Update on Forest Ecological Sites

West States -- 2008

White spruce in interior Alaska

O'hia forest and rangeland in Hawaii – invaded state

Pinyon-Juniper in New Mexico

Coastal redwood in California

Low site ponderosa pine in Montana

Tropical native forest in Hawaii

Lyn Townsend

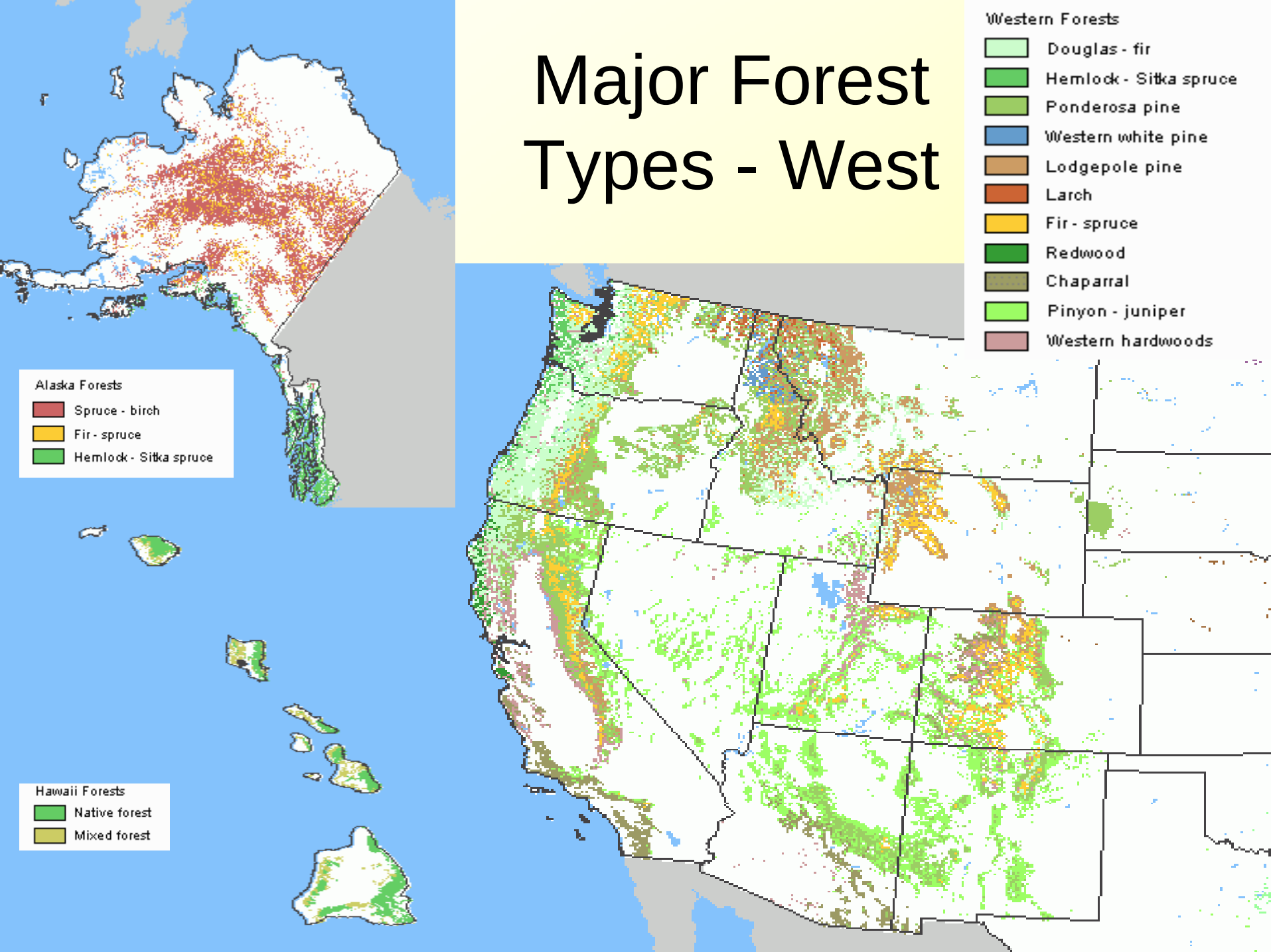
WNTSC Forester, Portland, OR

Prepared for the:

Western Regional Cooperative Soil Survey Conference

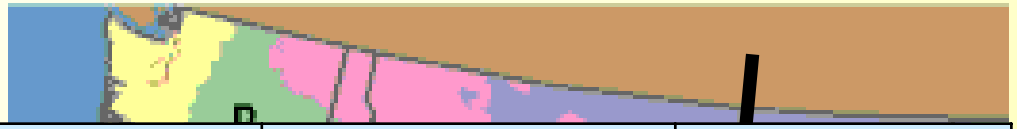
West Biologists Consortium Training

Major Forest Types - West



FOREST Ecological Site Descriptions by Land Resource Region

Total ESIS Forest ESDs equal 523 of which 14 have been "approved"
(available to the public as of Oct 2007).



State	Under Development - ALL	Approved - ALL	Under Development - FOREST	Approved - FOREST
Alaska	224	148	*65*	*32*
Arizona	682	347	*116*	*11*
California*	1202	33	*90*	*5*
Colorado*	244	41	*17*	*0*
Idaho*	384	2	*0*	*0*
Montana*	414	72	*13*	*1*
Nevada*	1048	33	*167*	*24*
New Mexico*	321	279	*31*	*5*
Oregon*	512	303	*37*	*18*
Pacific Islands*	66	0	*22*	*0*
Utah*	467	197	*14*	*0*
Washington*	137	0	*28*	*0*
Wyoming*	271	265	*0*	*0*
as of June 16, 2008	5972	1720	*600*	*96*

**Forest Ecological Site Training Sessions - WNTSC*

Forest ESDs by MLRA*

A2 = 5 (WA)	D22 = 42 (CA,NV)	D35 = 64 (AZ)	G58 = 10 (MT)
A3 = 10 (OR)	D23 = 12 (NV)	D36 = 13 (NM,CO)	G70 = 4 (NM)
A4 = 15 (CA)	D24 = 6 (NV)	D38 = 15 (AZ)	V159 = 4 (HI)
A5 = 6 (CA,OR)	D25 = 10 (NV)	D39 = 17 (AZ,NM)	V160 = 3 (HI)
A6 = 32 (OR,WA)	D26 = 21 (NV)	D40 = 10 (AZ)	V161 = 6 (HI)
B8 = 2 (WA)	D27 = 5 (NV)	D41 = 16 (AZ)	V162 = 5 (HI)
B9 = 2 (WA)	D28 = 33 (NV)	E43 = 9 (OR,WA)	V164 = 2 (HI)
C15 = 4 (CA)	D29 = 37 (NV,CA)	E44 = 3 (MT,WA)	?170 = 34 (AK)
C20 = 7 (CA)	D30 = 27 (NV, AZ)	E48 = 17 (NM,CO)	
D21 = 11 (CA)	D34 = 2 (CO)	E49 = 2 (CO,NM)	

*as of October 2007

Some perspective and very rough figures on workload in the West:

- **13 western states each have 5 to 15 major "forest types."**

- **Each state has/will have from 100 to 200+ forest ecological sites (which essentially subdivide the forest types based on similarity of forest vegetation and soils).**

- **Based on existing data (NRCS forest-soil-site data, data from partners, research reports and data), 12 days would be needed (factoring in new data collection and office time) to prepare a single working draft of an ESD with minimum "bare bones" information (including species cover estimates for overstory and understory plant community phases but <u>not</u> including biomass/weight estimates of understory). A state-transition model would be a crucial component for each ESD.**

- **If 20 sites per year per state were prioritized, staff time would equal about 240 days or about 1 staff year of work by a specialist in each state. After 5 years, about 100 ESDs on the highest priority areas and forest types in each state would be available for planners.**

- **The majority of completed forest ESDs to-date are primarily for pinyon-juniper ecological sites in the interior West. Some portion of these are "HCPC" pinyon-juniper forest sites but many have been currently identified as range ecological sites.**

Public Lands Managed by the Bureau of Land Management (BLM)

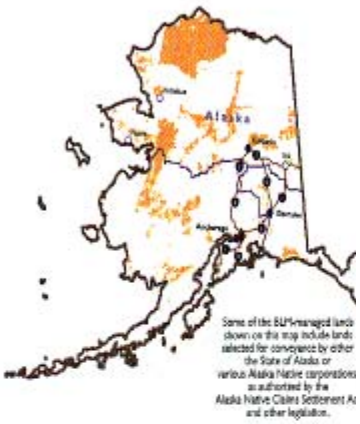


Figure 2-1b -- BLM forest land in relation to other forest land in the Western U.S.

There is an opportunity for BLM, NRCS, NPS and others to cooperate in completing "benchmark ecological sites." One idea was to develop 2-3 modern (latest format) <u>benchmark forest sites</u> for each MLRA.

In some cases, this would be selecting and upgrading existing sites … others would have to be developed from scratch.

Red underlined figures are the most common forest type in the state.

Table 2-1. Area estimates (acres) for the 10 most common and all other forest types on BLM land in the contiguous United States. Bold entries indicate the most common forest type for a State (Note: MT includes ND and SD; OR includes WA).

Forest Type	AZ	CA	CO	ID	MT	NV	NM	ND	OR	SD	UT	WA	WY	Total***
Pinyon / juniper woodland	**1,015,050**	**303,224**	**2,852,113**	28,972	0	**5,644,277**	**946,274**	0	0	0	**5,227,447**	0	17,171	16,034,527
Juniper woodland*	520,219	136,615	652,783	139,655	35,411	1,625,783	91,968	0	0	0	1,897,674	0	**619,112**	5,719,219
Douglas-fir (all)	0	16,927	243,528	267,004	435,984	0	0	0	1,493,634	0	81,980	48,690	65,268	2,653,015
*** Coastal Douglas-fir*	0	16,927	0	0	0	0	0	0	**1,479,830**	0	0	0	0	1,496,756
*** Non-coastal Douglas-fir*	0	0	243,528	**267,004**	435,984	0	0	0	13,804	0	81,980	48,690	65,268	1,156,259
Western Juniper	0	277,895	0	216,921	0	55,074	0	0	1,397,669	0	0	0	0	1,947,558
Ponderosa pine	12,772	0	158,769	0	**454,194**	0	61,952	0	226,386	11,661	50,994	0	95,406	1,072,133
Deciduous oak woodland	9,579	7,904	557,958	0	0	74,848	14,802	0	0	0	299,673	0	0	964,765
Cercocarpus woodland	0	67,279	20,272	51,757	37,476	264,972	0	0	29,908	0	145,509	0	24,827	642,001
Rocky Mountain juniper woodland*	0	0	184,881	41,560	153,822	0	0	1,924	0	0	51,100	0	0	433,288
Aspen	0	0	186,794	36,718	0	30,658	0	0	25,664	0	10,919	0	77,085	367,837
Lodgepole pine	0	0	93,819	0	109,565	0	0	0	70,712	0	0	0	85,210	359,306
All other forest types	335,819	639,352	125,523	162,722	63,538	135,607	5,543	8,445	544,707	13,733	59,995	30,136	306,083	2,431,203
Totals***	1,893,439	1,449,197	5,076,439	945,309	1,289,991	7,831,219	1,120,539	10,369	3,788,679	25,394	7,325,290	78,826	1,290,162	32,624,853

* Juniper Woodlands and Rocky Mountain Juniper discussions are combined in the report.

** In the report, there are separate discussions for the Douglas-fir forest type west of the Cascade Mountain Range (Coastal Douglas-fir) and the Douglas-fir forest type east of the Cascades (Non-coastal Douglas-fir).

*** Numbers may not add due to rounding.

BLM has identified these types of particular importance due to insects, disease, and dieback/decline.

Overview of Issues

1. Data collection too often precedes understanding of the ecological site's states and plant community phases (chicken-egg dilemma)
2. Influence of time and staff limitations on the collection of data
3. Inconsistency of what data is collected ("how" data is collected is not particularly an issue)
4. Inconsistency of how summary information is displayed within the ESD
5. Variations in the layout of STMs
6. Lack of participation of partners (consultants, agencies, universities) to complete ESDs due to funding, interest or expertise

1. Data collection too often precedes understanding of the ecological site's states and plant community phases (chicken-egg dilemma)

- **Using NRCS as an example, it is traditional that once soil components have been formulated and mapping begins … the forester begins by taking "site index" plots on forest areas on each soil component having 'suitable' trees**

- ***Usually this involves a focus on a plant community phase before knowing an approximation of the STM***
- ***Collection of understory vegetation data was important but secondary in getting "good" site index information (cover, plant canopy heights, weights, habitat use and value, and other attributes were omitted or perhaps only partially recorded)***
- ***Forest overstory and understory characterization based on a summary of data at the "site index" plots is NOT representative of the other plant community phases (NASIS-related interpretations can perpetuate such a false impression … unless the user knows what is going on)***

Suggested Strategy for Developing Forestland ESD's

1. Conduct literature searches
2. Create an ecological site network by contacting partners
3. Refine available ecological information, habitat types and/or plant associations into a first approximation of draft ecological site names … by MLRA
4. Integrate pre-European fire regimes as necessary, alter draft site names, and review with partners
5. Perform tentative correlation of soil components to draft site names
6. Develop first-approximation of state-transition models for draft ecological site names and review with partners

The strategy consists of 10 steps (this slide and next).

Note that "site index" determination really doesn't come into play until step 8!

Suggested Strategy for Developing Forestland ESD's

7. Develop strategy for collecting needed field data on soil components by ecological site, state, and plant community(ies)
8. Collect and interpret field data and validate: 1) correlation of soil components to ecological sites (and need for subdividing ecological sites based on kinds, amounts, and proportion of vegetation) and 2) state-transition models
9. Develop first drafts of complete ESDs and review with partners
10. Refine ESDs, enter in ESIS and publish in ESIS and section II of the FOTG

2. Influence of time and staff limitations on the collection of data

- ***Development of ecological sites and descriptions competes with NRCS programmatic and technical assistance workload***
- ***Too little time was invested in fostering partner participation to share the ecological site development workload***
- ***"Borrowing" data from other similar sites, soils, and reference data was done to some degree (which can be successful provided some kind of validation process is in place)***

3. Inconsistency of what data is collected (“how” data is collected is not particularly an issue)

- **With so many people trying to do so many things while an agency repeatedly reinvents itself and is constantly losing expertise through transfers and retirements … has led to a lot of solo efforts in interpreting policy and procedural requirements and then reinventing what should be collected**

- ***Some critical characterization attributes and the hierarchy of data collection and display in ESDs are confusing … this was caused by a discontinuity in national and regional assistance and expertise***
- ***“Favorite” attributes have been and are collected and evolved into “my way is best” (which is not necessarily undesirable … one outcome is that traditional procedures are challenged and have to be revalidated)***

4. Inconsistency of how summary information is displayed within the ESD

- **The ESIS ESD contains a summary of plot data (not raw data) typically arranged by PCP.**
- **During the ESIS web site development period, a key expert left a position at the NSSC just prior to a thorough review of data element logic and labeling.**
- **Because the elements were not tested, there has been a chronic confusion on what and where to enter certain summary data.**

- ***Redevelopment is underway.***
  - ***Forest overstory and understory "cover" tables***
  - ***Forest understory production will use range/understory data fields for air-dry weight annual production.***
  - ***Surface and ground cover will be expanded to accommodate downed wood and snags***
  - ***Last but not least … "F"orest naming convention will match the "R"ange naming convention.***

Forest Overstory Species (tree species only)

	Common Name (species repeated if in 2 or more strata)	NSPNS	Plant Type (nativity)*	Live Canopy Height (bottom-in feet)	Live Canopy Height (top-in feet)	Estimated Cover** - Low to High (%)	Tree Diameter Range - Low to High (in.)	Basal Area - Low to High (ft^2)
1	Douglas-fir	PSME	T (N)	70.0	130.0	40-60	14-27	130-150
2	grand fir							
3	red alder							
4	bigleaf maple							
5	grand fir							

Forest Understory (typically less than 13 feet in height including tree species)

	Common Name (species repeated if in 2 or more strata)	NSPNS	Plant Type (nativity) *	Live Canopy Height (bottom-in feet)	Live Canopy Height (top-in feet)	Estimated Cover** - Low to High (%)
1	western hazel	COCO6	S (N)	2.0	15.0	1-4
2	vine maple	ACCI	S (N)	0.0	10.0	1-4
3	salmonberry	RUPA	S (N)	2.0	8.0	5-15
4	western hemlock	TSHE	T (N)	3.0	8.0	0-2
5	grand fir	ABGR	T (N)	2.0	6.0	0-1
6	western swordfern	POMU	FA (N)	0.0	3.0	30-40
7	brackenfern	PTAQP2	FA (N)	0.0	3.0	1-2
8	dull Oregon-grape	MANE2	S (N)	0.5	3.0	0
9	snowberry	SYAL	S (N)	0.0	1.5	1-3
10	Hooker fairybell	DIHO	FH (N)	0.3	1.2	0
11	white inside-out flower	VAHE	FH (N)	0.0	1.0	3-7
12	rose	ROSA+	S (N)	0.0	1.0	0
13	trillium	TROV	FH (N)	0.0	1.0	0
14	trailing blackberry	RUUR	FH (N)	0.0	1.0	0
15	bedstraw	GALIU	FH (N)	0.0	0.7	3-7
16	pathfinder	ADBI	FH (N)	0.0	0.7	0-2
17	springbeauty	CLSI2	FH (N)	0.0	0.5	1-3
18	grand fir	ABGR	T (N)	0.0	0.5	0

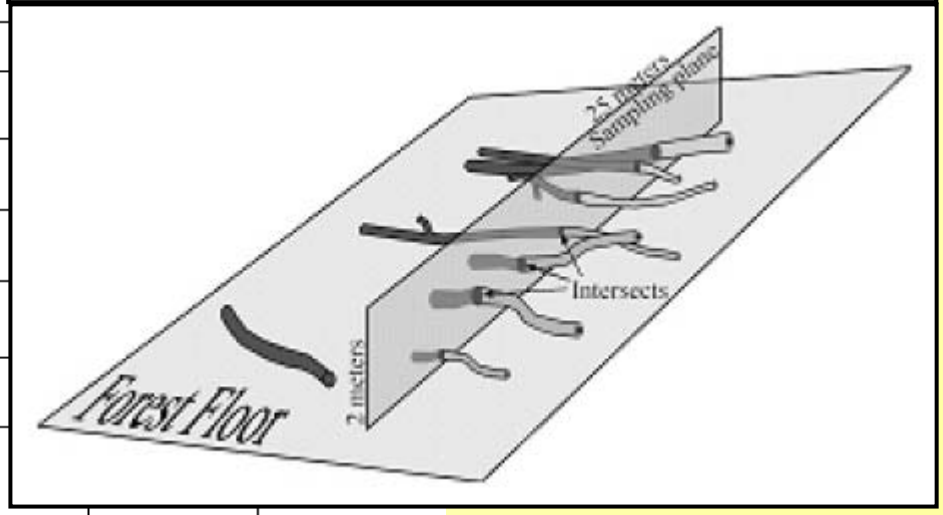
Percent Ground Cover by Material Type

Material Type	% Surface cover (basal cover for grass, forb, shrub, and tree types) min	% Surface cover (basal cover for grass, forb, shrub, and tree types) max	% Ground cover (canopy)** min	% Ground cover (canopy)** max
Grass/grass-like/ (graminoid)				
Forb/herb/fern/fern ally				
Shrub/tree-fern/vine/liana (typically < 13' height)				
Tree/tree-fern/vine/liana (typically > 13' height)				
Biological Crusts (e.g., algae, cyanobacteria, lichens)				
Nonvascular (e.g., mosses, liverworts, hornworts, stemmed lichens)				
Litter (leaves, needles, fruits, cones, bark)				
Downed wood, fine-small (0.00 - 0.40" diameter; 1-hour fuels)				
Downed wood, fine-medium (0.40 - 0.99" diameter; 10-hour fuels)				
Downed wood, fine-large (1.00 - 2.99" diameter; 100-hour fuels)				
Downed wood, coarse-small (3.00 - 8.99" diameter; 1,000-hour fuels;)				
Downed wood, coarse-large (> 9.00" diameter; 10,000-hour fuels;)				
Tree snag-hard (>4" diameter at 4.5' above ground and >6' height and no evidence of decay -- if less diameter OR height use downed wood codes)				
Tree snag-soft (>4" diameter at 4.5' above ground and >6' height and any evidence of decay -- if less diameter OR height use downed wood codes)				
Surface Fragments > 0.25" and <= 3"				
Surface Fragments > 3"				
Bedrock				
Water				
Bare Ground				

*height of the plant determines the height class -- enter canopy cover for that class only.

**heirarchy of ground cover from high to low; count highest intercepted material first with materials directly beneath not counted.

Keane, RE. 2004. The new GLOBE fire fuel protocol. In: 8th annual Globe Conference Proceedings (pp 97-101) July 25-30, 2004. Boulder, CO

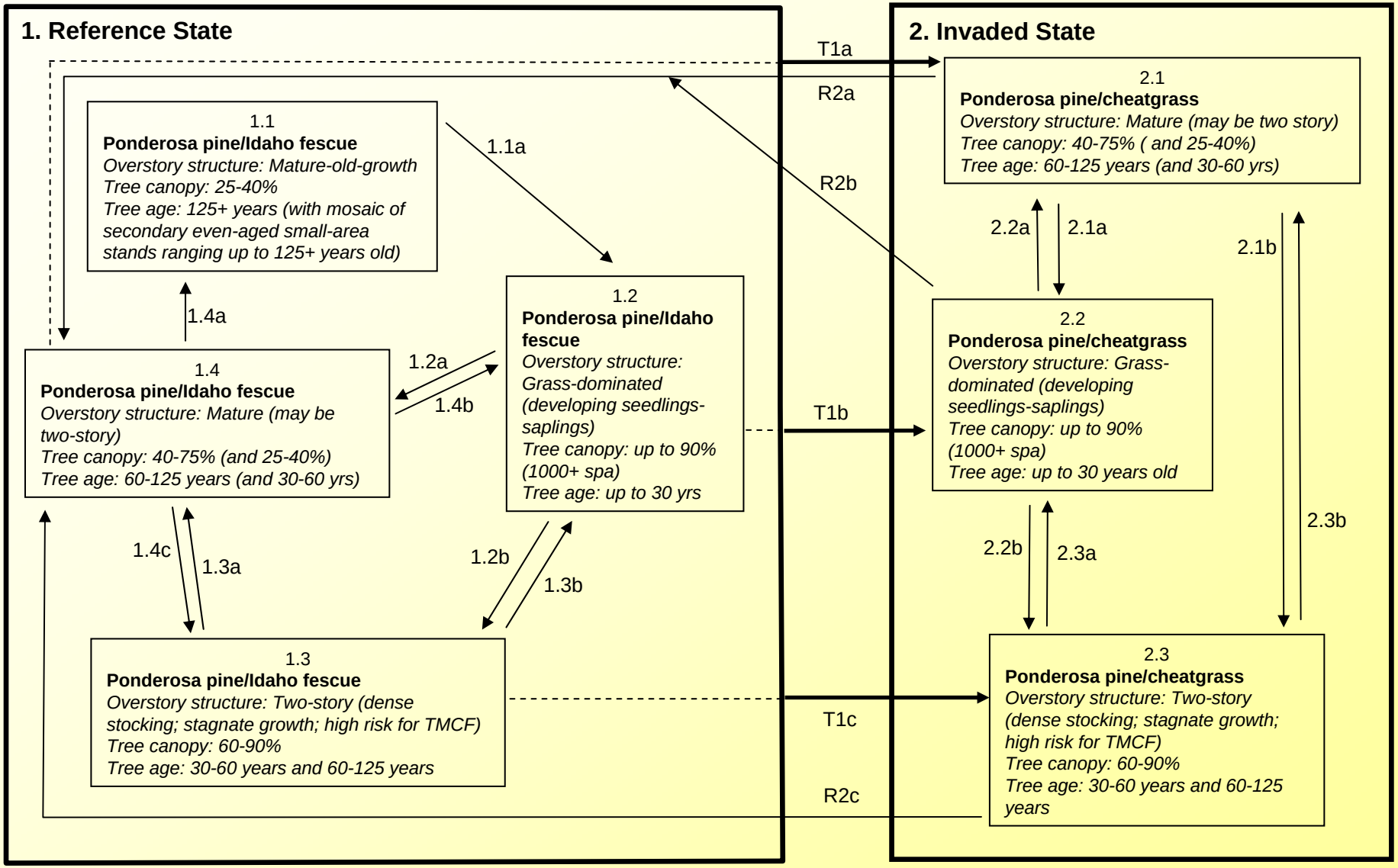


Thomas, J.W., R.G. Anderson, C. Maser, E.L. Bull. 1979. Snags (Chapter 5) In: Wildlife Habitats in Managed Forests. Agricultural Handbook No. 553. (Chapter 5) Washington, DC

5. Variations in the layout of STMs

- **STMs are quickly grasped and appreciated as "what-if" blueprints by partner specialists, clients and the general public**
- **Although HCPC is still policy, we need to evolve to "reference state" and "reference PCP"**
- **Standardization of STM-PCP numbering, labeling, and contents would help … although this is occurring in the West**

- ***Allowance needs to be given for professional judgment … judgment that is based on science and observation of conditions and <u>not</u> influenced by use and management biases***
- ***How is climate change factored in? For example, did the "Little Ice Age" (1540 – 1850) influence success and spread of quaking aspen? The answers to these questions can result in a few explanatory comments in an ESD to … justification of additional states in the STM.***
- ***A key display in forest STMs are structural stages described by such terms as <u>seedling, seedling-shrub, sapling-pole, mature, over-mature.</u> Additional terms and brief descriptions would be very helpful, e.g., <u>even-aged, uneven-aged, two-story, canopy 30-50%, tree age > 125 yrs, dbh 9-24"</u>.***
- ***Including managed PCPs with "natural" PCPs helps users understand the blueprint … separating them could complicate use by planners, clients, and partners.***



(Pinus ponderosa/Idaho fescue; Rev. 26Mar2008)

1.2

2.1

1.4

2.3

6. Lack of participation of partners (consultants, agencies, universities) to complete ESDs due to funding, interest or expertise

- Funding has been addressed on some soil survey and ecological site projects (e.g., NPS contracting, Conservation District Associations) … NRCS has difficulty funding beyond soil surveying and basic NASIS vegetation correlation (which is usually done by a part-time specialist).
- Some partners are not interested in ESDs because they already use in-house ecological classifications that are perceived as adequate or more useful.
- There is considerable potential to use university resources (Master of Science and PhD candidates) to investigate, organize and complete drafts of forest land ecological sites for various eco-geographic areas.
- The use of consultants or university and/or student resources would require a defined system of development and oversight by the NRCS.
- Multiple projects for a number of consultants or graduate degree candidates could be arranged based on the 10-step approach …

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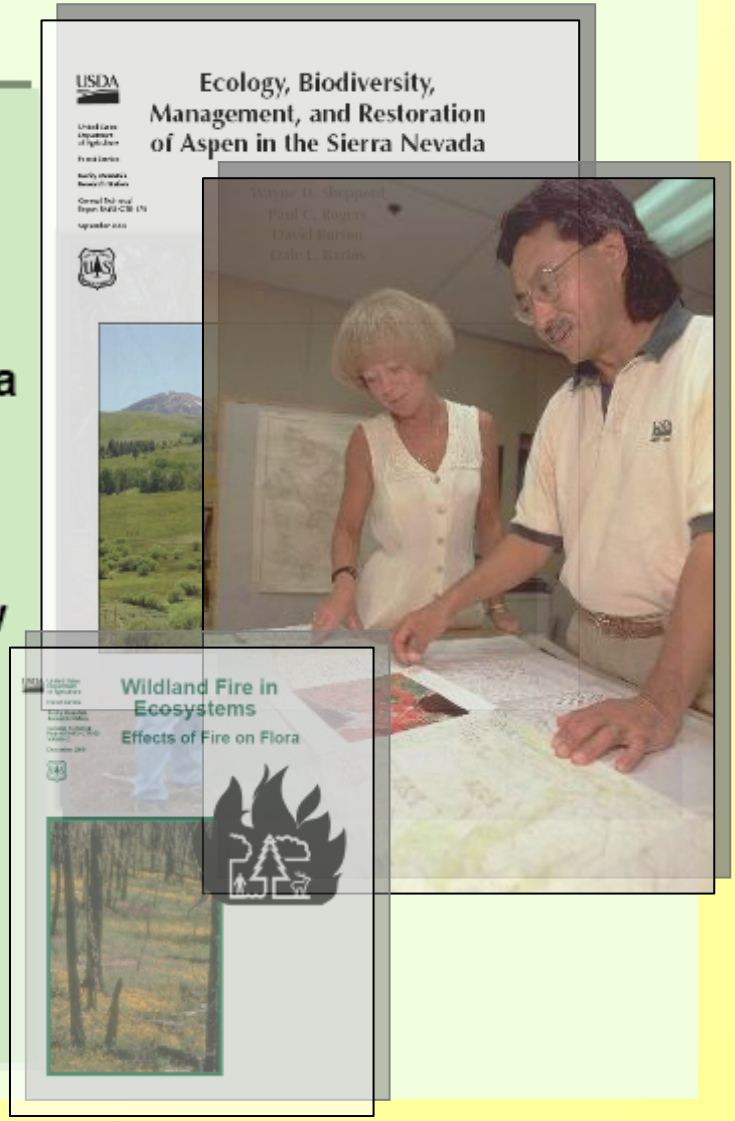

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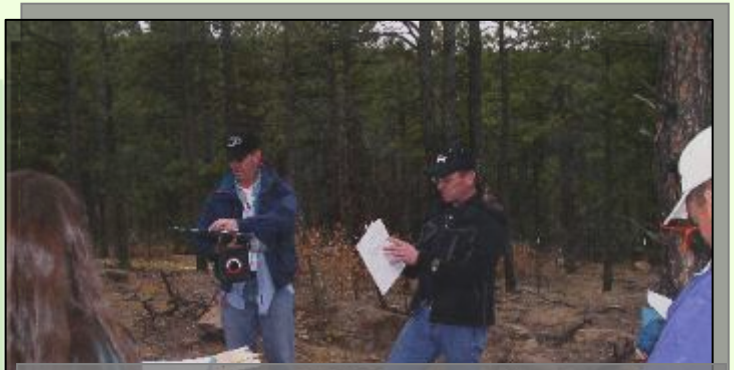

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

ECOLOGICAL SITE DESCRIPTION

ECOLOGICAL SITE CHARACTERISTICS

Site Type: Forestland

Site Name: *Sequoia sempervirens - Pseudotsuga menziesii / Rhododendron macrophyllum /* (redwood - Douglas-fir / Pacific rhododendron /)

DRAFT REDWOOD-DOUGLAS-FIR/PACIFIC RHODODENDRON, BIDCETOTS, SCHIST, RED CLAY

Site ID: F004BX104CA

Major Land Resource Area: 004B - Coastal Redwood Belt

Questions?

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