❖Standard 7: Select terrestrial, freshwater and marine conservation targets/biodiversity elements across multiple biological and spatial scales.

Case Study: **Analysis of Representation in the Klamath-Siskiyou Forests**

From: WWF (2002) Ecoregion Conservation: Securing Living Landscapes through science-based planning and action. A users guide for Ecoregion Conservation through examples from the field. Washington, DC.

Purpose and region of analysis

The highly variable habitats of the Klamath-Siskiyou ecoregion range from sea level to mountain peaks, from wet, virtual rain forests, to dry rain-shadow scrub. Knowledge of the distribution of species remains largely unknown here. Without such distribution data to assess representation of the species themselves, a surrogate, or proxy was used to predict the distribution of different habitat types. This proxy of habitat distribution served as the basis for the representation analysis.

Criteria/Methods

In order to develop a surrogate, a model of habitat heterogeneity was created by combining an analysis of the climatic variation within the ecoregion with a coarse vegetation map. The climate analysis was based on variation in characteristics of temperature and precipitation (Vance-Borland 1999). A principal components analysis identified the specific factors of precipitation and temperature that were most responsible for regional climate variation. They were:

- mean annual precipitation,
- December/July precipitation difference,
- mean annual temperature, and
- July/January temperature difference.

The coarser canopy vegetation/climate map was then refined by combining it with soil data (data representing finer-scale physical habitat). Soils data were obtained from STATSGO. Soil was described according to mean soil depth and available water capacity. The soil data helped to fine tune the vegetation map, because the vegetation classification is based on the single dominant overstory species and does not account for the variation in the herbaceous plant communities that occurs below canopy. These changes in understory plant communities likely affect invertebrate, and even vertebrate, community compositions that are responding to changes in microclimate and other factors that do not alter the dominant trees. Soil is known to be an important determinant of species distributions in the ecoregion. This way, the model incorporates the variation (beta diversity) caused by physical habitat gradients within each vegetation type, rather than just the overstory vegetation map. The climatological, soil, and coarse vegetation data sets were combined via matrix algebra (combining all values for each cell) with a GIS.

The units created in the proxy were analyzed for representation in existing protected areas. This required a GIS-based Gap Analysis (representation analysis that identifies where the gaps are in the existing protection) that compared the distribution of protected areas with heterogeneity according to the proxy. Representation was first examined based on the existing reserve system with percent representation values calculated for each representation class. Representation was incorporated into the roadless areas assessment by assigning percent representation values for each roadless area. The lower the values, the more desirable the roadless area based on representation. Highest scoring roadless areas were added to the reserve design and overall representation examined again.

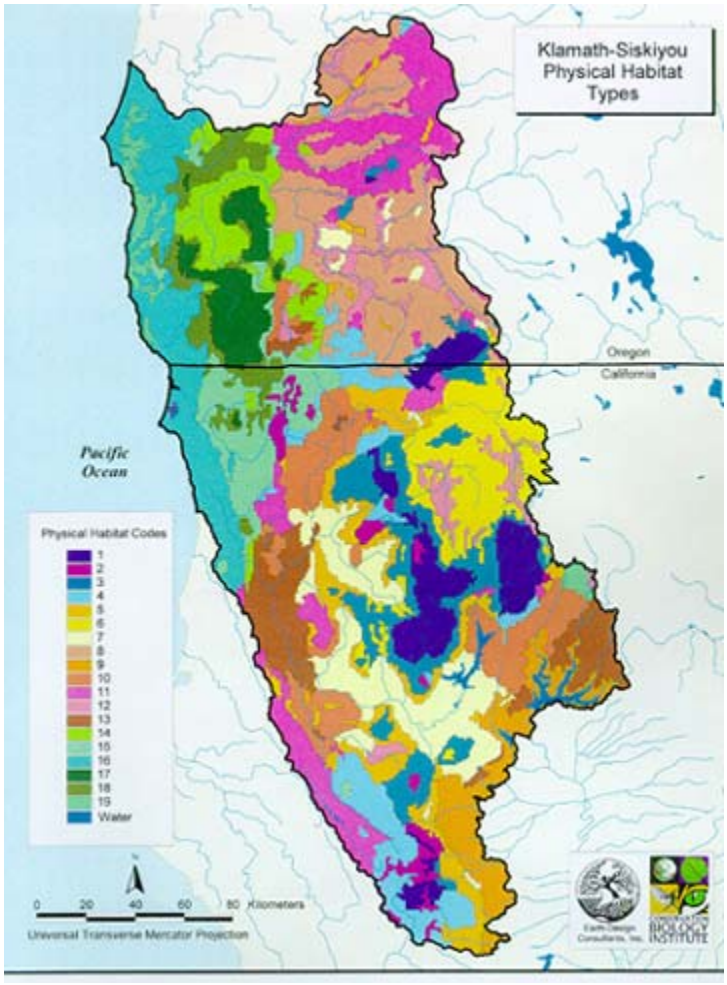
Products/Outcomes

A total of 19 physical zones were delineated for the entire ecoregion (see table right and map below). The table on the right summarizes the 19 physical habitat types as they occurred in the ecoregion.

Physical zones for representation proxy

Class	Habitat Type	Area (ha)	Percent
1	High cold	217,715	5.08
2	High cool poor	72,510	1.69
3	High cool	272,414	6.35
4	High cool moist	218,394	5.09
5	Low moderate	251,400	5.86
6	Low dry cool	255,341	5.95
7	Low warm	316,976	7.39
8	Low fertile	451,125	10.52
9	Low hot	195,674	4.56
10	Low warm moist	275,666	6.43
11	High moist fertile	371,193	8.65
12	Low dry fertile	157,760	3.68
13	Low warm moist fertile	211,009	4.92
14	Coastal warm moist fertile	170,219	3.97
15	Coastal cool moist	196,722	4.59
16	Coastal moist fertile lowlands	320,363	7.47
17	Coastal wet highlands	130,649	3.05
18	Coastal wet fertile	138,130	3.22
19	Coastal rich lowlands	66,152	1.54

Totals		***4,289,413***	***100.00***

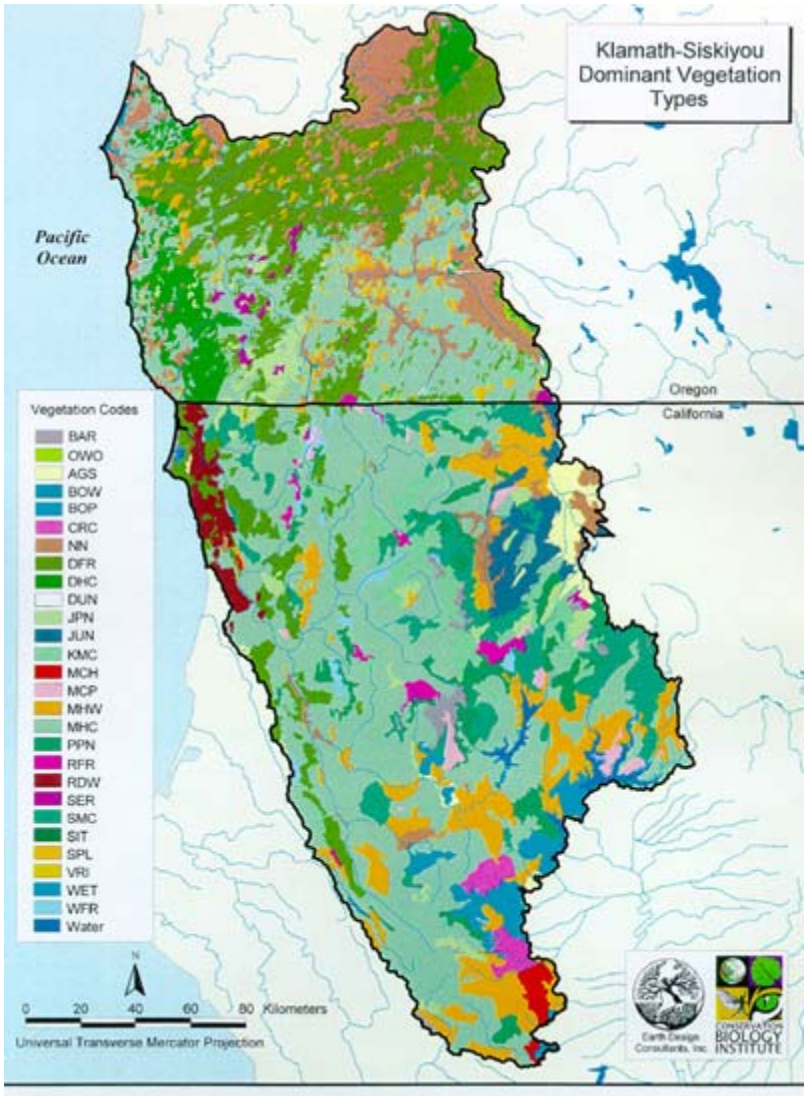


Twenty six vegetation classes were delineated and analyzed for occurrence in the ecoregion. All vegetation classes smaller than 500 total acres were dropped from the analysis and recoded to the vegetation class of its nearest neighbor. Some 8.5% of the study area was considered either not natural (e.g., urban and converted agriculture) or water and was removed from the analysis. Unlike the physical habitat map, the vegetation data layer is dominated by only a few dominant vegetation types (MHC – Montane Hardwood Conifer, DFR – Douglas-fir forests, and MHW – Montane Hardwood). The other vegetation types, while covering much smaller areas, are equally important to assess and adequately capture in a reserve design network.

Area summaries for the 28 vegetation types in the ecoregion

Class	Area (ha)	Percent
AGS	54,905	1.28
BAR	34,193	0.80
BOP	84,170	1.96
BOW	4,459	0.10
CRC	33,493	0.78
DFR	646,679	15.08
DHC	134,320	3.13
DUN	1,897	0.04
JPN	98,373	2.29
JUN	78,731	1.84
KMC	149,615	3.49
MCH	20,799	0.48
MCP	35,902	0.84
MHC	1,632,784	38.07
MHW	399,522	9.31
NN	348,337	8.12
OWO	5,939	0.14
PPN	130,404	3.04
RDW	51,093	1.19
RFR	30,271	0.71
SER	15,291	0.36
SIT	6,821	0.16
SMC	226,693	5.28
SPL	3,293	0.08
VRI	3,312	0.08
WAT	19,377	0.45
WET	11,988	0.28
WFR	26,753	0.62
Totals	***4,289,413***	***100.00***

The two classes not included in the representation analysis were not natural (NN) and water (WAT).



The combination of the 19 physical habitat classes and 26 vegetation classes yielded 215 types or representation classes. (A map showing all 215 combinations of physical and vegetation classes is extremely complex visually; therefore, it is not provided.) The number of physical habitat classes in which a vegetation type occurs varied. Two vegetation types (montane hardwood and montane hardwood-conifer) occur in all 19 physical habitat types, which suggests that considerable variation in community composition exists within these types. At the other extreme, two vegetation types (blue oak woodlands and subalpine parklands) occur in only one physical type (low interior hot and high interior cold, respectively), suggesting more uniformity (Vance-Borland 1999). The other 24 vegetation types lie between these extremes. We stress the importance of representing vegetation types not only in physical habitat types where they are most abundant but also in physical types where they are uncommon.

References

Vance-Borland, K. W. 1999. Physical habitat classification for conservation planning in the Klamath Mountains region. M.S. thesis. Oregon State University, Corvallis.