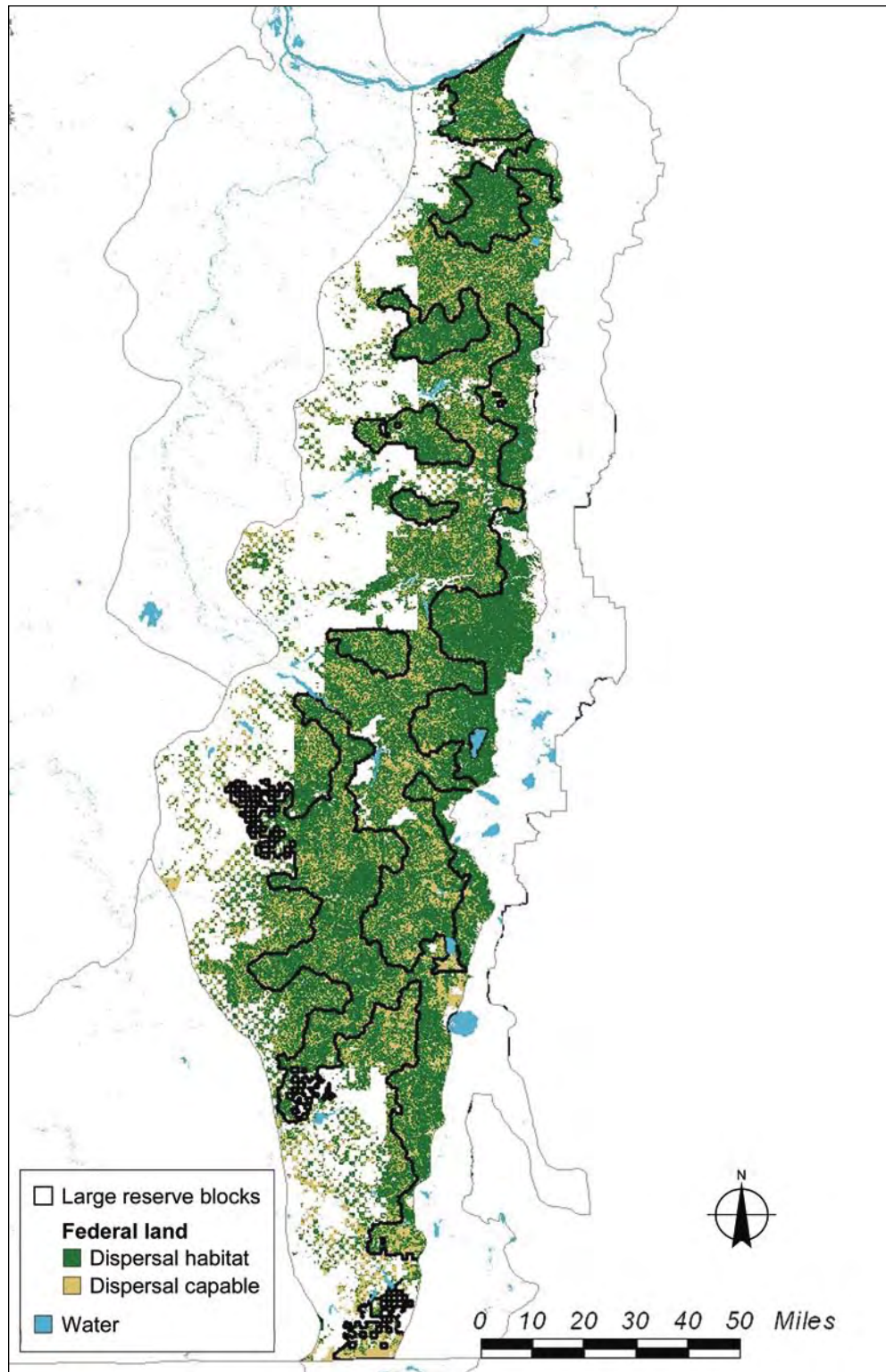


Figure I-5—Spotted owl dispersal habitat for dispersal-capable federal land in the Western Cascades province in Oregon.



Figure I-6—Spotted owl dispersal habitat for dispersal-capable federal land in the Coast Range province in Oregon.

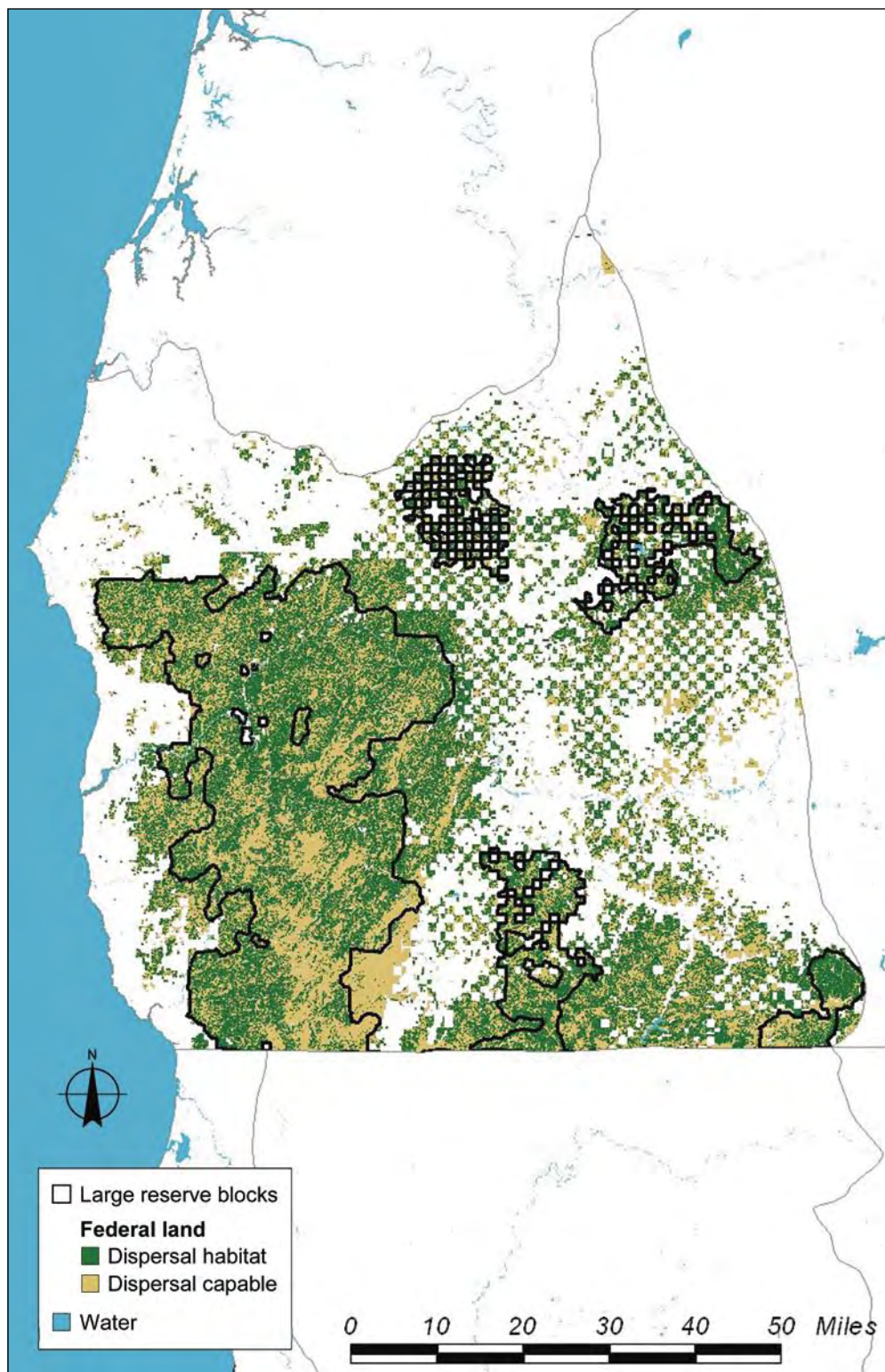


Figure I-7—Spotted owl dispersal habitat for dispersal-capable federal land in the Klamath province in Oregon.

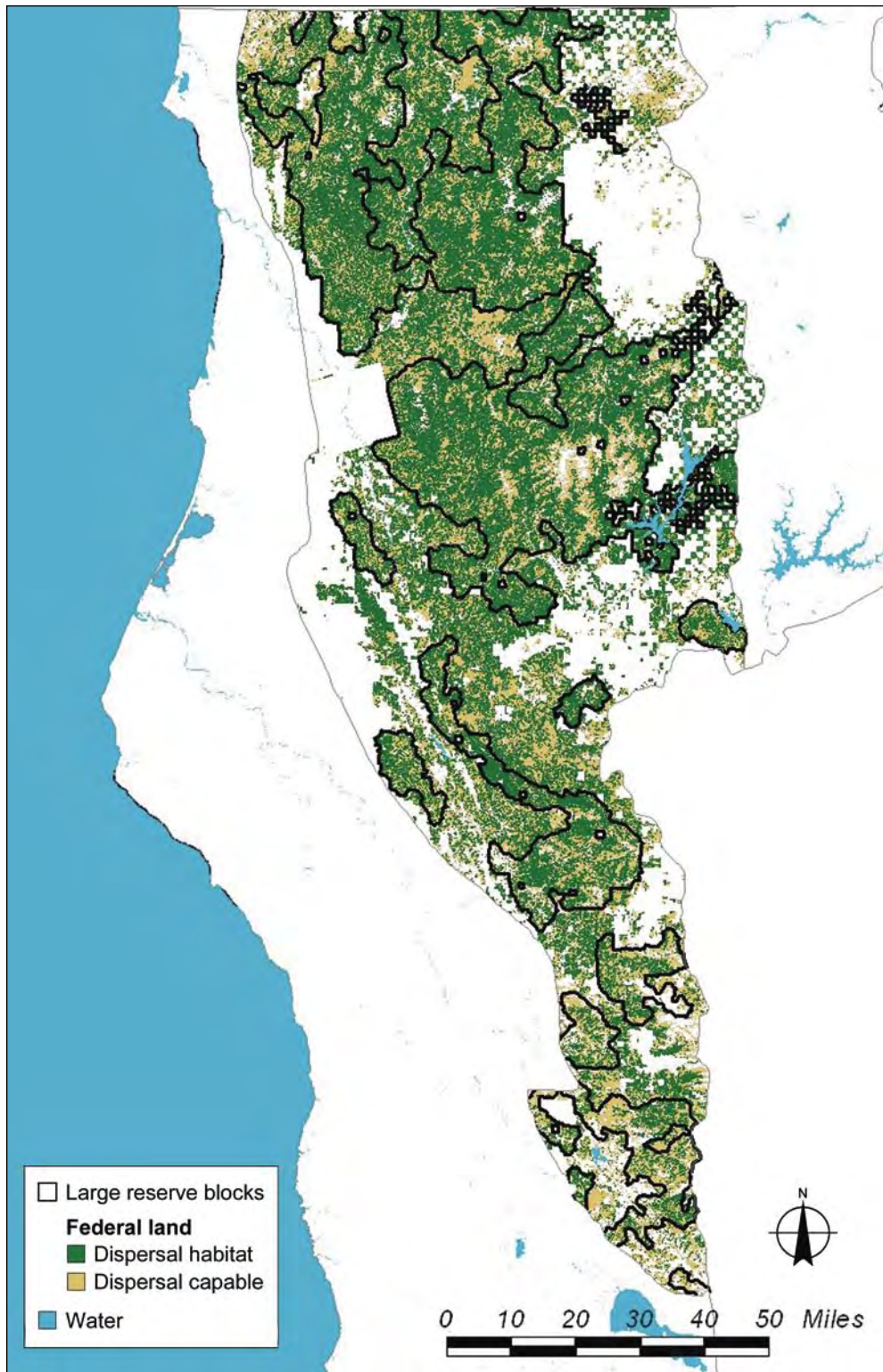


Figure I-8—Spotted owl dispersal habitat for dispersal-capable federal land in the Klamath province in California.

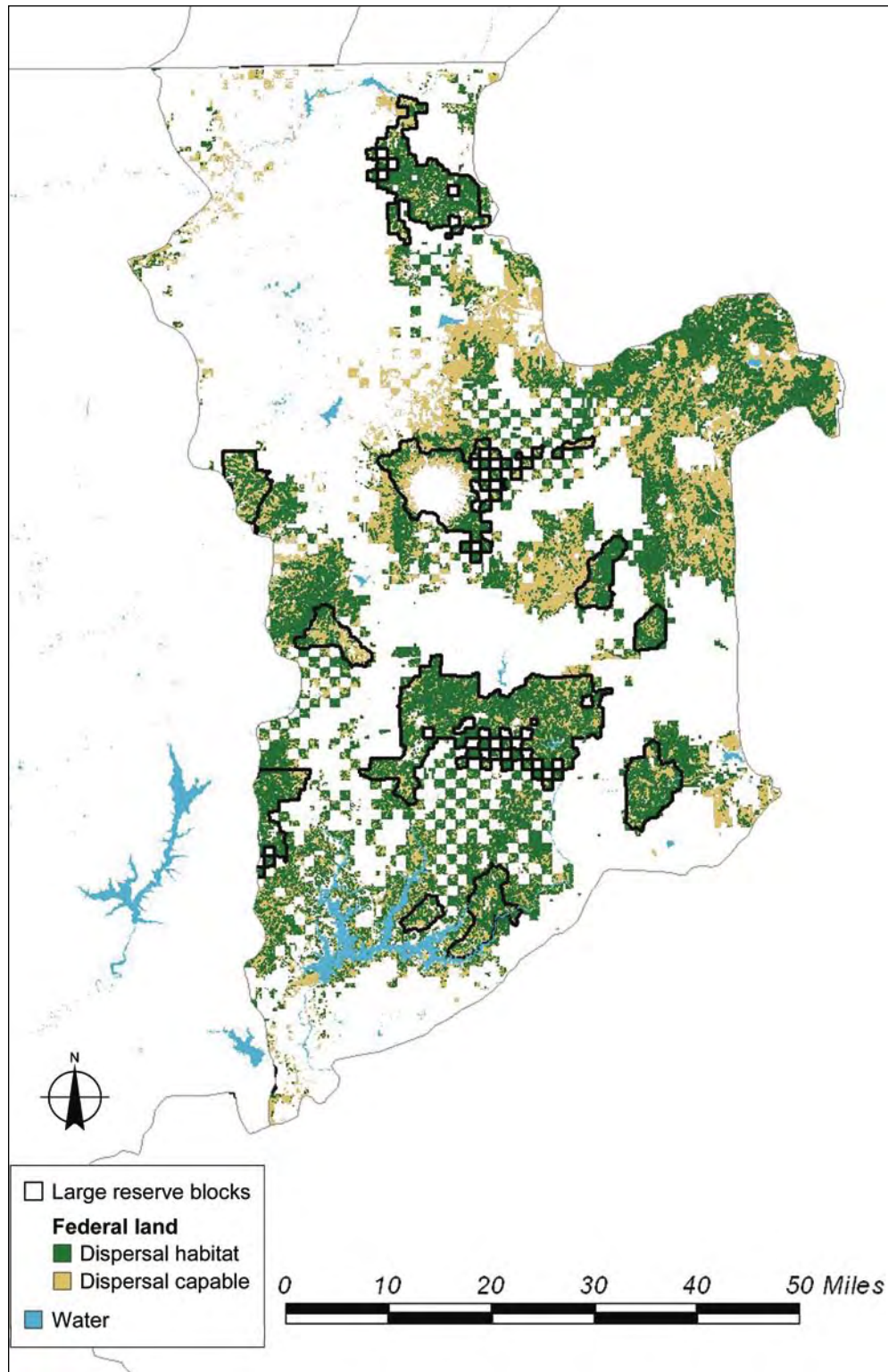



Figure I-9—Spotted owl dispersal habitat for dispersal-capable federal land in the Cascades province in California.



Figure I-10—Spotted owl dispersal habitat for dispersal-capable federal land in the Coast province in California.

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