

A photograph of a forest scene with tall pine trees and a yellow measurement tape in the foreground. The tape is marked with numbers 2, 4, 6, 8, and 1 M (meter). The background shows a dense forest of tall, thin trees under a clear blue sky.

IMAP Policy Oversight Group

October 13, 2006

What is IMAP?

- An interagency cooperative to build:
 - Mid-to broadscale planning and assessment models and tools
 - Wall-to-wall existing vegetation data
 - Ancillary data
- R6, Oregon Dept. of Forestry, BLM, PNW Research Station, The Nature Conservancy, Others?

IMAP Needs

- State-wide forest assessment (ODF)
- Simple models for Forest plan revisions (FS R6)
- Wall-to-wall data and models for Northwest Forest Plan monitoring
- Better integration and application of research for partners (PNW research station)

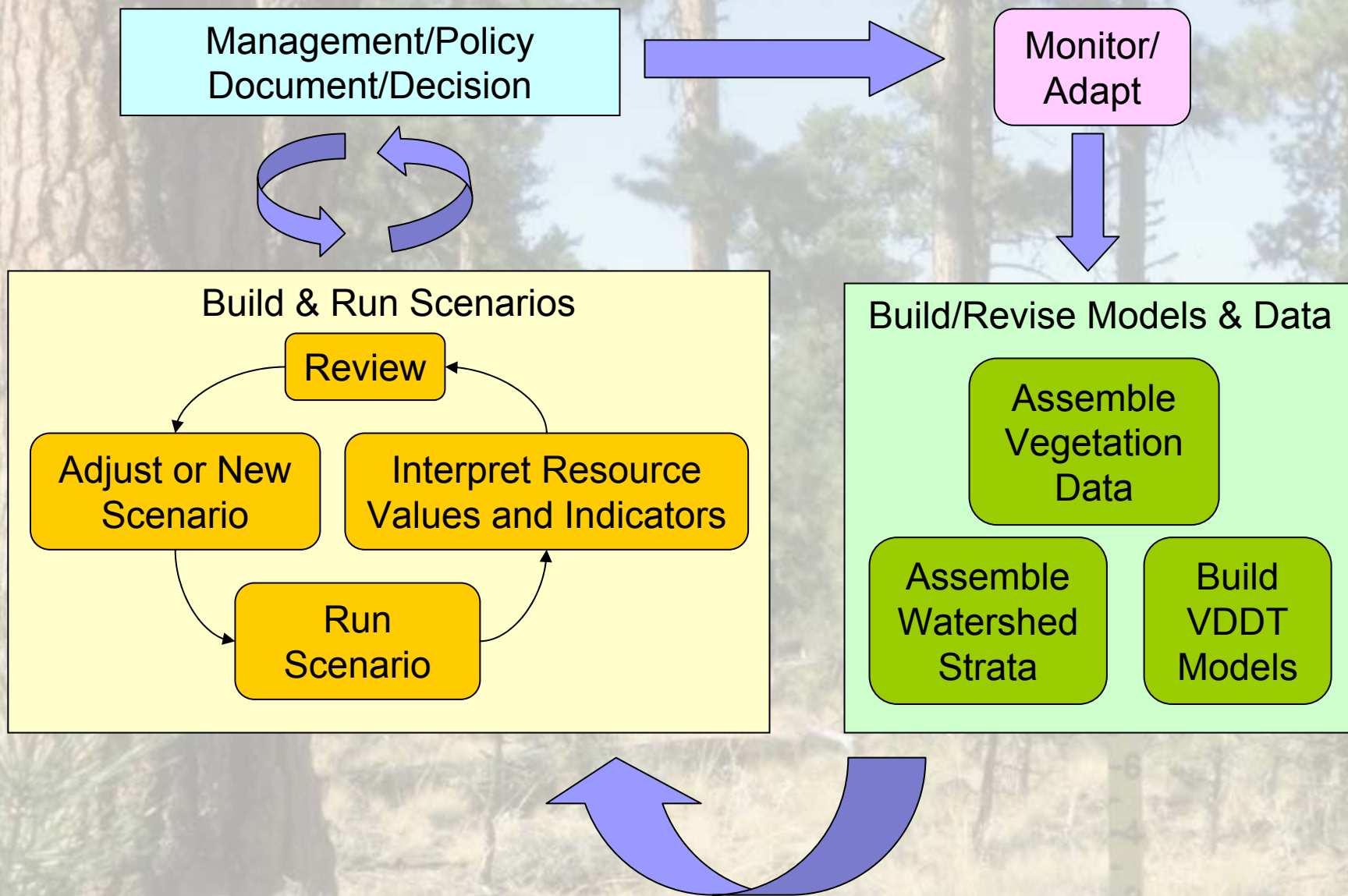
Challenges that make IMAP Useful

- Limited and declining funds
- Very busy people
- No desire for conflicting answers to broad questions
- Need integrated answers – single resource perspectives not suitable
- “Black box” models

An Approach

- Leverage and cooperate
- State and transition models
- Organize by geographic area
- Integrate natural disturbances and management activities
- Summarize to land units (watersheds)

IMAP Information Flow



Boxes and Arrows

(States and Transitions)

Vegetation Type A

Cover type: Ponderosa Pine

Structure: Old single-story forest



Regeneration
Growth
Underburning

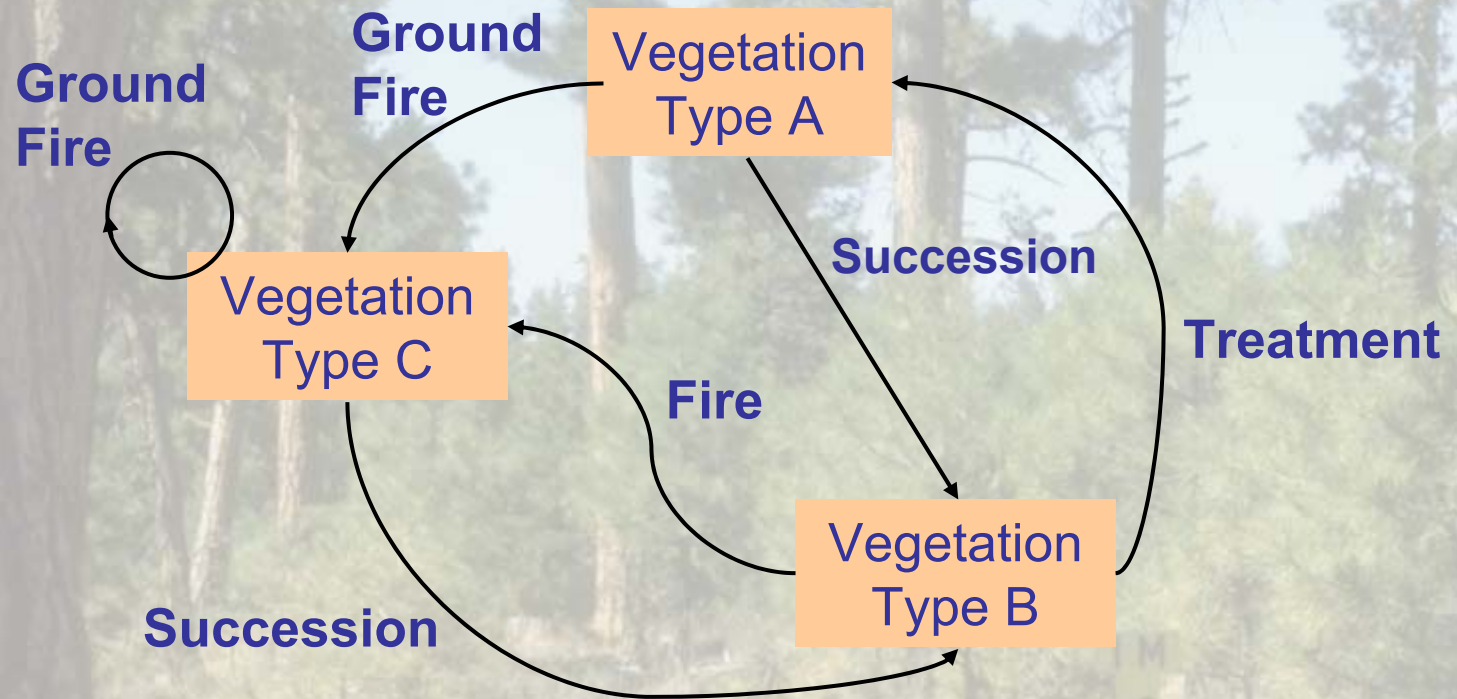


Vegetation Type B

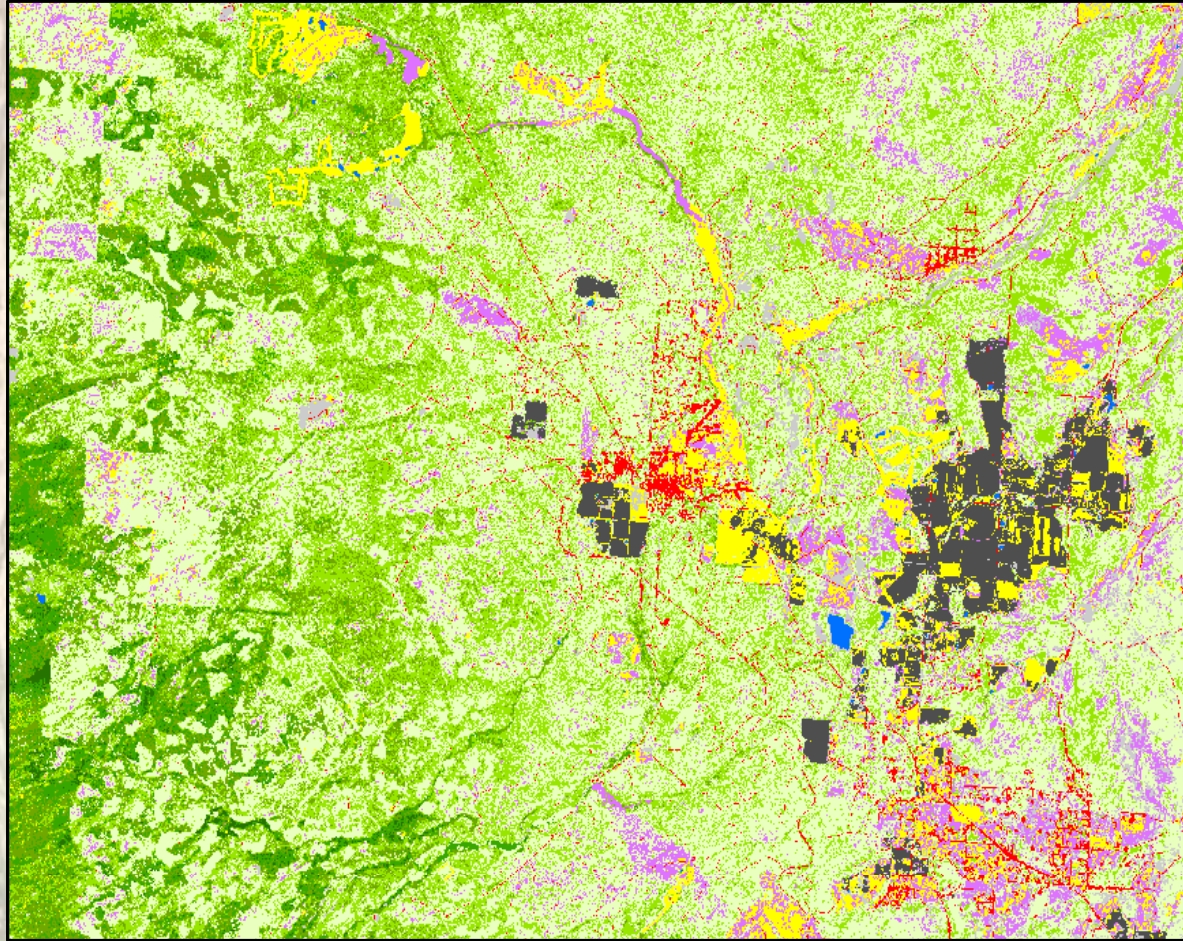
Cover type: Ponderosa Pine
Structure: Non-Stocked, Post disturbance



State and Transition Models



Wall to Wall Current Vegetation Data



**Local data
where
better**

+

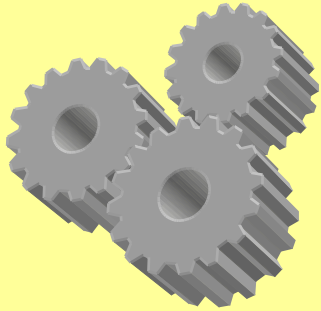
**ReGap for
non-forest**

+

**Gradient Nearest
Neighbor for forests
(FIA and CVS plots
assigned to 30 meter
pixels)**

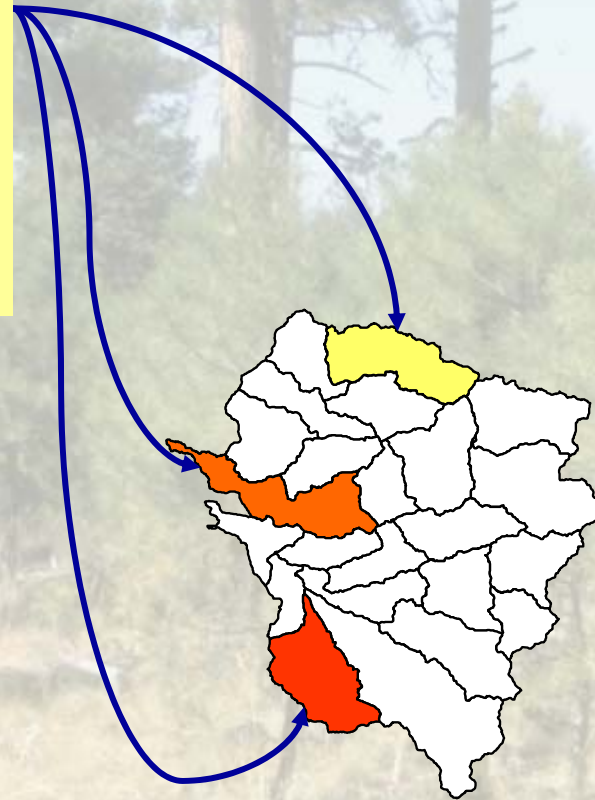
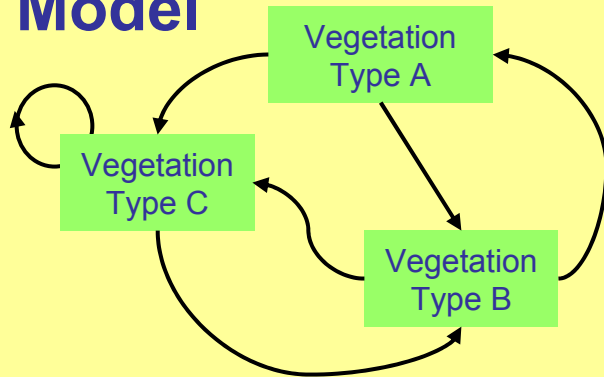
Run Models by Watershed

Database

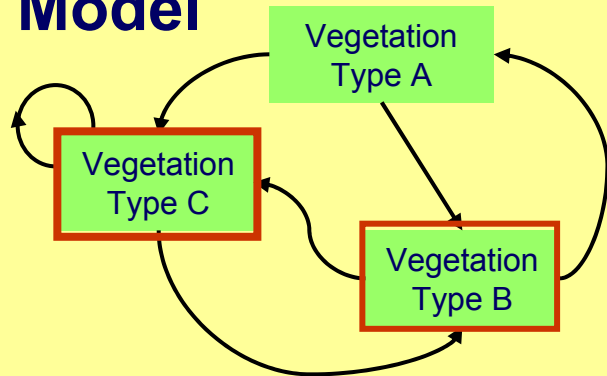


- Vegetation cover type, structure
- Disturbances
- Associated characteristics (e.g. wildlife habitat, products, etc.)

Model



Model



Wildlife Habitat

Acres & proportions

Habitat

Source Habitat Amount		
zero	0	<div><div></div><div></div><div></div><div></div><div></div></div>
low	0	<div><div></div><div></div><div></div><div></div><div></div></div>
moderate	100	<div><div></div><div></div><div></div><div></div><div></div></div>
high	0	<div><div></div><div></div><div></div><div></div><div></div></div>

Habitat Quality		
low	0	<div><div></div><div></div><div></div><div></div><div></div></div>
moderate	0	<div><div></div><div></div><div></div><div></div><div></div></div>
high	100	<div><div></div><div></div><div></div><div></div><div></div></div>

Habitat Index		
low	33.3	<div><div></div><div></div><div></div><div></div><div></div></div>
moderate	33.3	<div><div></div><div></div><div></div><div></div><div></div></div>
high	33.3	<div><div></div><div></div><div></div><div></div><div></div></div>

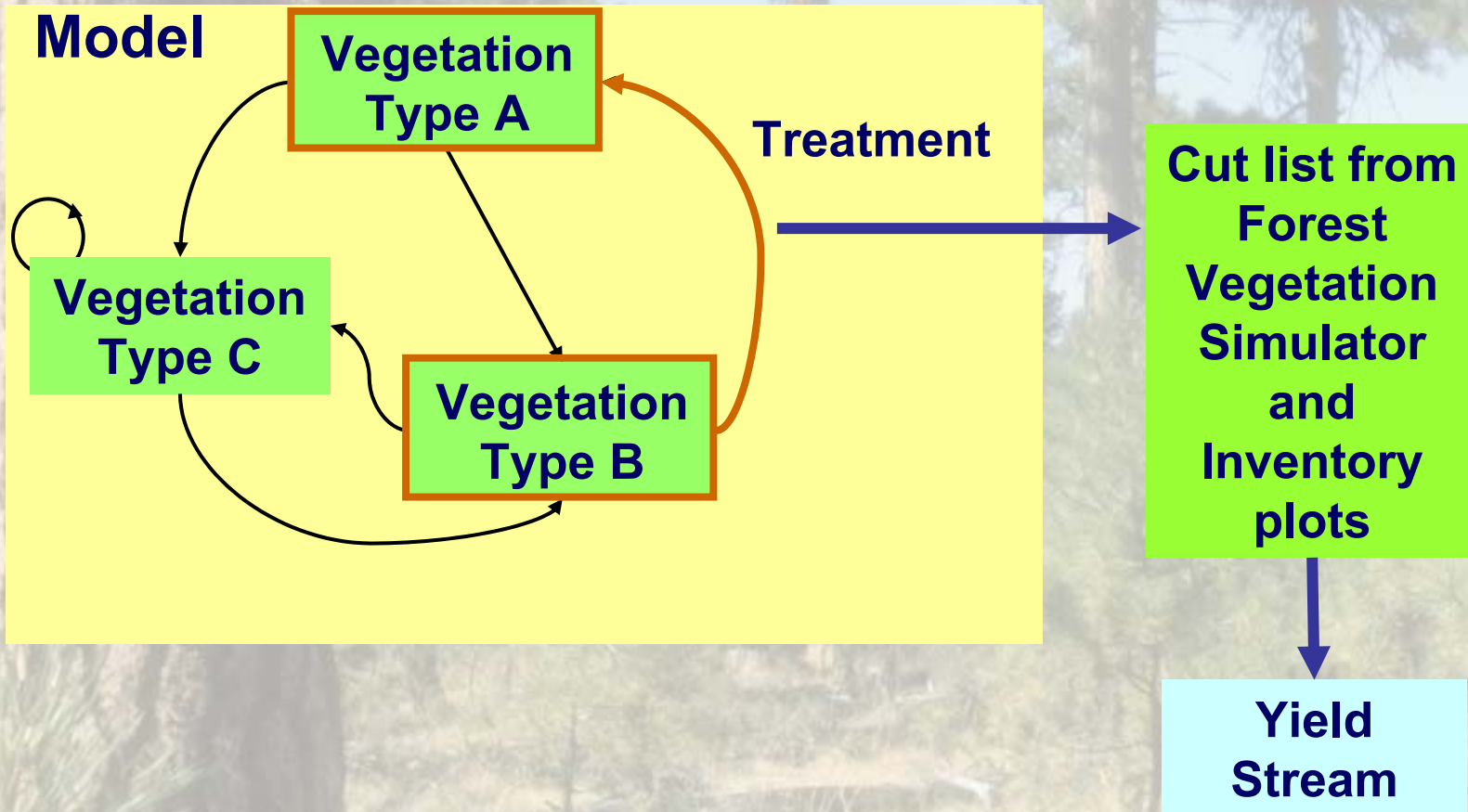
Risk factors

Human Disturbance		
low	0	<div><div></div><div></div><div></div><div></div><div></div></div>
moderate	100	<div><div></div><div></div><div></div><div></div><div></div></div>
high	0	<div><div></div><div></div><div></div><div></div><div></div></div>

Environmental Index		
low	25.6	<div><div></div><div></div><div></div><div></div><div></div></div>
moderate	52.2	<div><div></div><div></div><div></div><div></div><div></div></div>
high	22.2	<div><div></div><div></div><div></div><div></div><div></div></div>



Forest Products





Existing Vegetation

Mapping Current Vegetation in the Pacific Coast States with GNN, CART, and Other Tricks

**Landscape Ecology, Modeling, Mapping, and
Analysis (LEMMA) team (www.fsl.orst.edu/lemma)**

Janet Ohmann¹, Ken Pierce¹, Emilie Grossmann²,
Matt Gregory², Heather May², Tim Holt²

Collaborators:

Jeremy Fried³, Jimmy Kagan⁴, Ken Brewer⁵, Miles Hemstrom⁶,
Melinda Moeur⁷, Tom DeMeo⁷, Gary Lettman⁸, Mike Wimberly⁹

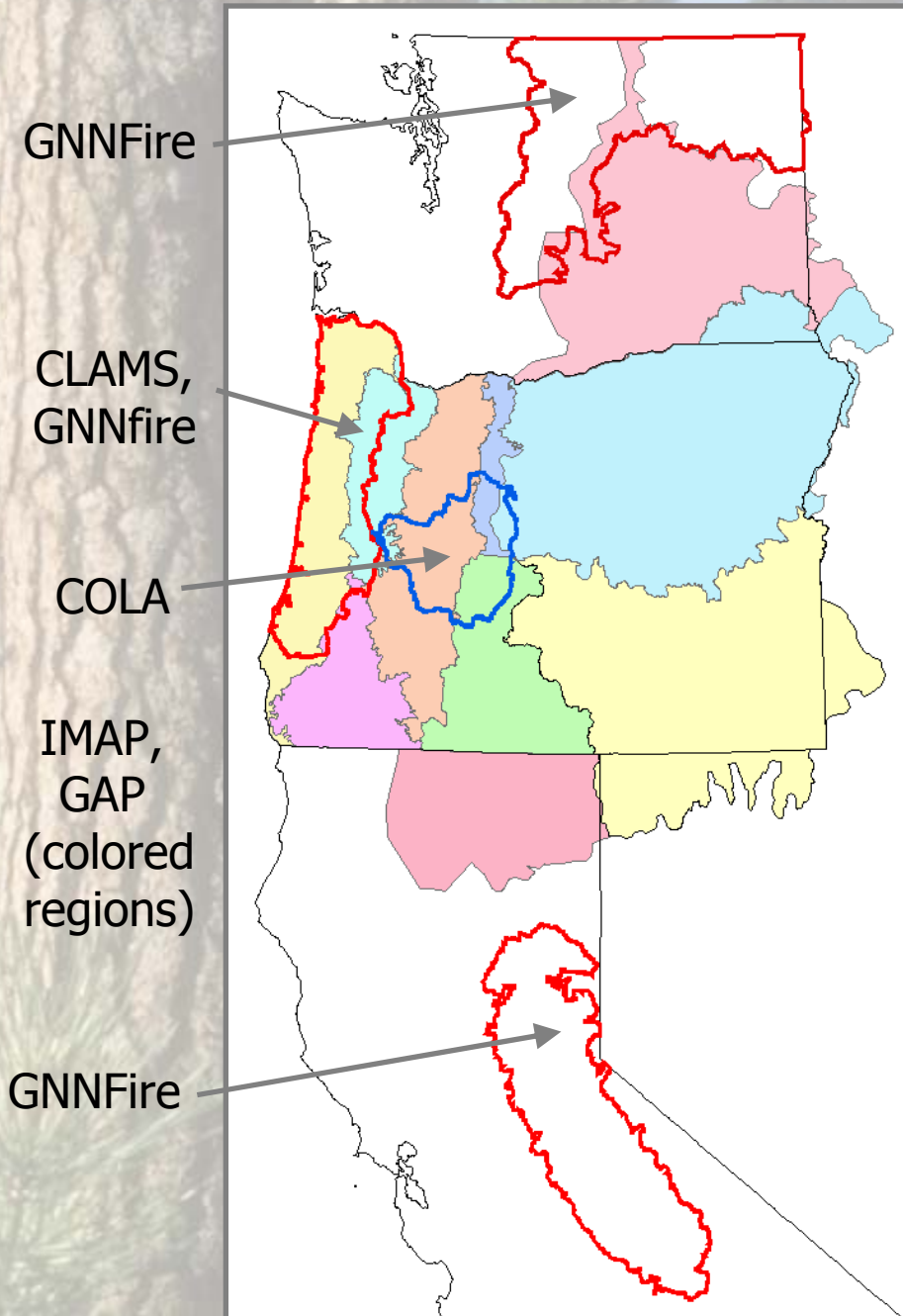
¹USDA FS, PNW, Ecosystem Processes; ²Oregon State University, Forest Science Department; ³USDA FS, PNW, Forest Inventory and Analysis; ⁴Oregon State University, Institute of Natural Resources;

⁵USDA FS, Remote Sensing and Applications Center; ⁶USDA FS, PNW, Focused Science Delivery;

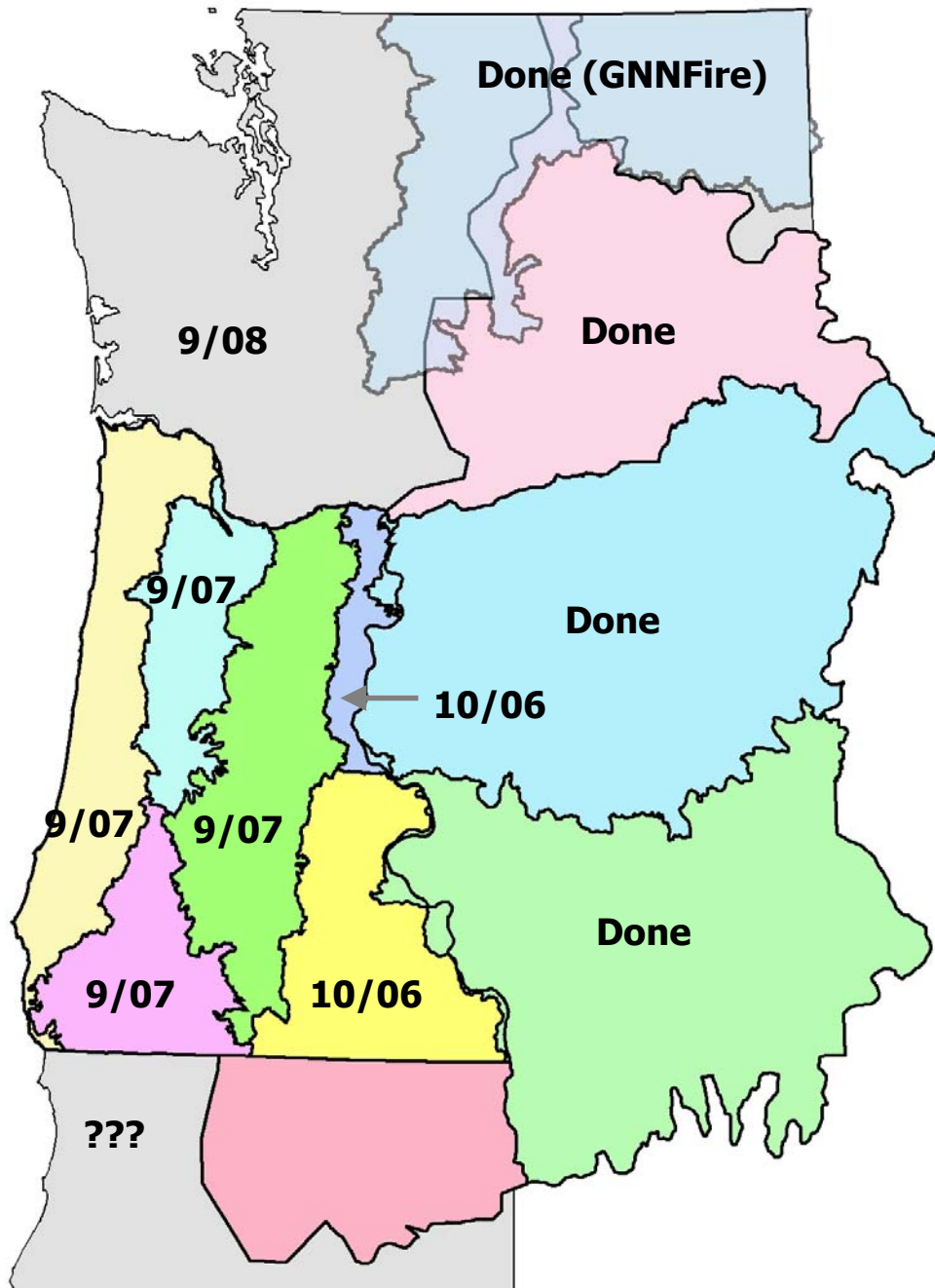
⁷USDA FS, Region 6; ⁸Oregon Department of Forestry; ⁹South Dakota State University

GNN vegetation mapping projects and applications

- Landscape modeling and scenario analysis: IMAP, COLA, CLAMS
- NWFP Effectiveness Monitoring
- Land management planning (Forest Plans, BLM Cumulative Effects, etc.)
- Regional risk assessment (WWETAC)
 - Fuels mapping (GNNFire), real-time fire behavior (Finney et al.)
 - Fire Learning Networks (Upper Deschutes, Sprague)
 - National 250-m study (RSAC, Brewer et al.)
- Biodiversity assessment and conservation planning (Gap Analysis Program (GAP))
- Research applications



‘Accelerated’ Timeline for IMAP Vegetation Mapping



- NWFP area by 10/08 (CA???)
- ReGAP (Ecological Systems): all Oregon ecoregions by 12/07
- Map dates:
 - Oregon: 2000
 - Washington: 2005
 - Update/backdate to 1996, 2000, 2005 for NWFP???

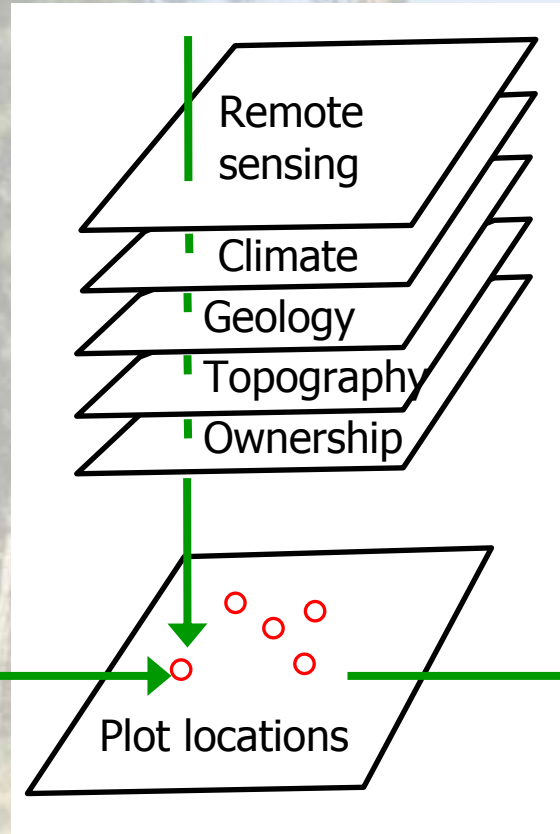
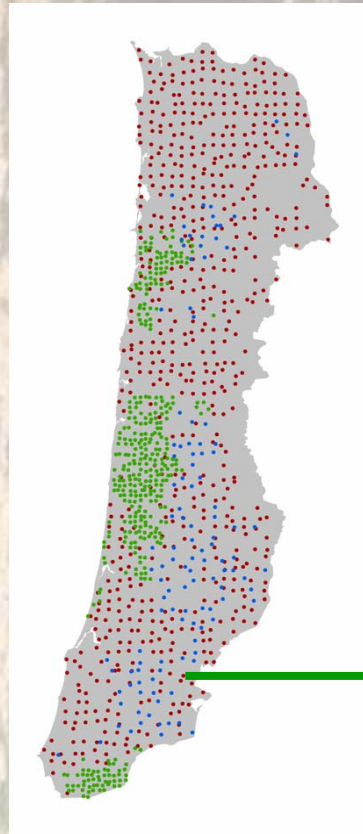
Gradient Nearest Neighbor Method

Plot data

Spatial data

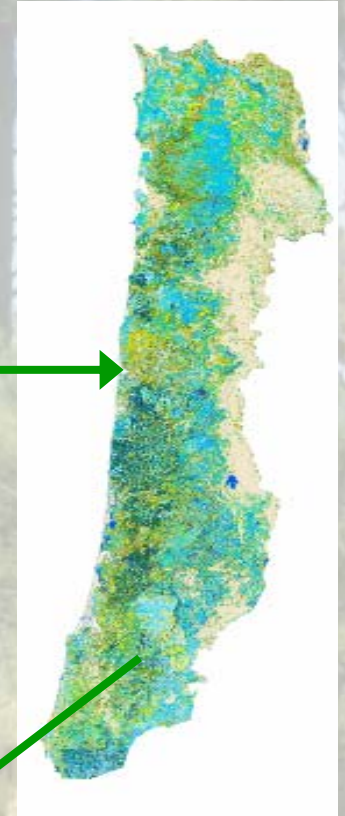
Statistical model

Prediction



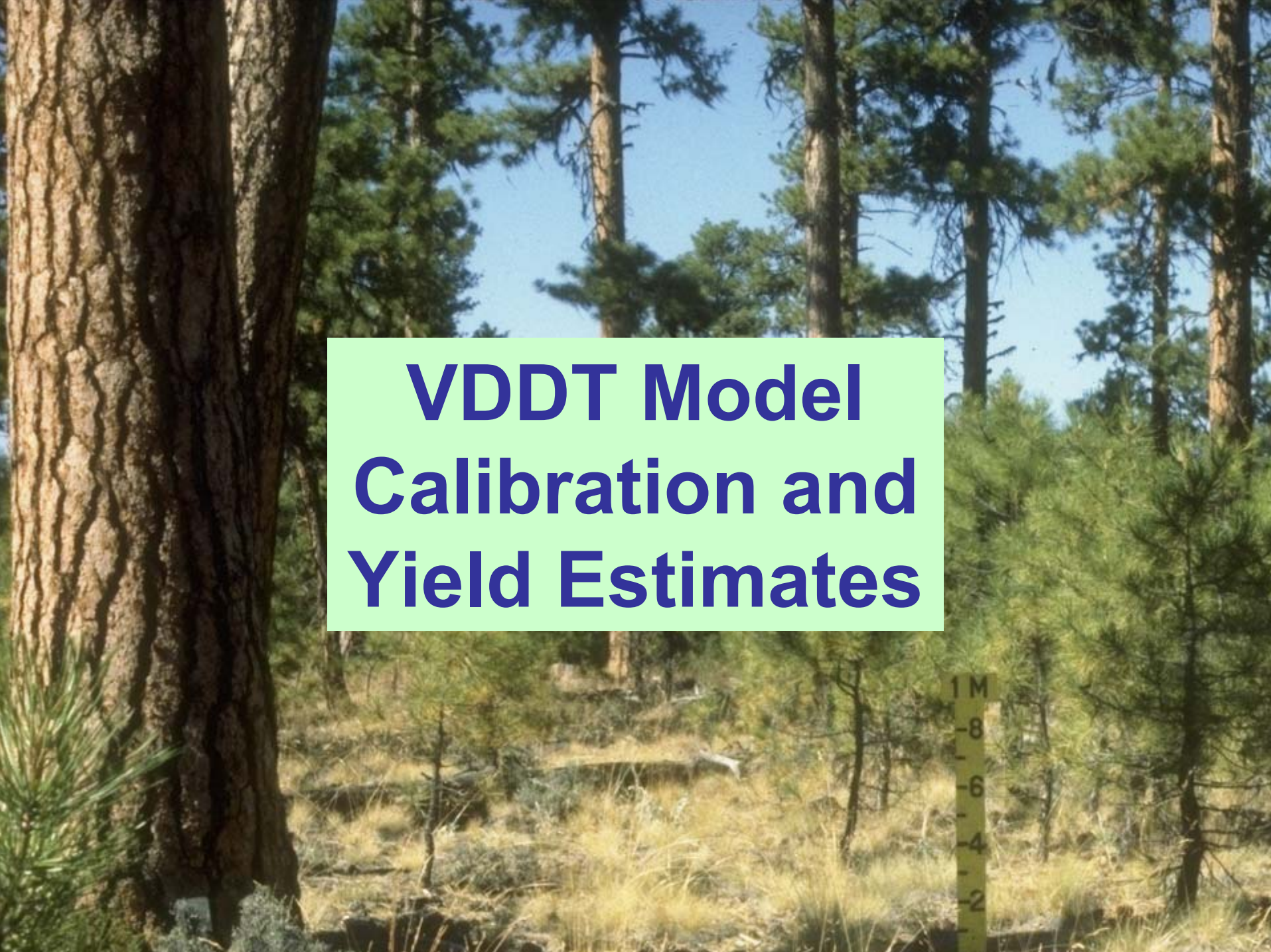
Imputation

Direct gradient analysis (CCA)



Pixel	PSME (m ² /ha)	CanCo v (%)	Snags >50 cm (trees/ha)	Old-growth index	Etc ...
1	11	3	7.4	0.27	...
2	79	97	2.1	0.82	...

Plot assigned to each pixel

A photograph of a forest scene with tall pine trees and a yellow measurement tape on the right side. The tape has markings for 1M, 8, 6, 4, and 2. The text is overlaid on a light green rectangular background in the center of the image.

VDDT Model Calibration and Yield Estimates

Develop Existing Vegetation Maps

Imagery plus DEMs,
Climate, Geology,
Soils, Ownership, etc.

GNN

Prepare Inventory Data FIA and CVS



Stratification

- Ownership/Allocation
- PVT
- Covertime,QMD,
Canopy Closure

FVS

Calibrate with FVS

- Natural Growth Runs
- Treatment Rx Runs

Estimate Transition Yields & State Values

Timber, Fire & Fuels, Wildlife, etc

Initialize Landscape Acres by Strata

VDDT

Build VDDT Models

- Define state classes
- Set/calibrate
transition probabilities

Run Scenario & Output Results

Objectives

Use inventory data / G&Y models to empirically derive:

State & Transition model parameters

- Residence times

- Pathways

- Transition Probabilities

Outputs

- Yield Profiles

- Lookup Tables

Calibrate Transition Probabilities and Estimate Yields

VDDT state class Pre-Harvest

Covertime: PPmd*
Structure: Lm**

*Ppmd: Ponderosa pine,
east-side mixed conifer
early seral dry

**Lm: Large tree,
medium cover

Disturbance: PH.salv*

*Partial harvest (salvage)
in post replacement classes

Post-Harvest state class

Ppmd
Go

Go: Giant tree-open

Ppmd
Lo

Lo: Large tree-open

Ppmd
Sh

Sh:Shrub

n(plots)		Transition	Yield
Pre-	Post-	Probability	Avg. CF vol/ac \pm s.d.
31	14	.45	3747 \pm 1252
31	9	.29	2935 \pm 1405
31	8	.26	4046 \pm 1004

Probs.

Yields

Silvicultural Prescriptions

FVS Event Monitor

- Regeneration harvest
- Selection harvest
- Precommercial thin
- Partial harvest (commercial thin)
- Salvage following disturbance
- Mechanical fuel treatment (noncommercial)
- Site prep and planting
- Prescribed fire non-lethal (underburn)

Yields

FVS keyword files

Timber production

Volume, Biomass

Fire and Fuels

Crown bulk density, Torching index,
Crowning index, CWD, FRCC

Focal Species Analysis

Snag density, Covertypes, Structure

Etc.

A photograph of a forest scene with tall pine trees and dry grass. A yellow measurement tape is visible on the right side, showing markings from 2 to 10 meters. The text "Indicators & State-wide Assessment" is overlaid in a blue box in the center.

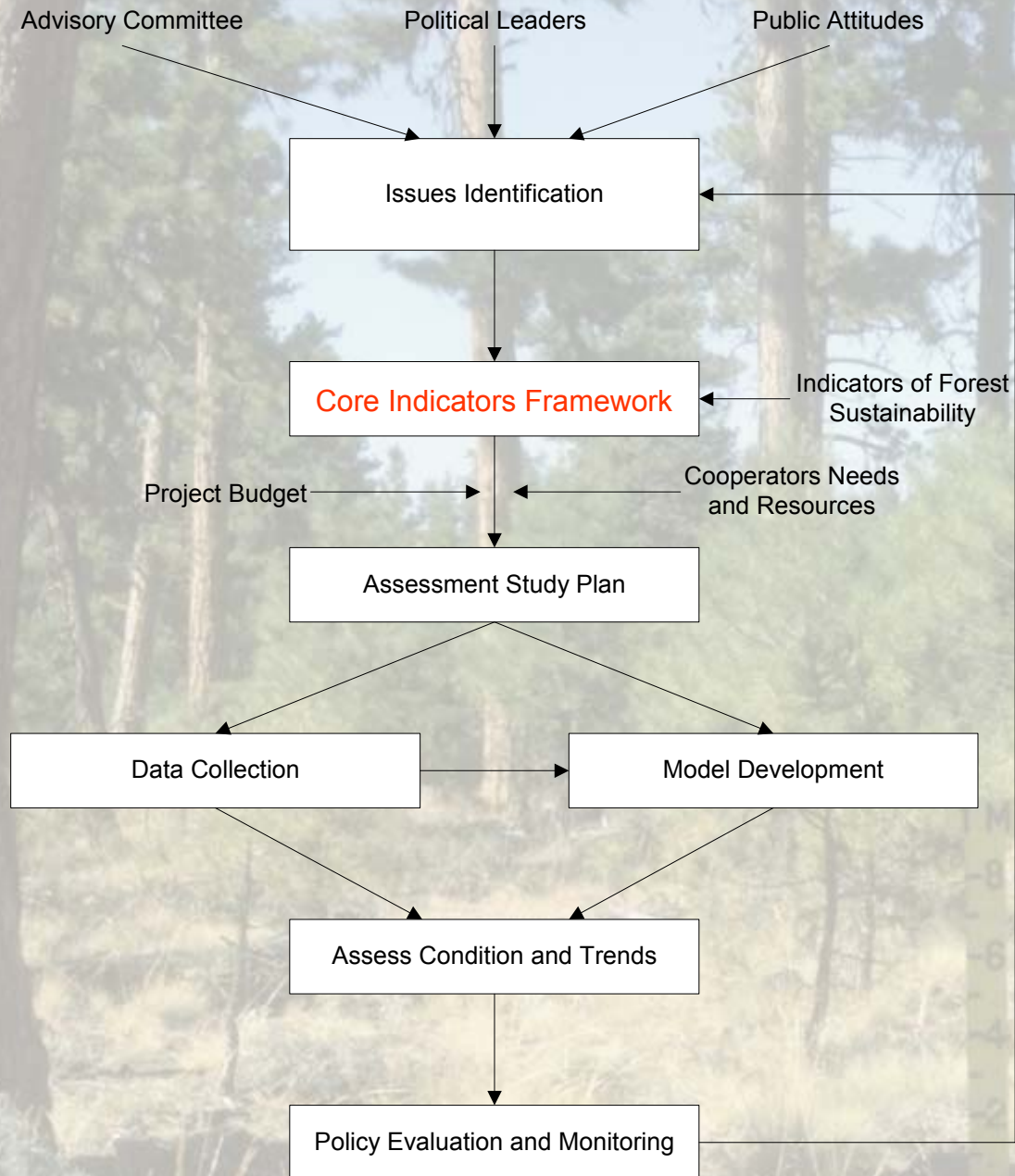
Indicators & State-wide Assessment

Purpose of Indicators

- “Indicators can be used to focus monitoring, assessments, and research, so that Oregon can more clearly tell its own citizens and the rest of the world the story of how well our forests are being managed.”

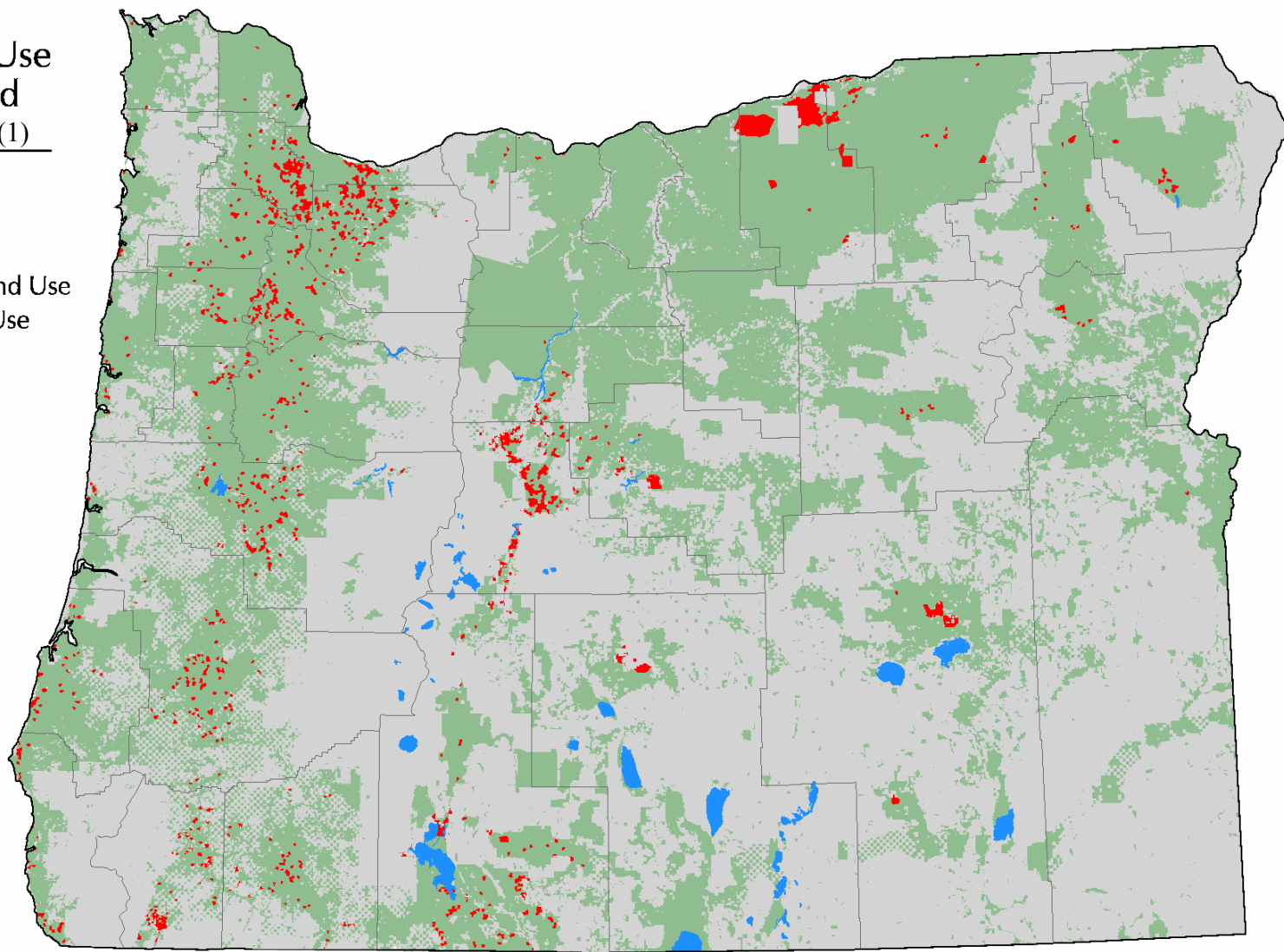
-- *Forestry Program for Oregon*, page 68

FOREST ASSESSMENT PROCESS



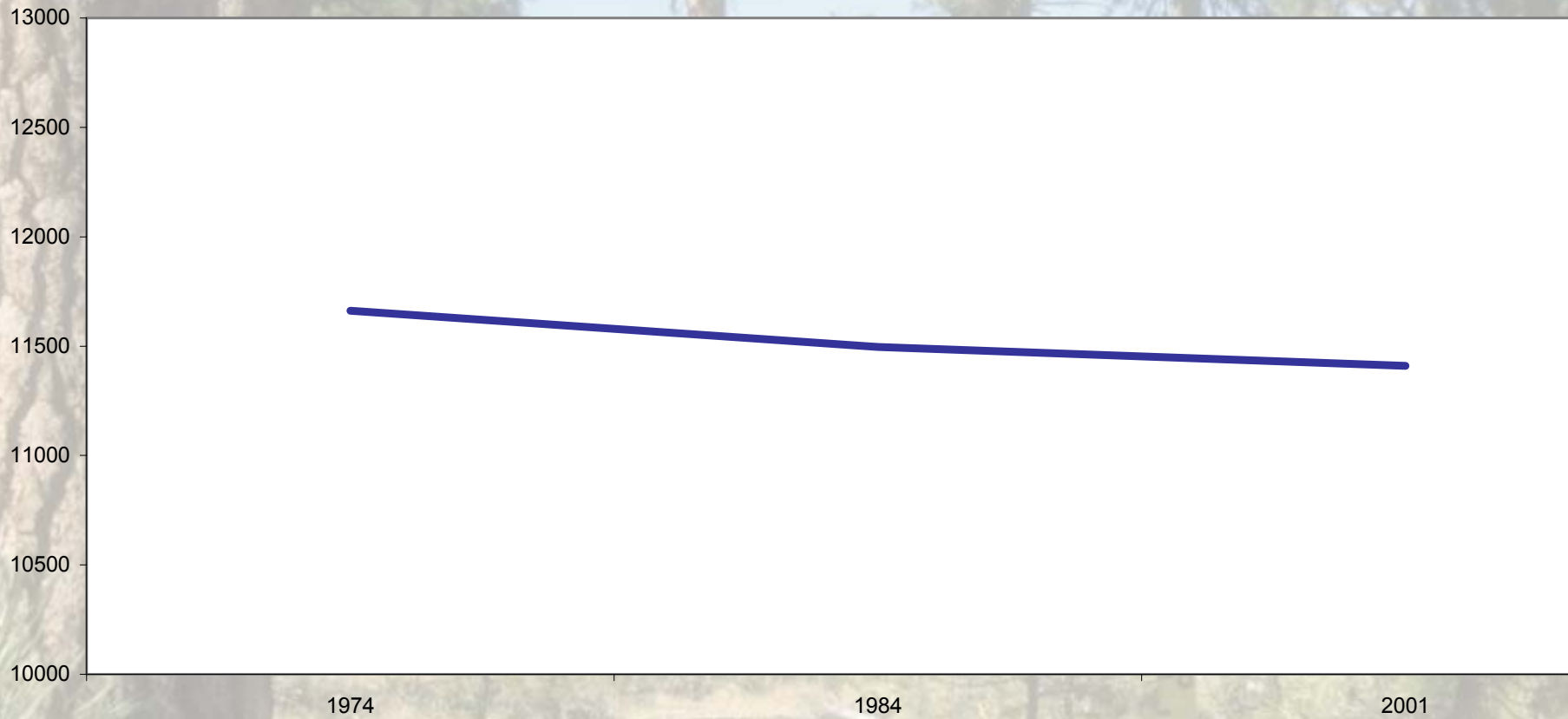
Change in Land Use On Private Land 1974 - 2000 (1)

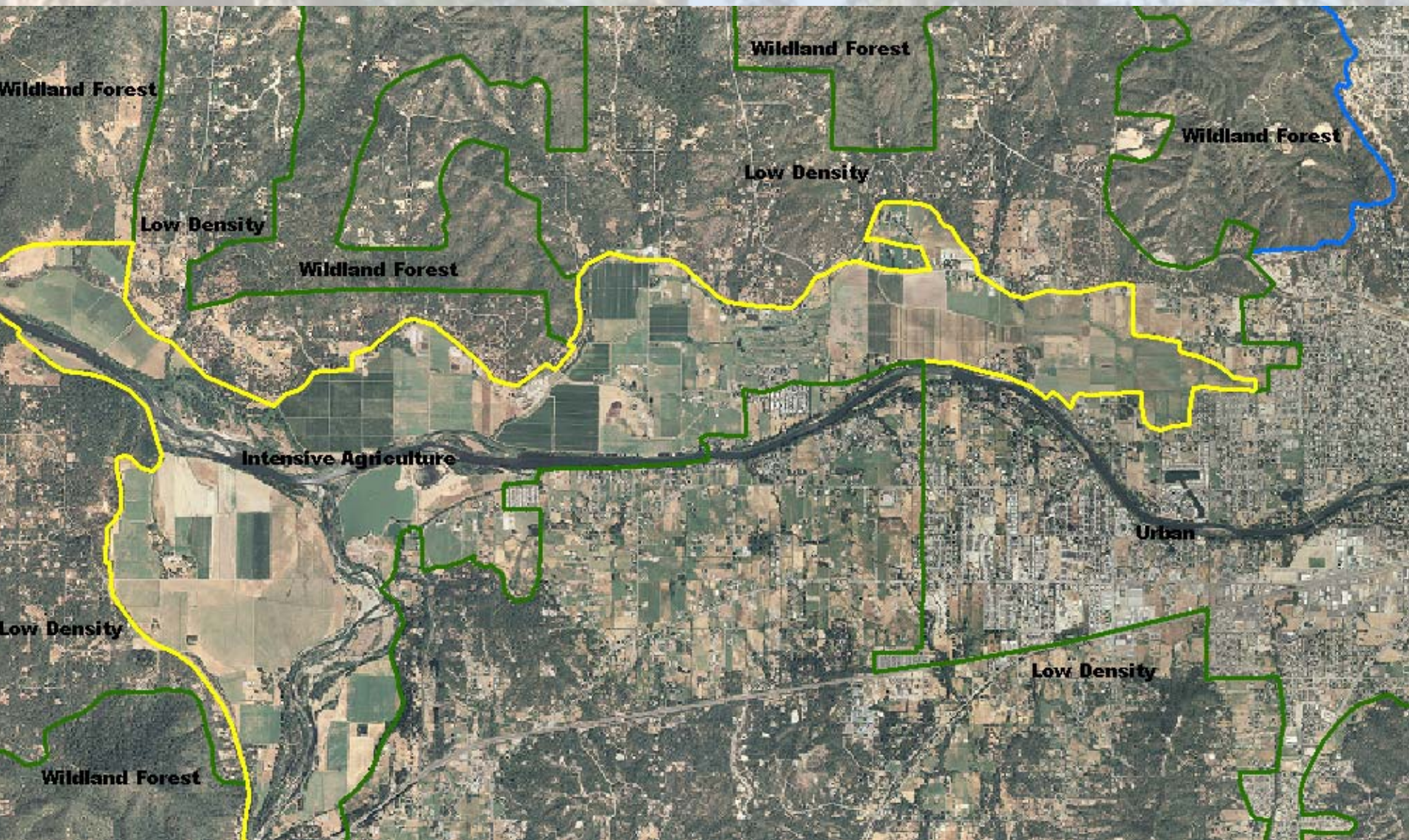
- No Change in Land Use
- Change in Land Use
- Public Land
- Water



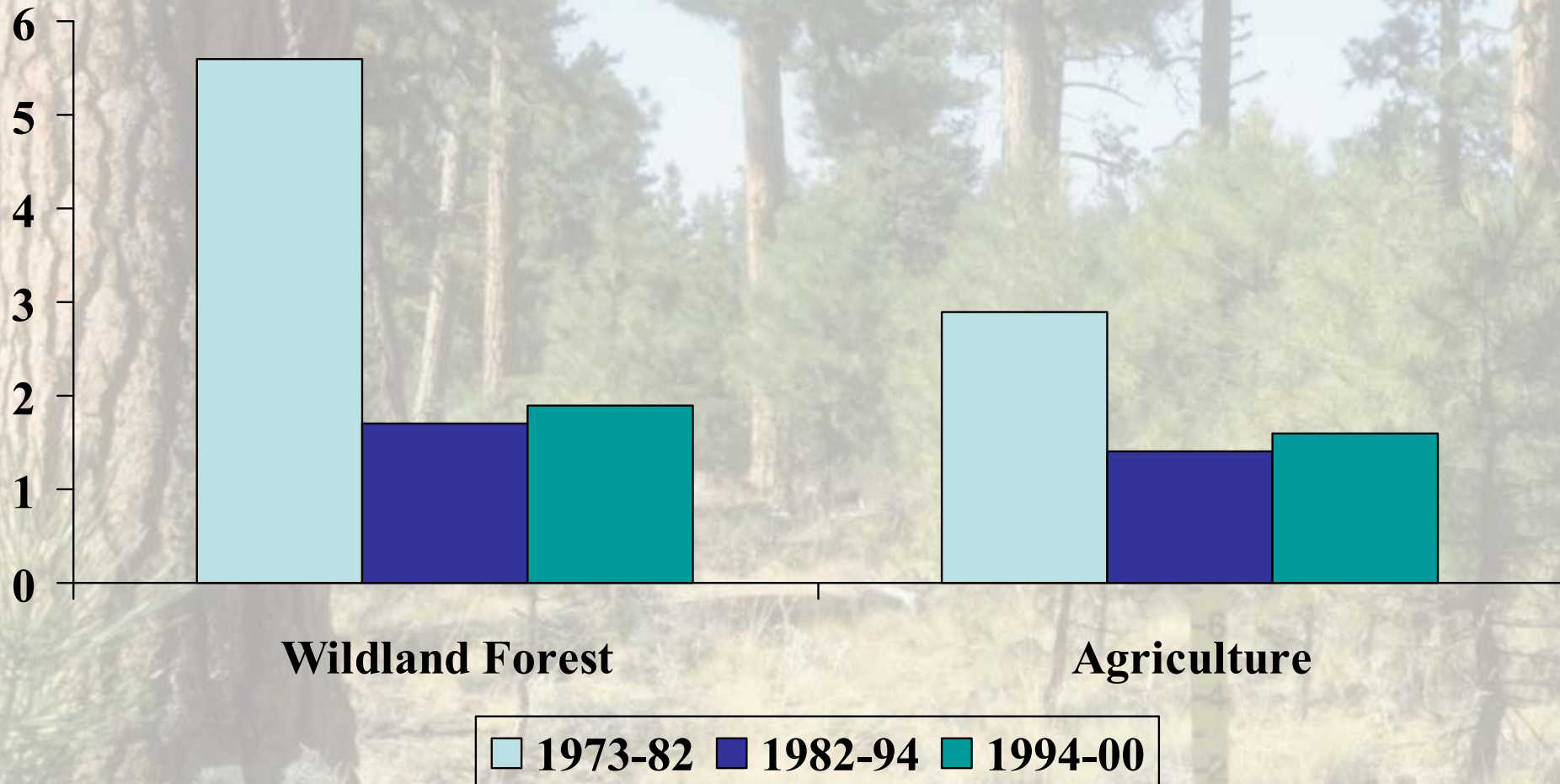
Area of nonFederal Wildland Forest in Oregon, 1973-2001

Thousand Acres





Percent Annual Change in Dwellings Per Square Mile in Western Oregon

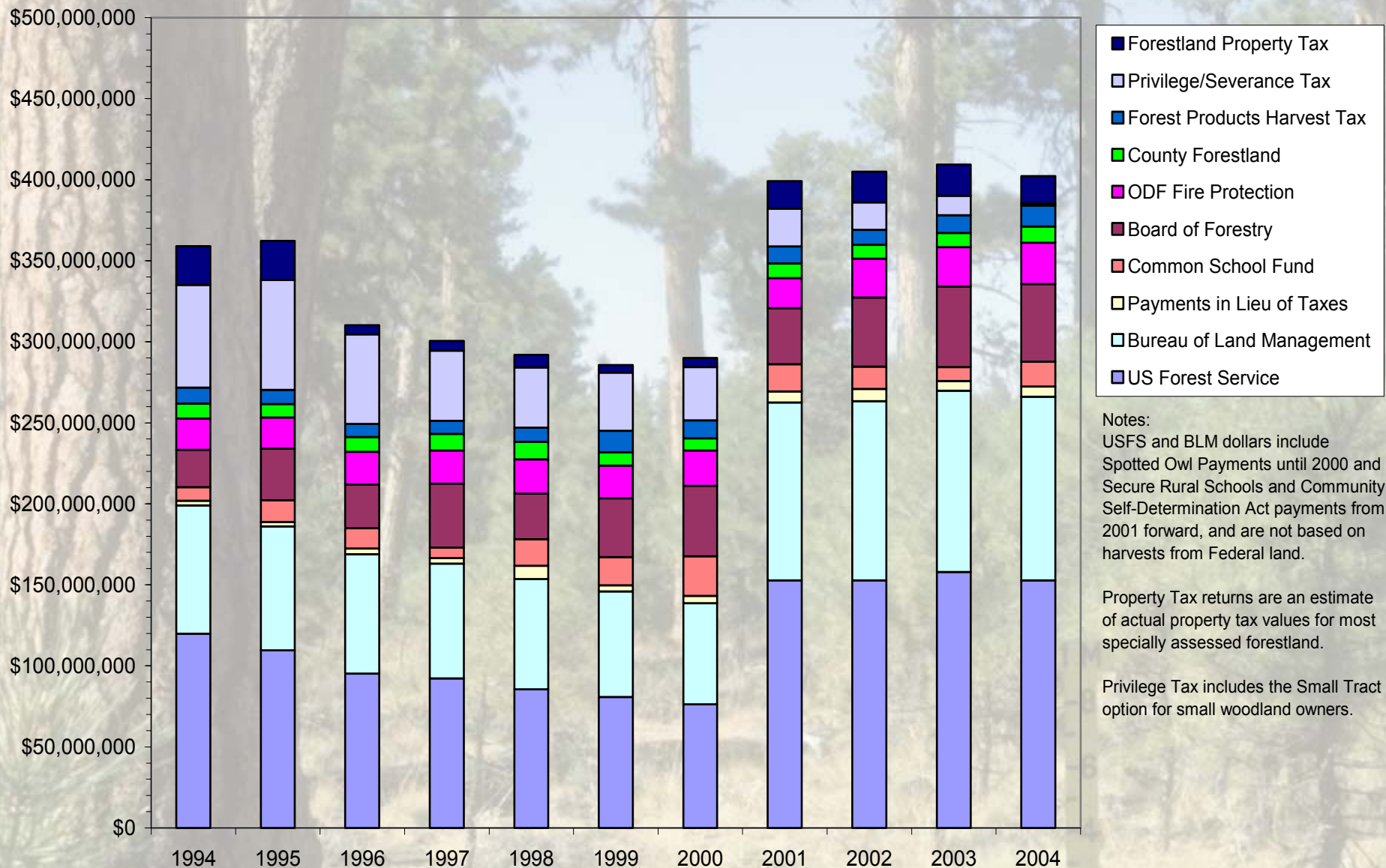


Leading Indicator Sample 2: Southern Edge of Sheridan

Year	2006	1994	1974
# of tax lots	33	28	4
# of owners	20	15	4
# of dwellings including manuf. homes	15	10	2
Developable acres*	299.86 (47%)	----	----

* Developable acres out of 640 acres determined by 3 Measure 37 tests: Lot-of-Record (length of ownership & capability of land), Large-Lot/ownership (acres owned by single owner), Template (development and capability within 160 acres)

DRAFT State and Local Government Forest Revenues by Year and Revenue Source 1994-2004



USFS/ODF Example Community Level Model: Central Tillamook

I/O Outcome	Sawmill	Resort Hotel
Direct Sector Jobs	80	80
Average Wage	\$35K	\$12K
Multipliers	high	low
Leakage	low	high
Total Area Jobs	253	138
Total Income	high	low
Socially Preferred	?Low?	?High?

Indicators

Indicator	Linkage
B.a. Forest Revenues	Yes - Adams (OSU)
B.b. Forest Employment	Yes - ODF (Lettman)
B.c. Consumption vs. Harvest	?
B.d. Non-commodity Contributions	Yes? - Indirect
B.e. Industry Competitiveness	?
C.a Area of Forestland	Yes - direct
C.b Timber Harvests	Yes - direct
D.a Water Quality Index	Possible?
D.b Index of Biotic Integrity	Possible?
D.c Forest Roads	GIS data – ODF/R6
D.d Drinking Water	?
E.a Forest Veg.	Yes - direct
E.b Protected Areas	Yes - direct
E.c Species at Risk	Yes - R6 focal species, OR/WA habitats
F.a Tree Mortality	Yes - direct
F.b Invasives	Yes - direct/indirect
F.c Fuel Treatment	Yes - direct
F.d Fuel Conditions	Yes - direct
G.a., G.b, etc. (carbon)	Yes - McCarter (UW)

A photograph of a forest scene with tall pine trees and a yellow measurement tape in the foreground. The tape is marked with numbers 2, 4, 6, 8, and 1 M. The text "R6 Plan Revisions" is overlaid in a green box with blue text.

R6 Plan Revisions

Support for R6 Forest Plan Revision

Vegetation maps compliant with USFS
national and regional mapping standards

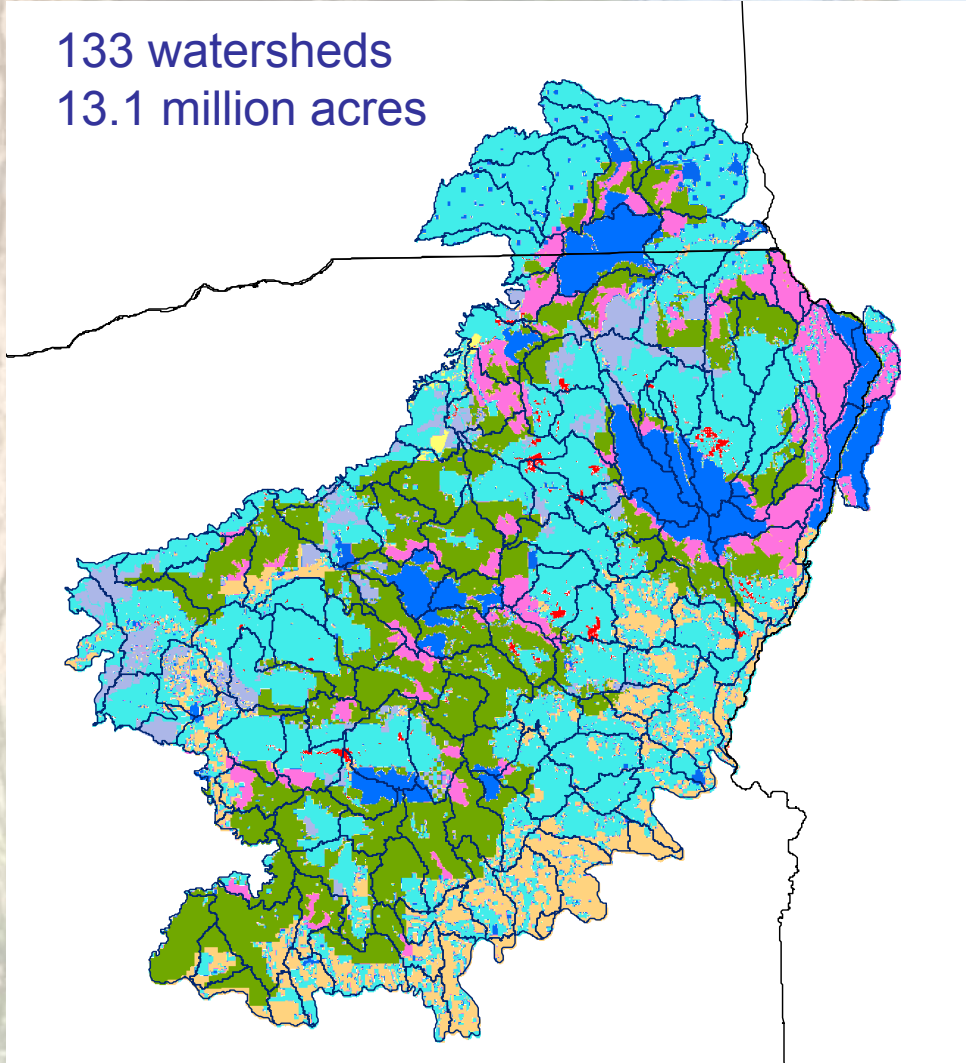
Initial Conditions and 2 modeling scenarios

HRV

Current Management

Blue Mountains Study Area

133 watersheds
13.1 million acres

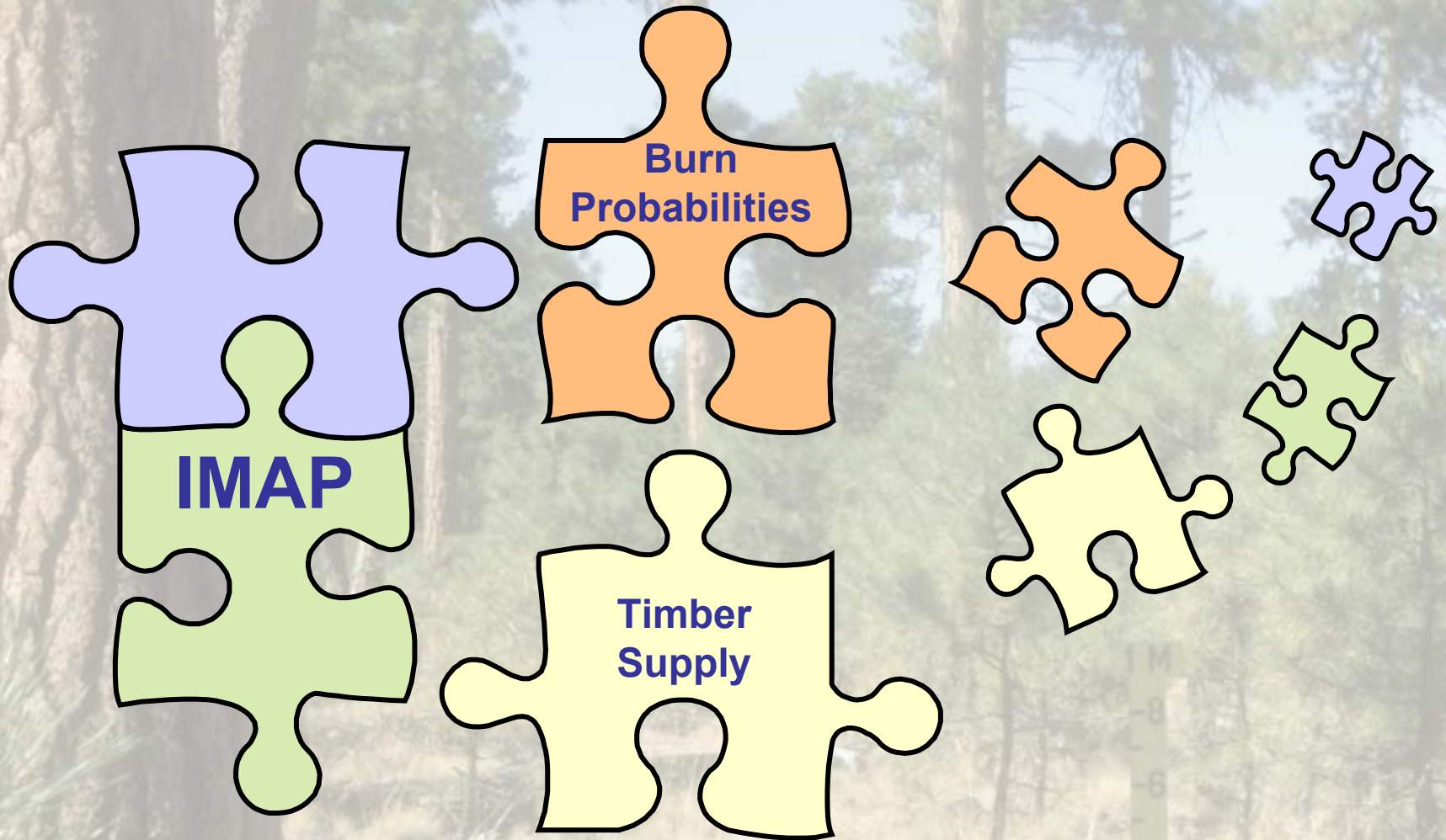


Grassland Shrubland Woodland	Forest
Idaho fescue-prairie junegrass	Hot, dry ponderosa pine
Idaho fescue-bluebunch wheatgrass	Warm, dry ponderosa pine
Green fescue	Warm, dry Douglas-fir
Low sage	Warm, dry grand fir
Montane shrub	Cool, moist
Mountain big sage	Cold, dry
Mountain mahogany	Subalpine woodland
Juniper	
Sanberg's bluegrass- Onespike oatgrass	
Bitterbrush	
Rigid sage	
Greasewood-Saltgrass	
Wyoming big sage	

A photograph of a forest research plot. In the foreground, a large, textured tree trunk is on the left. The ground is covered with dry, yellowish grass and small shrubs. In the background, several tall, slender pine trees stand against a clear blue sky. A yellow measuring tape is visible on the right side of the image, marked with numbers 2, 4, 6, 8, and 1 M (meter).

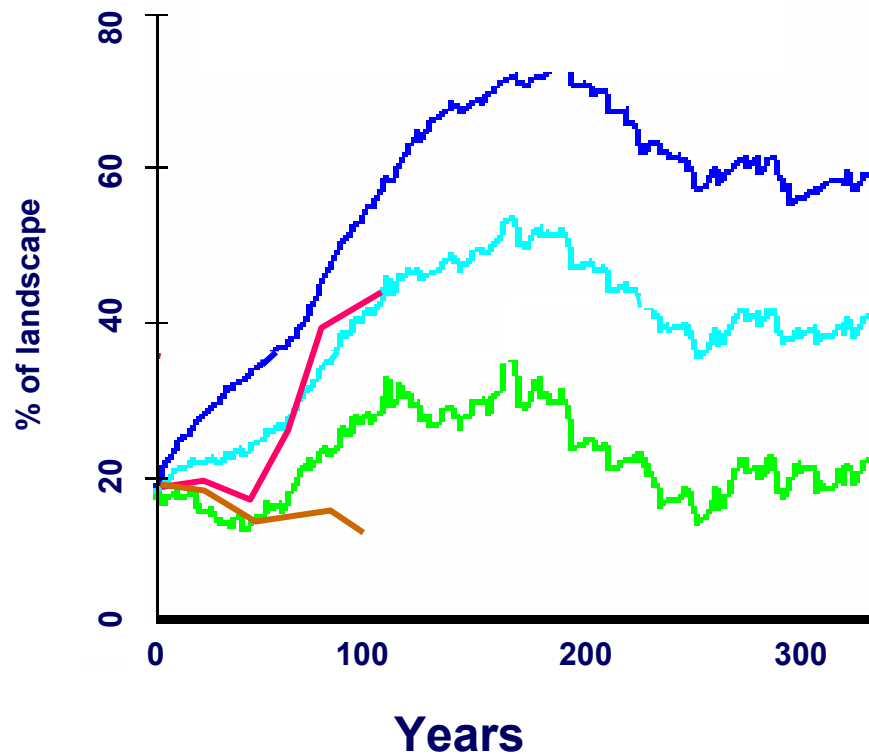
Research

Research Plug-N-Play



Time Lags and Real Differences

Important characteristics may change slowly or episodically or both



- Reality takes one path of the huge number possible
- Within range of expected behavior?
- If not, why?
- Is the model wrong?
- External factors changing?

Future Directions

- Refine fire and insect disease year variability estimates
- Add development rates to models
- Examine the effects of variability and uncertainty on important landscape attributes (e.g. high severity wildfire, economics, etc.)
- Link to project design and cumulative effects
- Others...

A photograph of a forest scene with tall pine trees and a yellow measurement tape on the right side. The tape has markings for 1 M, 8, 6, 4, and 2. The text is overlaid on a light green rectangular background.

NW Forest Plan Status and Trends Monitoring



Northwest Forest Plan status and trends monitoring

Vegetation maps updated to 2007 for the
15-yr report

Long-term projections of alternative
management scenarios,
esp. in fire-prone provinces

A photograph of a forest with tall, slender pine trees. In the foreground, a yellow measuring tape is visible on the right side, showing markings from 2 to 10 meters. The ground is covered with dry, yellowish grass and some small shrubs. The sky is clear and blue.

Brainstorming - Needs

Charter


1 M

8

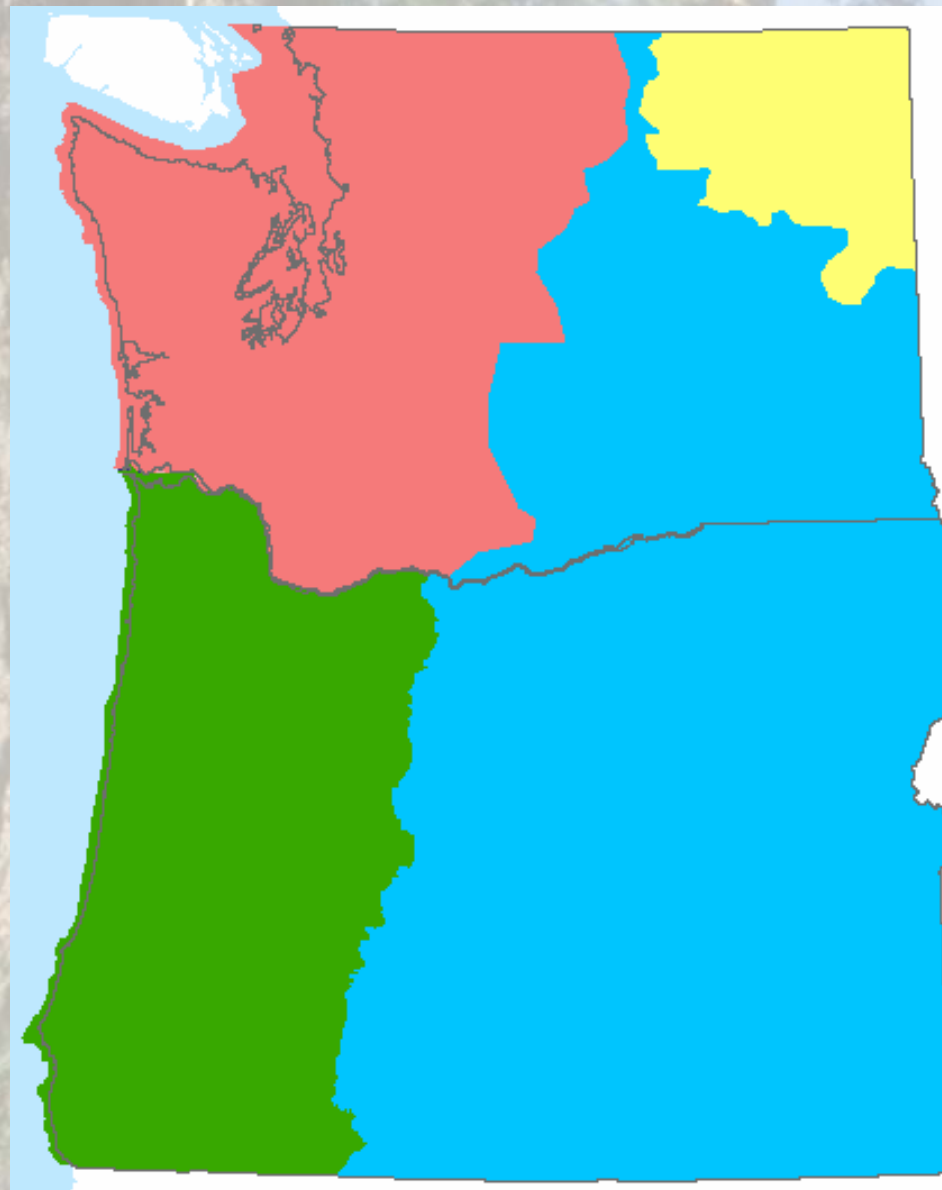
6

4


2

A photograph of a forest scene with tall pine trees and a yellow measurement tape on the right side. The tape has markings for 1M, 8, 6, 4, and 2. The text "Proposed Schedule of Products" is overlaid in a green box in the center.

Proposed Schedule of Products



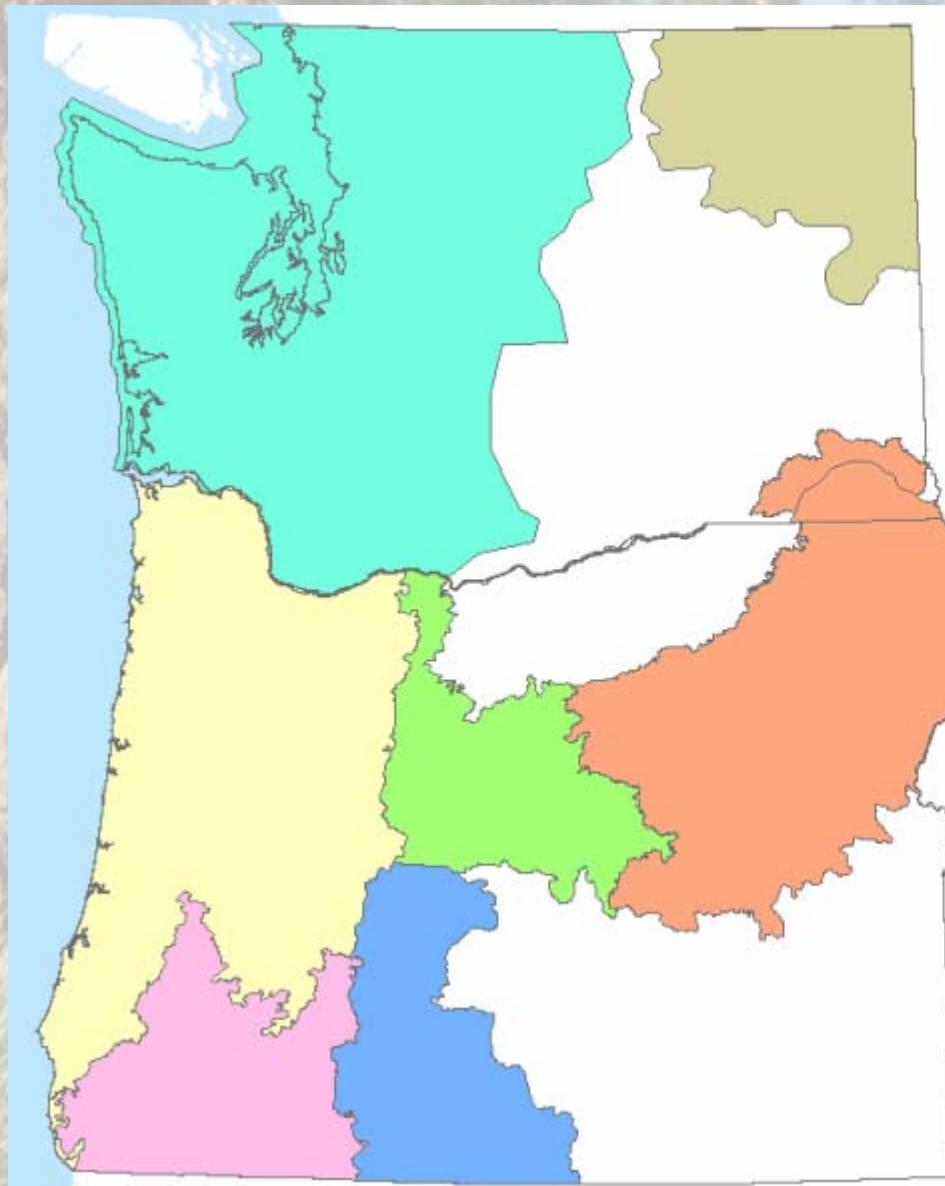
Vegetation Map Proposed schedule

 9/06 Complete!

 6/07

 3/08

 12/08



VDDT Models Proposed schedule

- NE Or - Current
- E Cas S Or - fy07
- E Cas N Or - fy07
- SW OR - fy08
- W WA- fy09
- NE WA - fy10

A photograph of a forest scene with tall pine trees and a yellow measurement tape in the foreground. The tape is marked with numbers 2, 4, 6, 8, and 1 M. The text "Budget and Funding" is overlaid in a green box with blue text.

Budget and Funding

Partner Contributions	fy06	fy07	fy08	fy09	fy10	Total
PNW Research Station						
In-kind	\$180,320	\$174,214	\$182,350	\$223,399	\$223,399	\$983,682
Cash	\$154,775	\$106,830	\$112,020	\$117,469	\$117,469	\$608,563
Total	\$335,095	\$281,045	\$294,370	\$340,868	\$340,868	\$1,592,245
R6 IMAP						
Cash	\$97,171	\$259,456	\$261,806	\$275,332	\$275,332	\$1,169,096
Total	\$97,171	\$259,456	\$261,806	\$275,332	\$275,332	\$1,169,096
R6 IM						
In-kind	\$163,389	\$177,119	\$184,383	\$253,459	\$253,459	\$1,031,810
Cash	\$117,983	\$53,734	\$56,320	\$0	\$0	\$228,037
Total	\$281,372	\$230,853	\$240,703	\$253,459	\$253,459	\$1,259,847
NFWP Regional Monitoring						
In-kind	\$64,330	\$104,032	\$109,059	\$114,337	\$114,337	\$506,095
Cash	\$32,321	\$68,521	\$83,559	\$82,250	\$82,250	\$348,901
Total	\$96,651	\$172,553	\$192,617	\$196,587	\$196,587	\$854,996
ODF						
In-kind	\$78,624	\$82,555	\$86,683	\$91,017	\$91,017	\$429,896
Cash	\$155,456	\$112,843	\$118,083	\$123,585	\$123,585	\$633,551
Total	\$234,080	\$195,398	\$204,766	\$214,602	\$214,602	\$1,063,447
WWETAC						
Cash	\$422,536	\$388,626	\$66,868	\$0	\$0	\$878,030
Total	\$422,536	\$388,626	\$66,868	\$0	\$0	\$878,030
Project Totals						
In-kind	\$486,663	\$537,921	\$562,475	\$682,212	\$682,212	\$2,951,483
Cash	\$980,243	\$990,010	\$698,655	\$598,635	\$598,635	\$3,866,178
In-kind+Cash	\$1,466,905	\$1,527,931	\$1,261,130	\$1,280,847	\$1,280,847	\$6,817,660
Total Need	\$1,466,905	\$1,551,246	\$1,676,935	\$1,834,250	\$1,834,250	\$8,363,584
Shortfall	\$0	\$23,315	\$415,805	\$553,402	\$553,402	\$1,545,924

A photograph of a forest scene with tall pine trees and a grassy undergrowth. A large, light green rectangular box is superimposed over the center of the image, containing the text "Next Meeting" in a bold, dark blue font. In the lower right corner, a yellow measuring tape is visible, showing markings from 2 to 10 meters. The background shows a dense forest of tall, slender pine trees under a clear blue sky.

Next Meeting