U.S. National Vegetation Classification:
Advancing the Description and Management of the Nation's Ecosystems

Cross-walking US Forest Service Vegetation Types to the US NVC.

David Tart, Regional Ecologist, Intermountain Region, USDA Forest Service.

Background

In January 2017, Regional Foresters were directed to crosswalk regional dominance type classifications to the Macrogroup level of the USNVC as a first step in evaluating the value of the USNVC for addressing Forest Service information needs for existing vegetation. This effort provides the Intermountain Region the opportunity to compare the USNVC to our dominance type classification.

In 2006, the Intermountain Region (R4) of the Forest Service adopted a very simple approach to classifying dominance types in order to expedite mid-level vegetation mapping in accordance with the agency's Existing Vegetation Classification and Mapping Technical Guide (Brohman and Bryant 2005). Regional dominance types were defined by the most abundant species in the most ecologically important lifeform/layer present (i.e. trees, shrubs, or herbs). Ten percent cover of a lifeform constituted a layer. The resulting physiognomic classes were forest, woodland, krummholz, shrubland, grassland, forbland, sparse vegetation, and barren. In hindsight, our dominance type approach was reasonably useful for forest and woodland vegetation, but cumbersome for shrublands and herbaceous communities. The resulting numbers of shrubland, grassland, and forbland dominance types are very large (205, 208, and 338 respectively) based the currently available plot data for the Region. Over half of these dominance types are too rare to usefully inform land management decisions. The shrubland dominance types do not account for herbaceous species which are often ecologically significant and have varying responses to management actions. Given these inadequacies, it is necessary to look for a better alternative.

Dominance types are most analogous to the Alliance level of the USNVC (Tart et al. 2005), so a list of USNVC types from the Formation Class down to the Alliance was compiled for the Intermountain Region, including all lands within the exterior boundary of the Region. The potential value of Alliances to address R4's concerns with our non-forested dominance types was indicated by comparing the numbers of Alliances and dominance types as follows:

TerrestrialVegetation	R4 Dt5's	Alliances
Forest and Woodland	60	76
Shrubland	208	138
Grassland and Forbland	546	92
Total Types	814	306

The number of forest and woodland dominance types and Alliances are similar, but USNVC Alliances may provide a much simpler classification for shrublands and herbaceous communities in R4.

Methods

Cross-walking types between classification systems ultimately requires the use of plot data to validate and refine the relationships between types in each system. In this exercise 25,842 plots with complete species lists (i.e. characterization plots) in the R4 vegetation database will be assigned to the USNVC. This dataset includes 19,452 plots on National Forest lands and 6,390 plots from other ownerships.

In order to crosswalk dominance types to macrogroups, it was necessary to compare R4 dominance type names to USNVC Alliance names. When an Alliance included more than one dominant species, it was necessary to compare dominance types to Associations to determine if the relevant Association occurred with the Region. This was done by querying R4 dominance type names in NatureServe Explorer (explorer.natureserve.org) and reading type descriptions at USNVC.org.

The above query process resulted in three groups of dominance types: those potentially cross-walking to one Macrogroup, those potentially cross-walking to more than one Macrogroup, and those with no apparent crosswalk. For dominance types with no apparent crosswalks, plot data for these types were compared to Alliance and Associations based on geographic location, abiotic setting, and associated plant species; and potential macrogroups were assigned where possible. This step was completed only for plots on Forest Service lands. For dominance types potentially cross-walking to more than one Macrogroup, the relevant USNVC type descriptions, down to the Association, were reviewed to develop criteria to distinguish the Macrogroups based on understory species, geographic location, and/or abiotic setting.

Results

The USNVC for the Intermountain Region includes 38 Macrogroups. Results of the crosswalk of R4 dominance types to Macrogroups are shown in Table 1. About 77 percent of the R4 types crosswalk to one Macrogroup, 13 percent crosswalk to more than one Macrogroup. About 10 percent have not been cross-walked yet because they lacked characterization plots, lacked complete species identification, and/or did not occur on Forest Service lands. These types will be addressed later.

Relatively few dominance types crosswalk to multiple Macrogroups, but these types account for two-thirds of our vegetation plot data (Table 2). Only 36 percent of our forested types crosswalk to more than one Macrogroup, but they include 97 percent of the forested plots. Likewise for shrubland types, 20 percent of the types crosswalk to multiple Macrogroups, but they include 68 percent of the shrubland plots. The 628 dominance types that crosswalk to one Macrogroup include 8436 plots (an average of 13 plots per type). The 101 types cross-walking to multiple Macrogroups include 17233 plots (171 plots per type). These are major dominance types with large geographic extents across the Region.

Table 1. Results of Cross-walking Dominance Types to Macrogroups.

	No. of dominance types:				
R4 Veg. Class	Total	Not yet X-walked	X-walks to 1 Macrogroup	X-walks to 2+ Macrogroups	Pct of DTs
FOREST	33		21	12	4%
WOODLAND	27		24	3	3%
KRUMMHOLZ	3		3		0%
SHRUBLAND	205	13	150	42	25%
GRASSLAND	208	12	177	19	26%
FORBLAND	338	60	253	25	42%
Total DTs	814	85	628	101	
Pct. of DTs		10%	77%	13%	

Table 2. Number of Plots Affected by Cross-walking to Macrogroups.

	No. of vegetation plots:				
R4 Veg. Class	Total	Not yet X-walked	X-walks to 1 macrogroup	X-walks to 2+ macrogroups	Pct of Plots
FOREST	10426		364	10062	40%
WOODLAND	2429		2336	93	9%
KRUMMHOLZ	12		12		0%
SHRUBLAND	8285	43	2635	5607	32%
GRASSLAND	3061	36	1856	1169	12%
FORBLAND	1629	94	1233	302	6%
Total Plots	25842	173	8436	17233	
Pct. Of Plots		1%	33%	67%	

The crosswalk of forested R4 dominance types to Macrogroups is shown in Figure 1. The *Abies concolor, A. grandis, and A. lasciocarpa* dominance types each crosswalk to an upland Macrogroup (M022, M500, and M020 respectively) and a riparian Macrogroup (M034). Two of them also can occur in avalanche chutes (M048). For each of these dominance types, lists of upland and riparian indicator species were compiled from the relevant Alliance and Association descriptions within each Macrogroup. The total cover of upland and riparian indicators was calculated for each plot using a database query. Most plots had a clear majority of either upland or riparian species. Plots with nearly equal cover of each were inspected to determine if additional species could be used to distinguish upland and riparian types. Such species were added to the queries and indicator cover was recalculated for all plots. This continued until all plots were assigned to a Macrogroup.

Figure 1. Crosswalk Results for Forested Dominance Types.

Table : C:...\NVC X R4 DT TO MACROGROUP.DB

	R4 Veg Class	R4 DomType	ORIGSCINAME	N	MACG 1	MACG 2	MACG 3	MACG 4	MACG 5
1	FOREST	ABCO	Abies concolor	133	M022	M034	M048		
2	FOREST	ABGR	Abies grandis	153	M500	M034			
3	FOREST	ABLA	Abies lasiocarpa	875	M020	M034	M048		
4	FOREST	ABLO	Abies lowiana		M023				
5	FOREST	ABMA	Abies magnifica		M023				
6	FOREST	ABMAS	Abies magnifica var. shastensis		M023				
7	FOREST	ACNE2	Acer negundo	51	M034	M036			
8	FOREST	ALRH2	Alnus rhombifolia	2	M036				
9	FOREST	CADE27	Calocedrus decurrens		M023				
10	FOREST	LAOC	Larix occidentalis	5	M500				
11	FOREST	PIEN	Picea engelmannii	944	M020	M034	M887		
12	FOREST	PIGL	Picea glauca	1	M034				
13	FOREST	PIPU	Picea pungens	125	M022	M034			
14	FOREST	PIAL	Pinus albicaulis	202	M020	M025			
15	FOREST	PICO	Pinus contorta	1352	M020	M034			
16	FOREST	PICOM4	Pinus contorta ssp. murrayana	18	M034				
17	FOREST	PIFL2	Pinus flexilis	114	M501	M020			
18	FOREST	PIJE	Pinus jeffreyi	1	M023				
19	FOREST	PILO	Pinus longaeva	52	M020				
20	FOREST	PIPO	Pinus ponderosa	902	M022	M501	M023	M034	M118
21	FOREST	POPUL	Populus	2	M034				
22	FOREST	POAC5	Populus X acuminata	13	M034				
23	FOREST	POAN3	Populus angustifolia	162	M034				
24	FOREST	POBAT	Populus balsamifera ssp. trichocarpa	62	M034				
25	FOREST	PODEW	Populus deltoides ssp. wislizeni	8	M036				
26	FOREST	POFR2	Populus fremontii	32	M036				
27	FOREST	POHI8	Populus hinckleyana	3	M036				
28	FOREST	POTR5	Populus tremuloides	3538	M022	M020	M034	M048	
29	FOREST	PSME	Pseudotsuga menziesii	1673	M022	M501	M500	M023	
30	FOREST	SAAL2	Salix alba		M298				
31	FOREST	SAAM2	Salix amygdaloides	2	M036				
32	FOREST	SAFR	Salix fragilis	1	M298				
33	FOREST	SALA3	Salix laevigata		M036				

The same process described above was used to compile two lists of indicator species and calculate total cover of each set of indicators for each plot. Ten of 51 plots contained only trace amounts of indicator species, even after several iterations of searching for additional indicators and recalculating cover totals. All ten had either understories that were dominated by non-natives or depauperate understories due to dense tree canopies. These ten plots could not be assigned to a Macrogroup. Of the remaining plots, 32 were assigned to the Montane Macrogroup (M034) and 9 were assigned to the Desert Riparian Macrogroup (M036). These results suggest that an *Acer negundo*/ruderal understory type, or two depending on the appropriate level of the hierarchy, may need to be added to the USNVC.

The *Acer negundo* dominance type crosswalk to two riparian Macrogroups:

M034 - Montane Riparian & Swamp Forest Macrogroup
M036 - Desert Riparian Forest Macrogroup

Conclusions

The above results, and others not reported here, suggest that cross-walking Forest Service dominance types may identify gaps in the USNVC (e.g. missing types and types with incomplete descriptions) and possible revisions to its hierarchical structure. As our Regional crosswalk proceeds, we hope to find a suitable replacement for our numerous and cumbersome shrubland and herbaceous dominance types. This will require us to propose new USNVC types and revisions to existing types at the Alliance and Association levels. That will result in a more complete characterization of existing vegetation of the Intermountain Region.

Author Contact: dtart@fs.fed.us phone: 801-625-5817