MAPPING VEGETATION ACROSS THE NORTHWEST FOREST PLAN AREA: INTEGRATING TWO REMOTE SENSING APPROACHES

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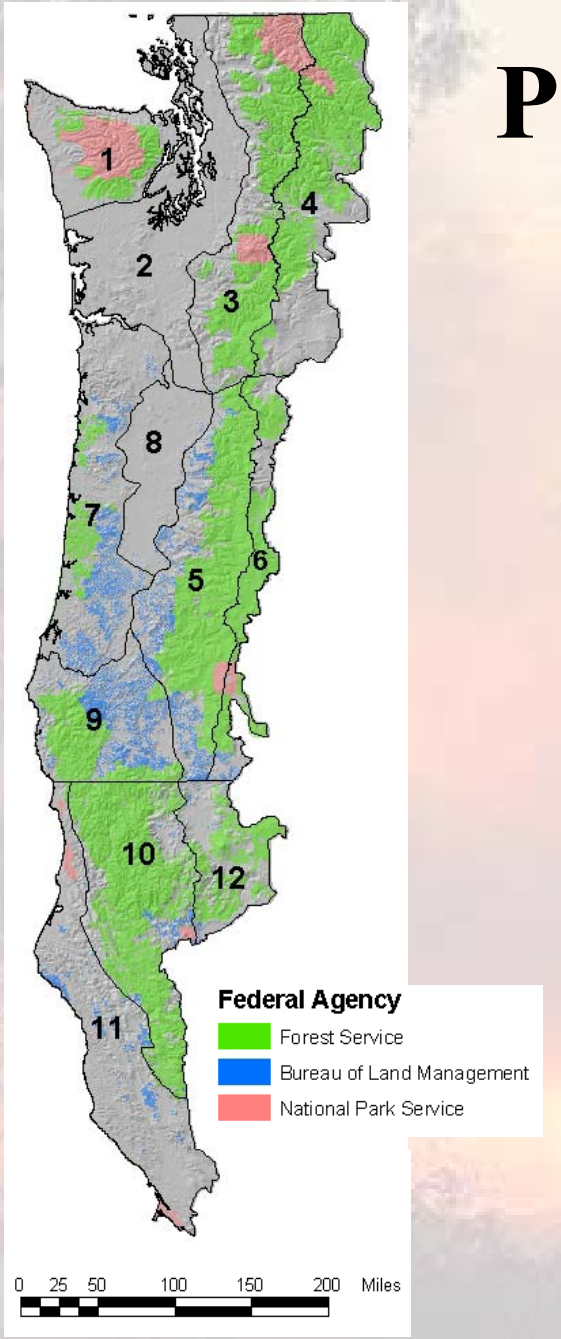
Relevance to Northwest Forest Plan

- NWFP result of contentious socio-economic debate that constrained forest management options
- Devised strategies to protect environment, assist affected communities, facilitate collaboration among federal land management agencies
- Monitoring of Plan objectives required establishment of consistent (start of Plan) baseline map of vegetation across all ownerships

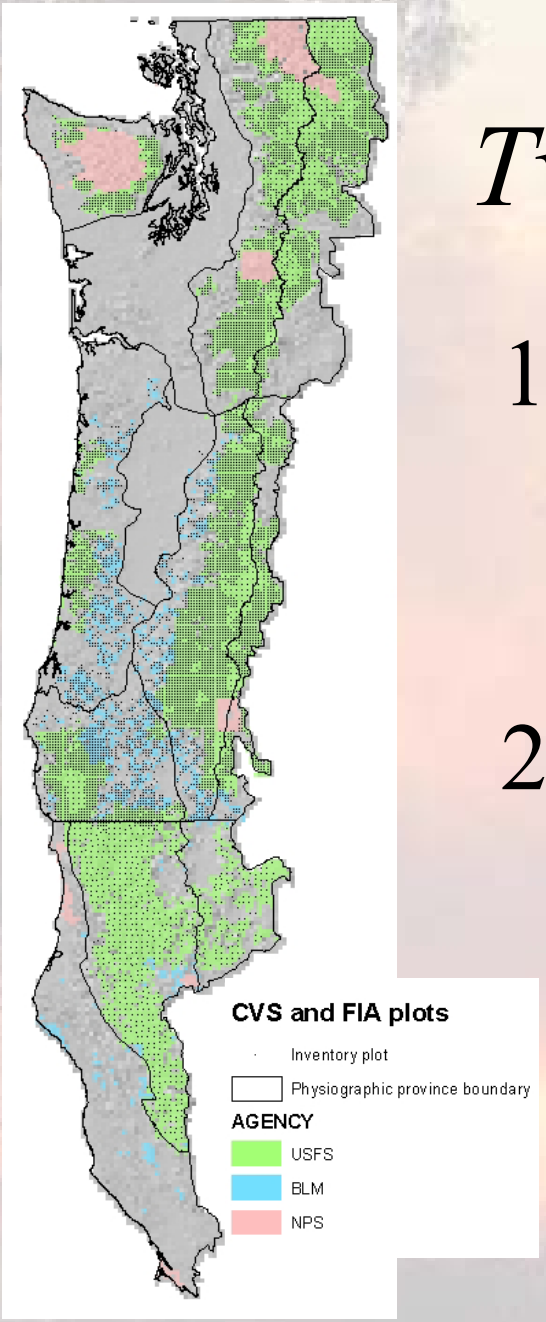


Primary Considerations…

1. Need for consistent map products on ***all*** ownerships and 12 physiographic provinces of the 23 million ha (57 million acre) NWFP area
2. Must "cross-walk" with Vegetation Strike Team standards, including specs for percent tree cover, canopy structure, and overstory size class
3. Use previously acquired ground inventory (FIA, CVS, 5-point), airphoto, and ancillary data
4. Base map on Landsat image data

VST Standards

Element	Standard
Total Tree Cover	10 percent classes
Canopy Structure	Single-Layered / Multi-Layered
Overstory Size Class	0-4.9, 5-9.9, 10-19.9, 20-29.9, 30-49.9, 50+ inches DBH

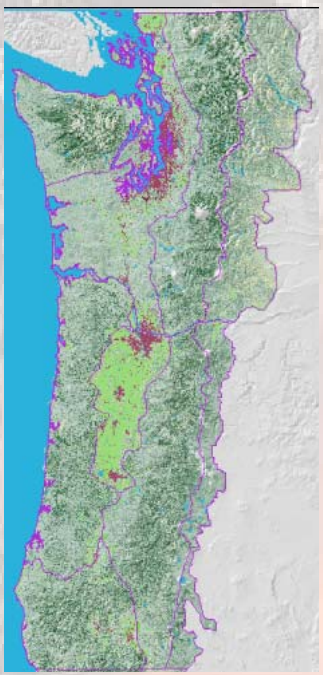


Two mapping approaches…

1. Oregon and Washington
   IVMP (Interagency Vegetation Mapping Project)
2. California
   CALVEG (Classification and Assessment with Landsat of Visible Ecological Groupings)

Divergent histories…

- OR/WA
  - FS/R6 remote sensing program not well-developed, mostly relied on contractors; BLM program nascent; FS/PNW ample experience
  - IVMP brought these three together
- CA
  - FS/R5 advanced remote sensing program after decades of development & implementation
  - CALVEG joined with a variety of Federal and State agencies with interests in remote sensing



IVMP (USFS R6/PNW, BLM)

1. Mapping by province to stratify on relationships b/t image data and vegetation attributes
2. Forest v. non-forest (e.g., water, urban, agriculture, etc.) mask
3. Cover (% conifer v. % all other vegetation) and size modeled by regression as continuous variables; however, size by classification in non-closed-conifer & structure modeled from variations in % cover and size
4. Mapping at the pixel level, except structure
5. Map ca. 1996

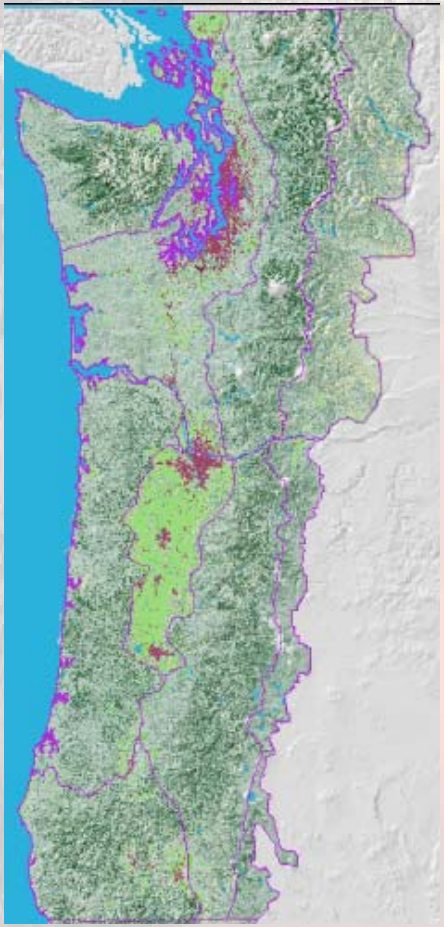
CALVEG (USFS R5 & partners)

1. Integration of multiple existing map products and new analyses
2. Define and attribute polygons
3. Life-form by careful editing of existing maps (e.g., conifer, hardwood, mixed, non-forest)
4. Vegetation type by geoclimatic classification
5. Percent canopy cover G-O modeled
6. Tree size (DBH) translated from classified crown width
7. Structure modeled w/in type-% cover-size classes w/ aid of plot data
8. Map ca. 1994

Accuracy Assessment

- Purpose is to inform developers and users about map quality
- Quantitative assessment by both IVMP & CALVEG comparing predicted/mapped values against observed
- Typical assessment involves error matrices…

	Reference				Row total	User's Accuracy
Map	Deciduous	Conifer	Agriculture	Shrub		
Deciduous	65	4	22	24	115	57 %
Conifer	6	81	5	8	100	81 %
Agriculture	0	11	85	19	115	74 %
Shrub	4	7	3	90	104	87 %
Column total	75	103	115	141	434	
Producer's Accuracy	87 %	79 %	74 %	64 %		74 % Overall Accuracy



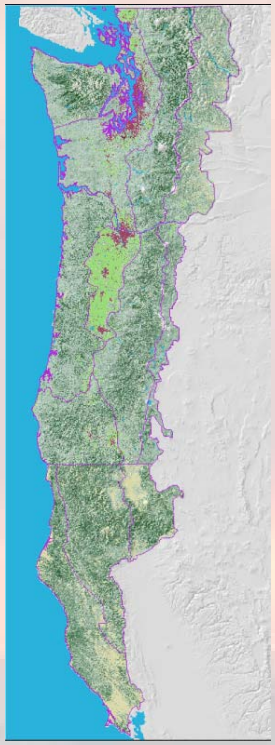
- IVMP
  - Traditional error matrices for all mapped variables
  - Accuracies reported for VST standards and broader classes tailored to monitoring needs
  - Across provinces accuracies ranged from:
    - ✓ 40-80% for 20% cover classes
    - ✓ 60-80% for two size classes
    - ✓ 55-90% for two structure classes

❖ CALVEG

- Traditional and "fuzzy" error matrices for life-form, percent cover, and size; nothing reported for structure
- Accuracies reported for classes somewhat broader than VST standards
- Overall accuracies within life-form classes ranged from:
  - ✓ 50-70% for four % cover classes (75-85% fuzzy)
  - ✓ 40-60% for six size classes (70-80% fuzzy)

Integration of IVMP & CALVEG

- Each map user group within NWFP has specific needs for map detail and accuracy
- Integration done informally by each group
- Example: LSOG Status & Trends



Start-of-Plan LSOG Variations

- Cover 10% min.
- Size 20 in. min.

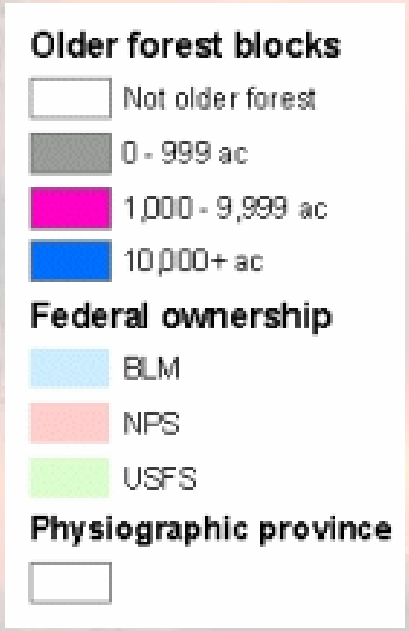
- Cover 10% min.
- Size indexed to PNV zone

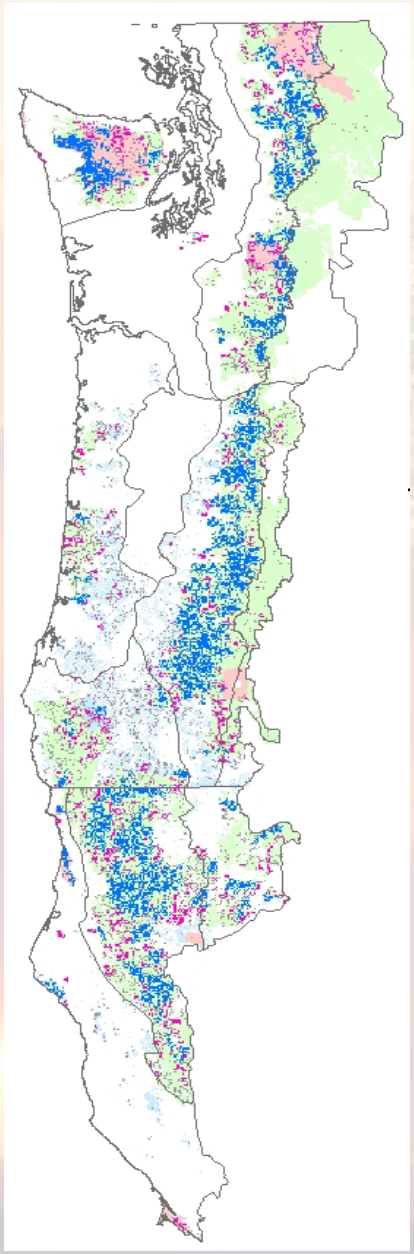
- Cover 10% min.
- Size 30 in. min.
- Multi-story

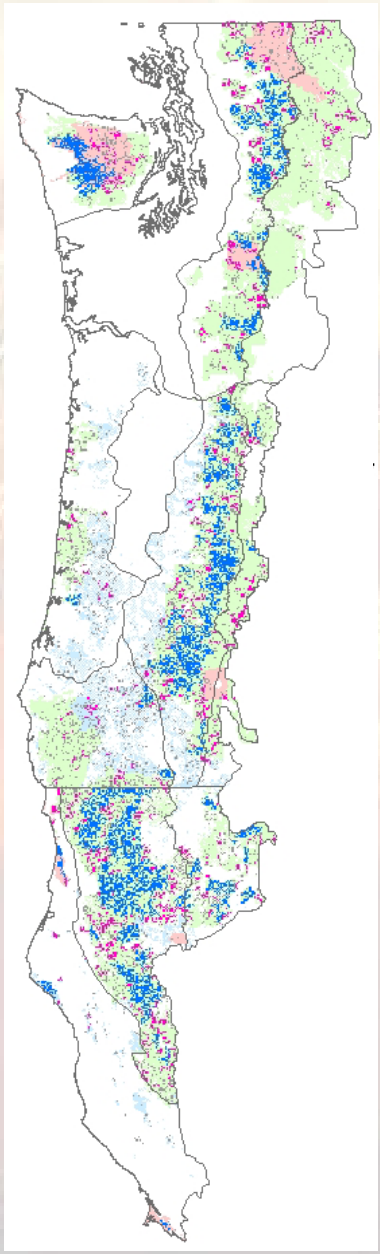
Medium & large

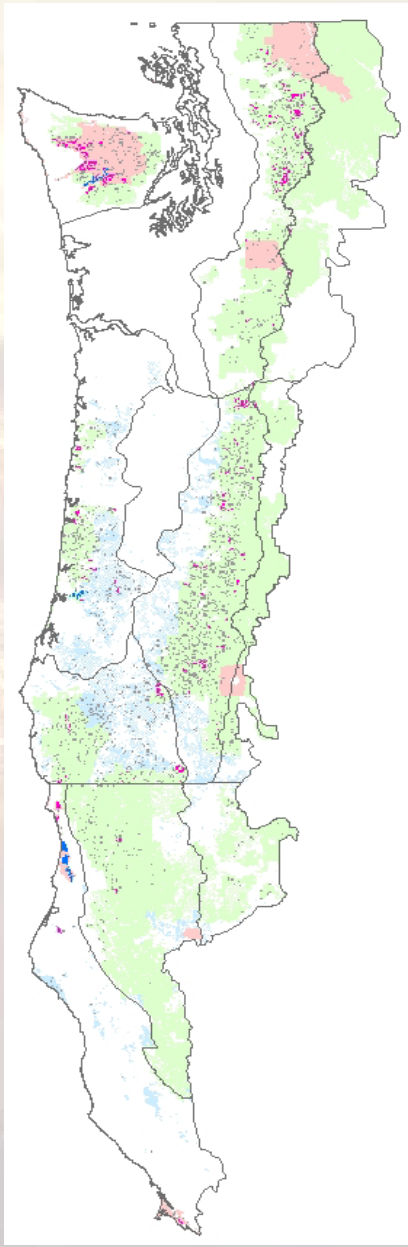
Indexed to PNV Zone

Large multi-story









Summary

- Given differences in history & experience in the two regions, two separate but coordinated baseline vegetation mapping efforts
- VST standards gave mapping efforts compatible targets, enabling integration
- Greatest distinctions between the resulting maps are pixel v. polygon and numbers and definitions of classes
- From the baseline conditions, baseline habitat analyses are possible and changes can be monitored
- Role of remote sensing in the future of the Plan must now be considered