Predictive Mapping of Forest Composition and Structure Using Direct Gradient Analysis and Nearest-Neighbor Imputation Janet L. Ohmann, USDA Forest Service, Corvallis, OR 97331 USA Matthew J. Gregory, Oregon State University, Corvallis, OR 97331 USA

Introduction

Spatially explicit information on the species composition and structure of forest vegetation at broad spatial scales is needed for ecological research, bioregional assessment, and policy analysis. Satellite remote sensing has been successfully used to map broad forest classes, but more detailed information often is desired. We undertook a study in the Oregon coastal province with these **objectives**: (1) quantify spectral, environmental, and disturbance factors associated with regional gradients of tree species composition and structure; (2) develop

GIS-based tools that integrate field plot, remotely sensed, and mapped environmental data to map current vegetation; (3) produce vegetation maps (model predictions). We sought a method that would predict the co-occurrence of assemblages of species and structures, capture the full range of variability, and realistically portray spatial heterogeneity. We also desired a method that was consistent with a conceptual model of vegetation varying continuously along environmental gradients.



Private Public

0 - 50m

50 - 100m 100 - 200m 200 - 400m 400 - 800m 800 - 1300m Volcanic Mafic Sedimentary Other

deg C / In mm 1.883



tion
nip (public or private)
n (m) percent) osition, from 0 (bottom) to 100 (ridgetop) diation (cal/cm ²), from program SOLARRAD
: volcanic and intrusive rocks : mafic rocksmiocene and older ntary
recipitation from May-September (nat. log, mm) ent of variation of December and July precipitation p-season moisture stress (SMRTMP/SMRPRE) nual temperature (C) max. temperature - December min. temperature (C) stratus ceiling <1,524 m and visibility <8 km (percer

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17 - 121









Explanatory variables	Species model	Structure model
Ownership	N/A	4.8
Topography	3.9	4.9
Geology	0.5	1.7
Climate	7.7	8.8
Landsat TM	5.6	13.6
Location	5.8	5.0

Vegetation attribute		Mean	Range	Standard deviation	
Total basal area	Observed	29.2	0.1 - 124.9	20.4	
(BA) (m²/ha)	Predicted	28.2	0.1 - 124.9	21.8	
Broadleaf proportion	Observed	0.26	0.0 - 1.00	0.32	
(proportion of BA)	Predicted	0.25	0.0 - 1.00	0.32	
Quadratic mean	Observed	30.0	0.0 - 153.3	22.3	
diameter (cm)	Predicted	30.2	0.0 - 153.3	24.5	
Trees/ha >100 cm	Observed Predicted	2.2 2.4	0.0 - 54.4 0.0 - 54.4	6.4 6.8	
Stand Age (years)	Observed Predicted	45.6 31.4	0.0 - 718.0 0.0 - 718.0	45.3 38.5	
Tree species	Observed	2.9	0.0 - 11.0	1.7	
richness	Predicted	2.4	0.0 - 11.0	1.4	

