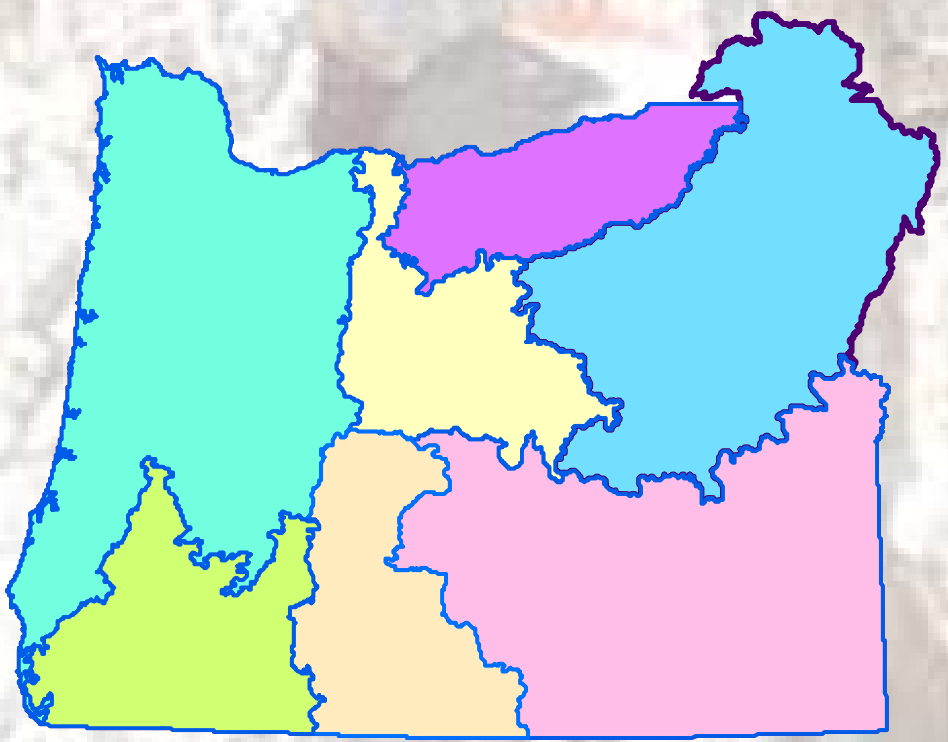
Interagency Mapping and Assessment Project (IMAP)

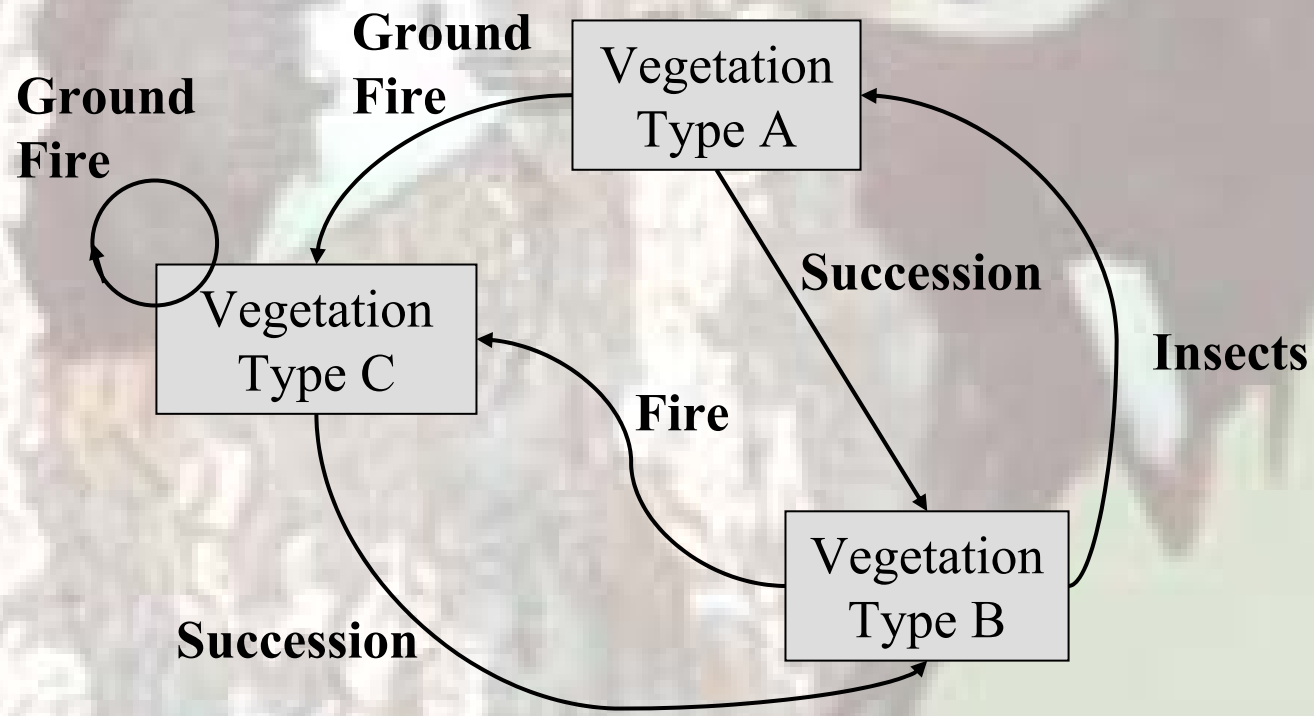


- **Purpose is integrated planning, assessment, monitoring**
- **IMAP (Oregon) – 7 Study Regions**
- **Vegetation Modeling of different management scenarios**
  - **VDDT**

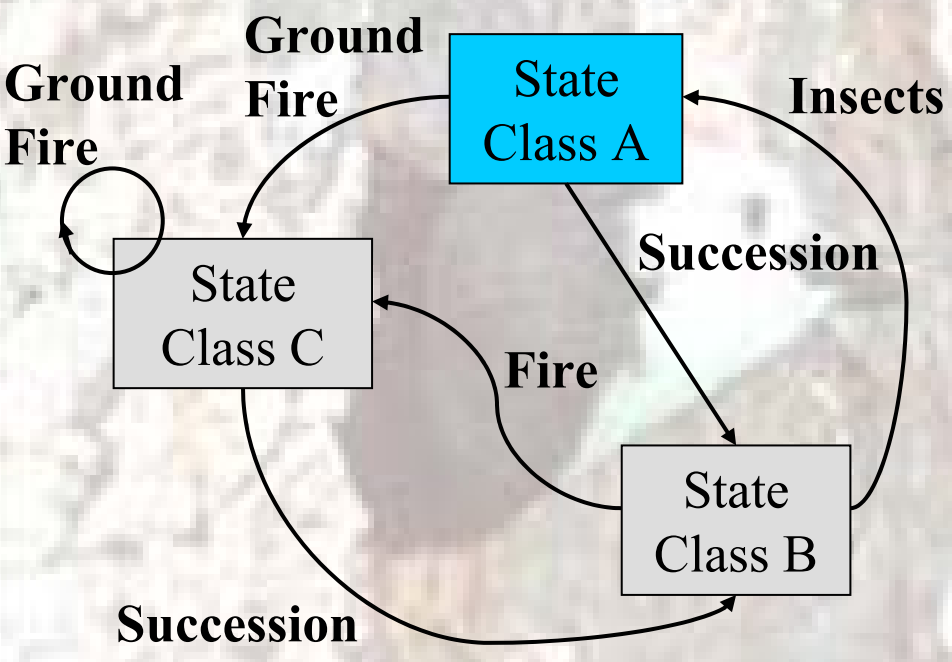
IMAP Wildlife Analysis

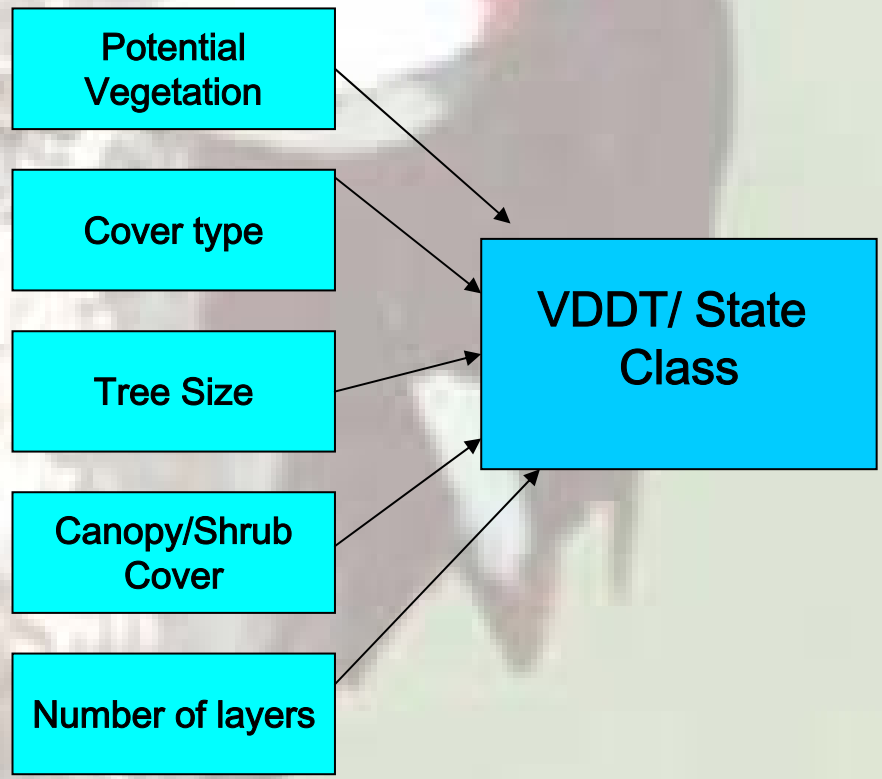
- **PART I**
  - Available information
- **PART II**
  - Steps to evaluate species of conservation concern
- **PART III**
  - Other species

VDDT = State and Transition Models

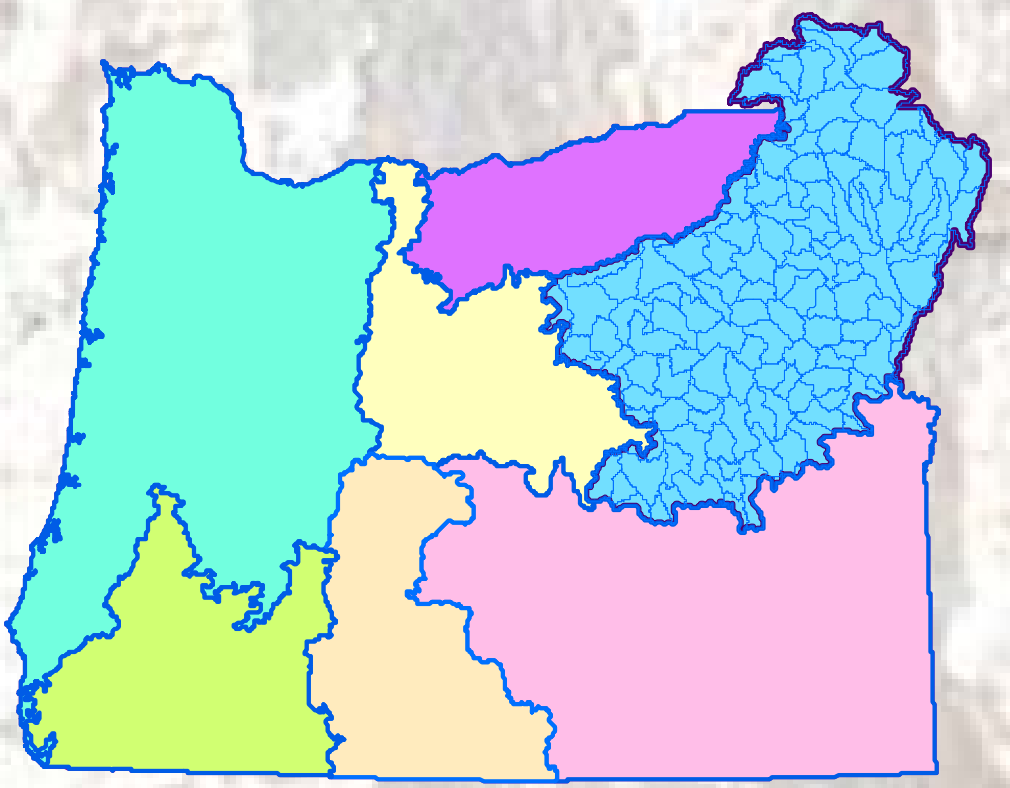


State Class


Ground
Fire
Ground
Fire
State
Class A
Insects
Succession
State
Class C
Fire
State
Class B
Succession

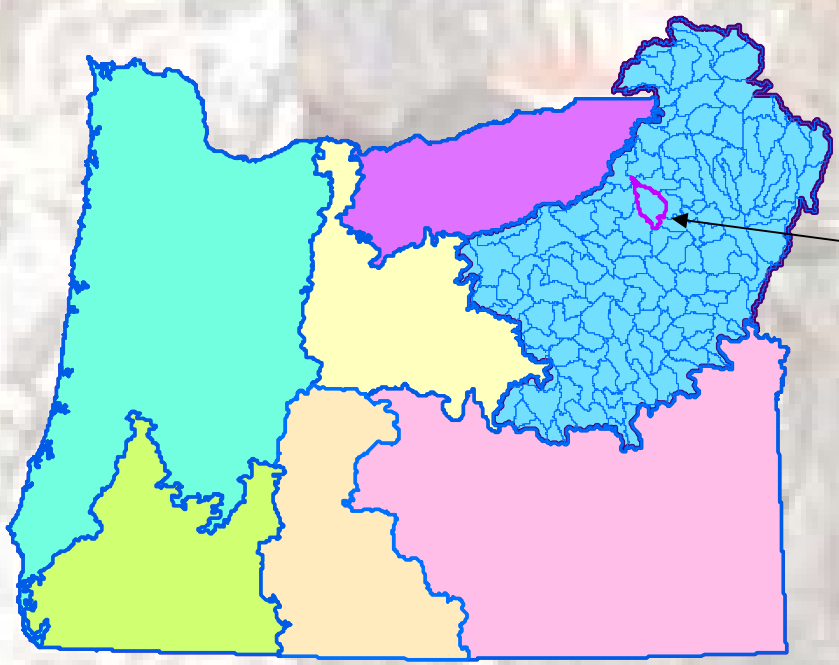

Potential
Vegetation
Cover type
Tree Size
Canopy/Shrub
Cover
Number of layers
VDDT/ State
Class

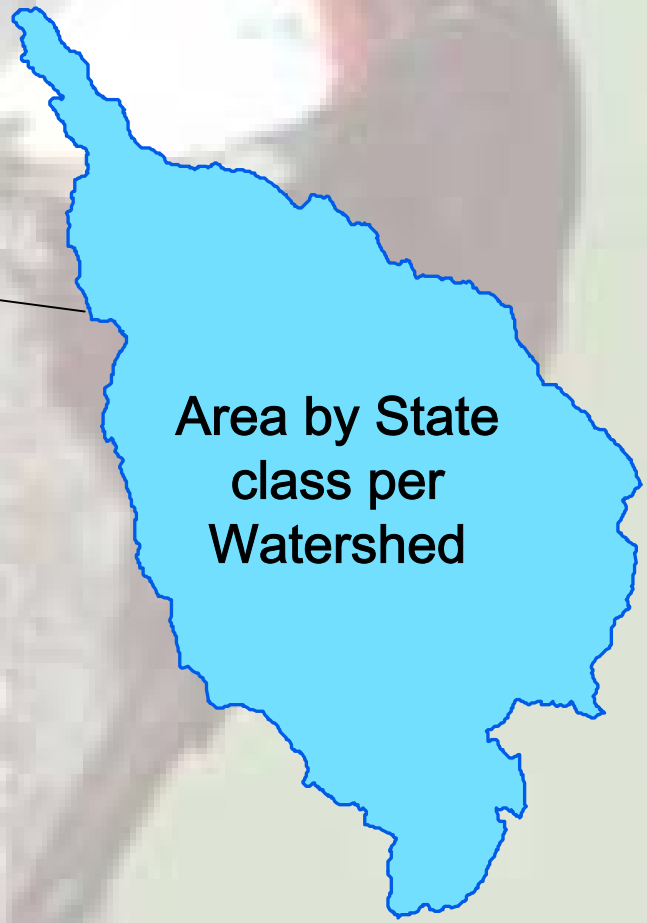
IMAP



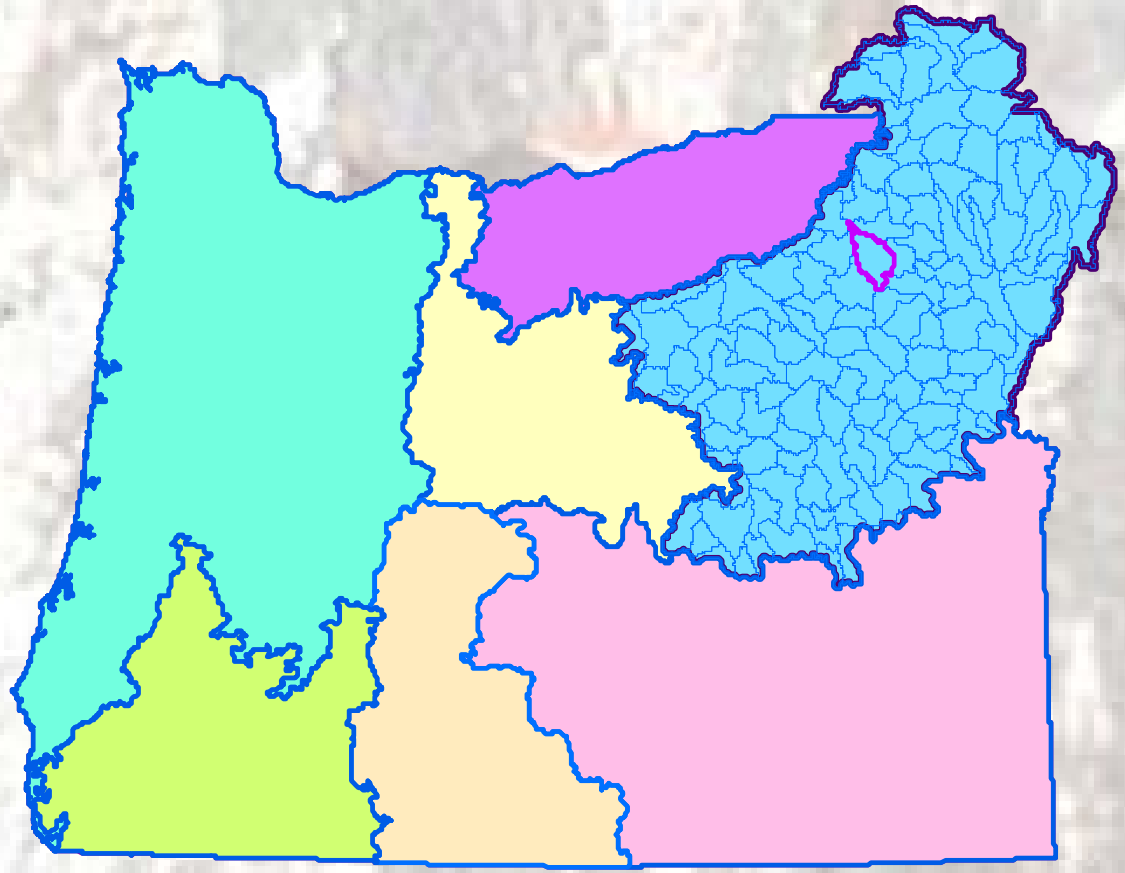
- **IMAP (Oregon) – 7 Study Regions**
- **Blue Mountains – 133 Watersheds**
- **Vegetation data is wall to wall**
  - **30 m vegetation data from GNN and Sagemap**
- **Nearly 500 State Classes**
  - **373 Forest state classes**
  - **116 Non-Forest state classes** (shrub/grasslands)

Blue Mountains – 133 Watersheds

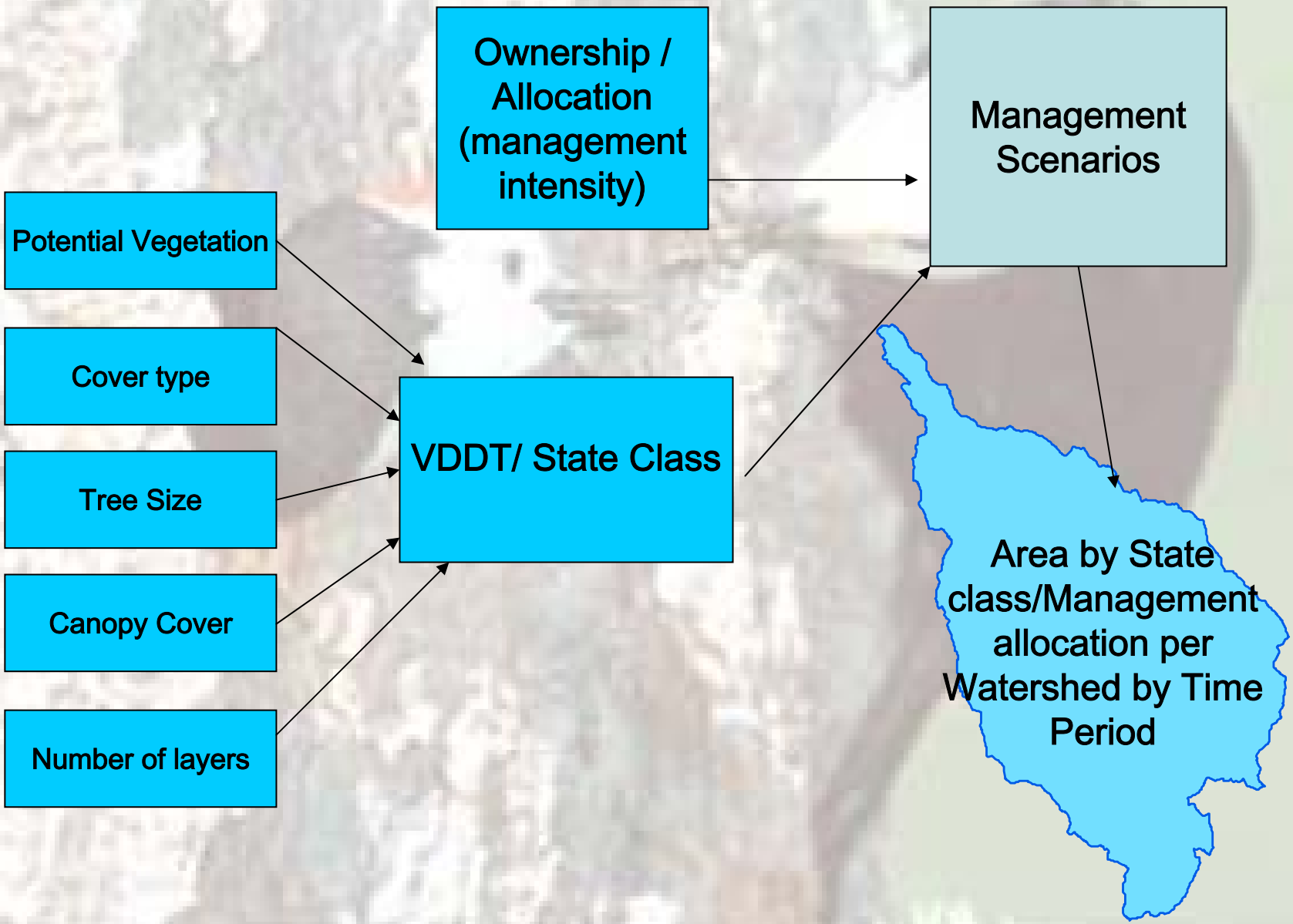




IMAP - Futuring



- **Use VDDT to model potential outcomes based on different management scenarios**
- **12 Management allocations – e.g:**
  - **Federal wilderness**
  - **Federal managed**
  - **Private industrial**
  - **WUI**


Ownership / Allocation (management intensity)
Management Scenarios
Potential Vegetation
Cover type
Tree Size
Canopy Cover
Number of layers
VDDT/ State Class
Area by State class/Management allocation per Watershed by Time Period

IMAP Wildlife Analysis

- **PART I**
  - Available information
- **PART II**
  - Steps to evaluate species of conservation concern
- **PART III**
  - Other species

Steps to evaluate species of conservation concern

1. **Identify species of concern and interest**
2. **Link species to habitats**
3. **Group species by habitat**
4. **Identify risk factors**
5. **Select focal species for groups**
6. **Develop and apply Bayesian Belief Network (BBN) models for focal species**
7. **Identify Conservation Approaches**
8. **(Develop Monitoring Strategy)**

Step 1: Identify Species

- **USFWS Threatened and Endangered**
- **Proposed & candidate**
- **NatureServe Global rankings**
- **NatureServe State ranks**
- **Birds of Conservation Concern**
- **Interior Columbia Basin Ecosystem Management Project viability concerns**
- **State T&E and Comprehensive Wildlife Conservation Strategy species**

Step 2: Link Species to Source Habitats (vegetation type and stand structure (state class))

COMMON NAME	Alpine	Sub-Alpine	Mont Conif	Lodgepole	Mixed Con	Pond Pine	Post fire	Juniper	Shrublands	Grasslands	Lrg Tree	Med Tree	Small Tree	Sapling	Grs Early	Can open	Can closed
FLAMMULATED OWL					1	1					1	1				1	1
WHITE-HEADED WOODPECKER					1	1					1					1	
CASSIN'S VIREO					1	1					1	1	1			1	
FOX SPARROW			1	1	1	1									1	1	
BLACK-BACKED WOODPECKER							1				1	1	1				
SAGE THRASHER					1	1			1							1	
AMERICAN MARTEN		1	1	1							1	1					

Step 3: Group Species

Source habitat cluster analysis

53 habitat variables:

Forested

- **6 forest land cover classes**
- **5 tree size classes**
- **2 canopy closure categories**

Non-forested

- **3 non-forest land cover classes**
- **6 riparian/water land cover classes**

Blue Mountains Study area

-174 Species

-26 Groups

Group Examples – Forested Habitats

Forest Mosaic Family

- **Forest Mosaic Group**

Medium/Large Trees Family

- **All Forest Communities**
- **Cool/Moist Forest**
- **Dry Forest**

Golden-crowned kinglet

Group Examples – Non-forest

Grass/Shrub/Woodland Family

- **Grassland**
- **Shrub**
- **Juniper Woodland**
- **Grass/Shrub**
- **Shrub/Woodland**
- **Woodland/grass/shrub**

Step 4: Identify Risk Factors

Activities that may change habitat availability or effectiveness and/or affect populations.

Examples:

- **Roads**
- **Recreation**
- **Fire**
- **Grazing**
- **Invasive species**

Step 5: Select focal species based on habitat and risk factors

White-Headed Woodpecker

- **Represent ecological conditions**
- **Represent the risk factors affecting group**
- **Population dynamics do not directly represent population dynamics of other species**

Step 6: Develop Bayesian Belief Network Models (BBNs)

What Are "Bayesian Belief Network Models?"

In short, a Bayesian Belief Network (BBN) is simply a way of showing how things interact and cause specific outcomes.

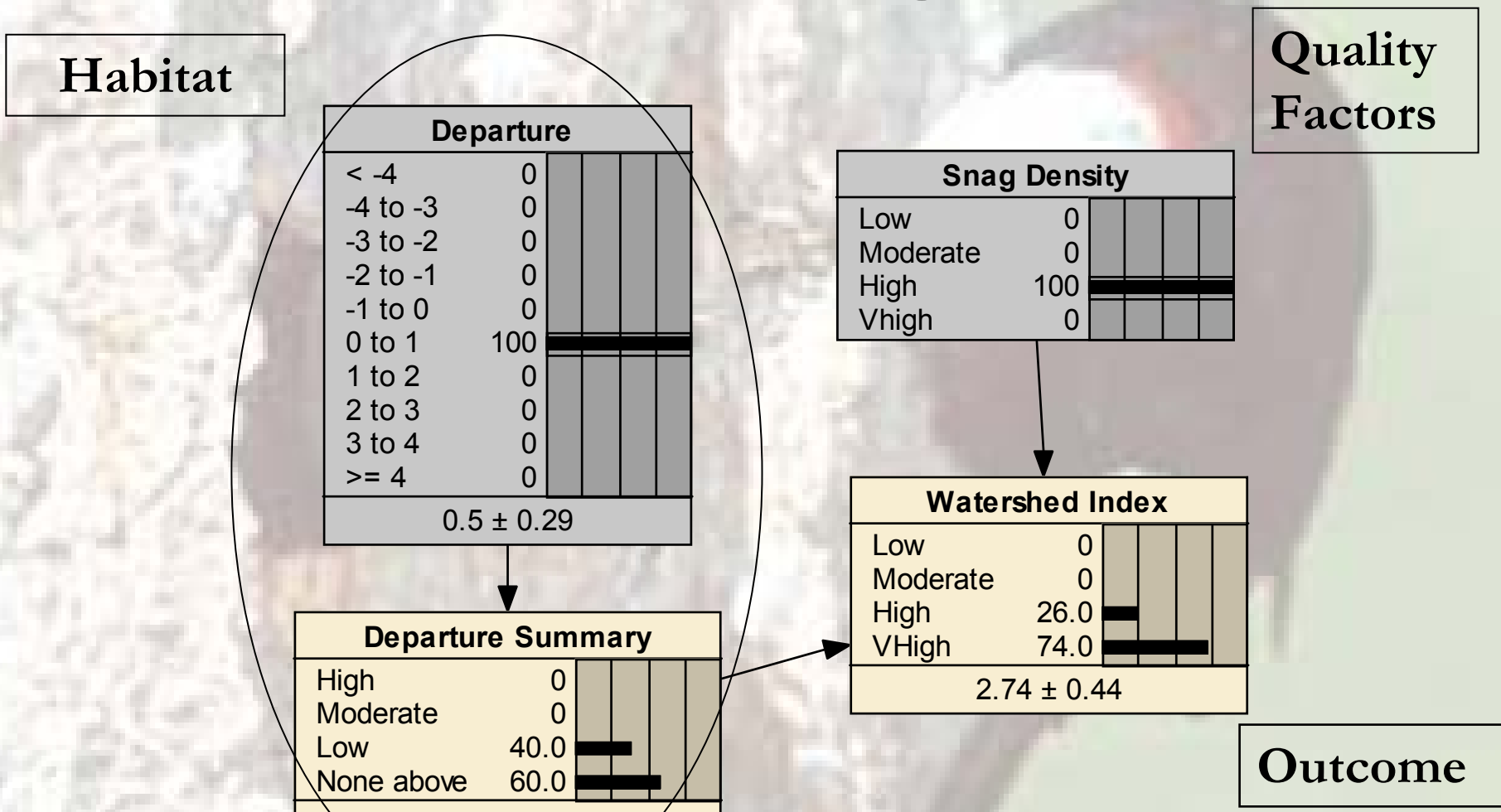
Uses of Bayesian Belief Network Models

- Regeneration management of aspen woodlands (Haas 1991)
- Aquatic systems for fisheries management (Reckhow 1999, Kuikka et al. 1999, Schnute et al. 2000)
- Wildlife habitat (Wisdom et al. 2002)

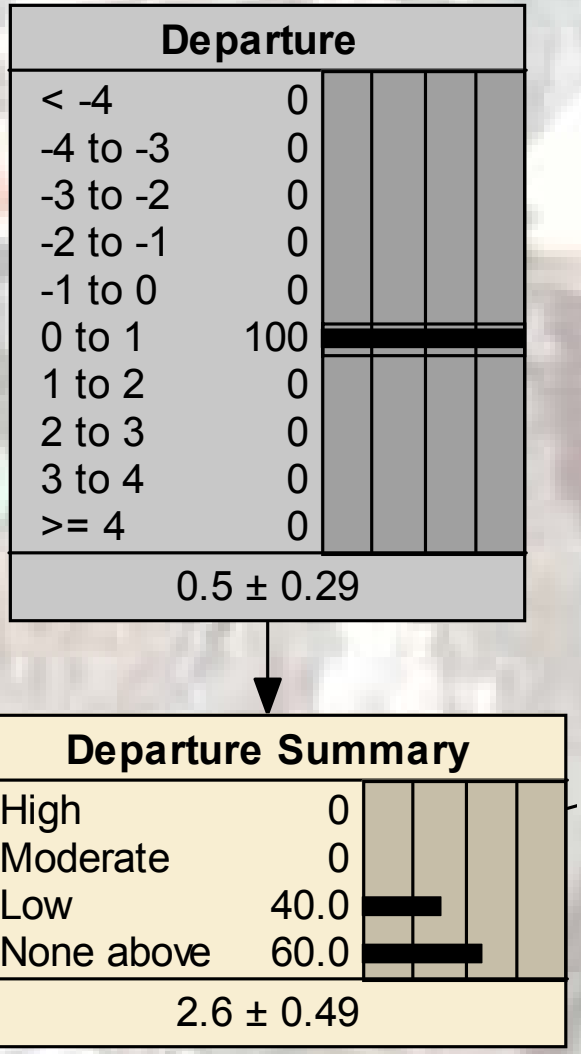
Why BBNs?

- Display key influences on wildlife populations
- Integrate scientific data and expert knowledge
- Use categorical and continuous variables
- Express predicted outcomes as likelihoods
- Help represent uncertainty
- Link to spatial data
- Easily updated

Influence Diagrams



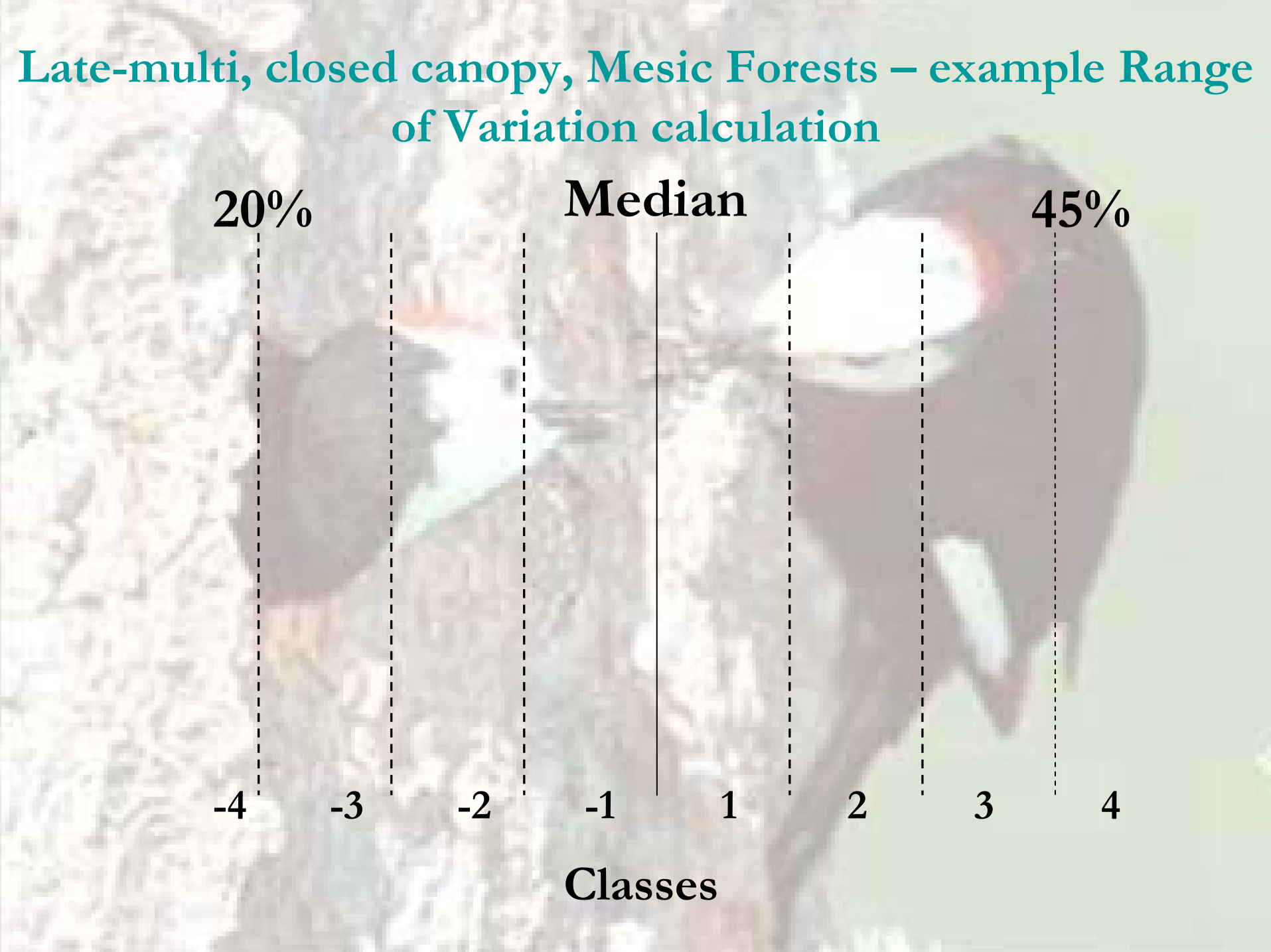
Source Habitat Departure



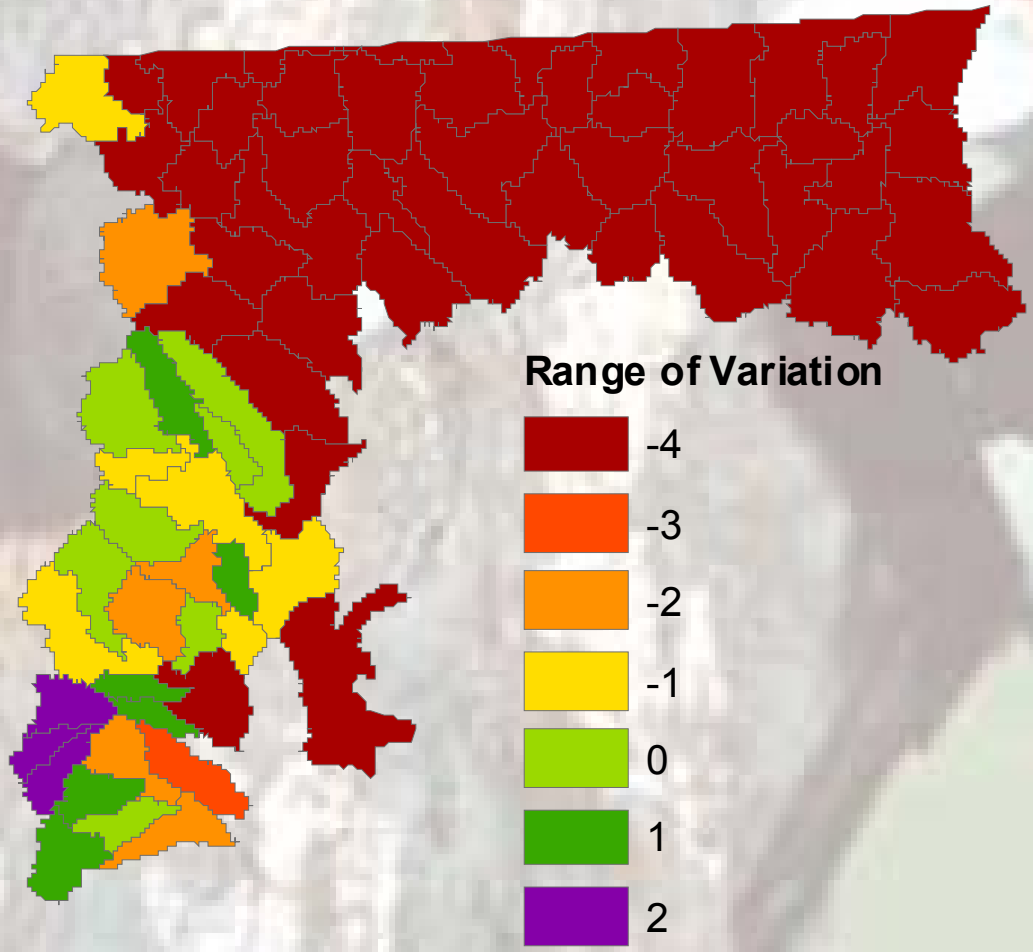
Range of Variation

Forest Group	Post-fire	Early Open	Early All	Mid Open	Mid Closed	LateSingle Open	LateSingle Closed	LateMulti_Open	LateMulti_Closed
Dry	10-18%	10-22	10-25	36-64	9-16	11-31	2-5	1-8	0-1
Mesic	15-22	15-27	15-35	4-9	16-41	0-3	0-12	4-9	21-42
Cold-moist	10-14	10-20	10-36	2-7	18-53	0-1	0-5	3-7	23-59
Cold-dry	10-22	10-30	10-52	9-13	36-52	na	na	3-7	12-33

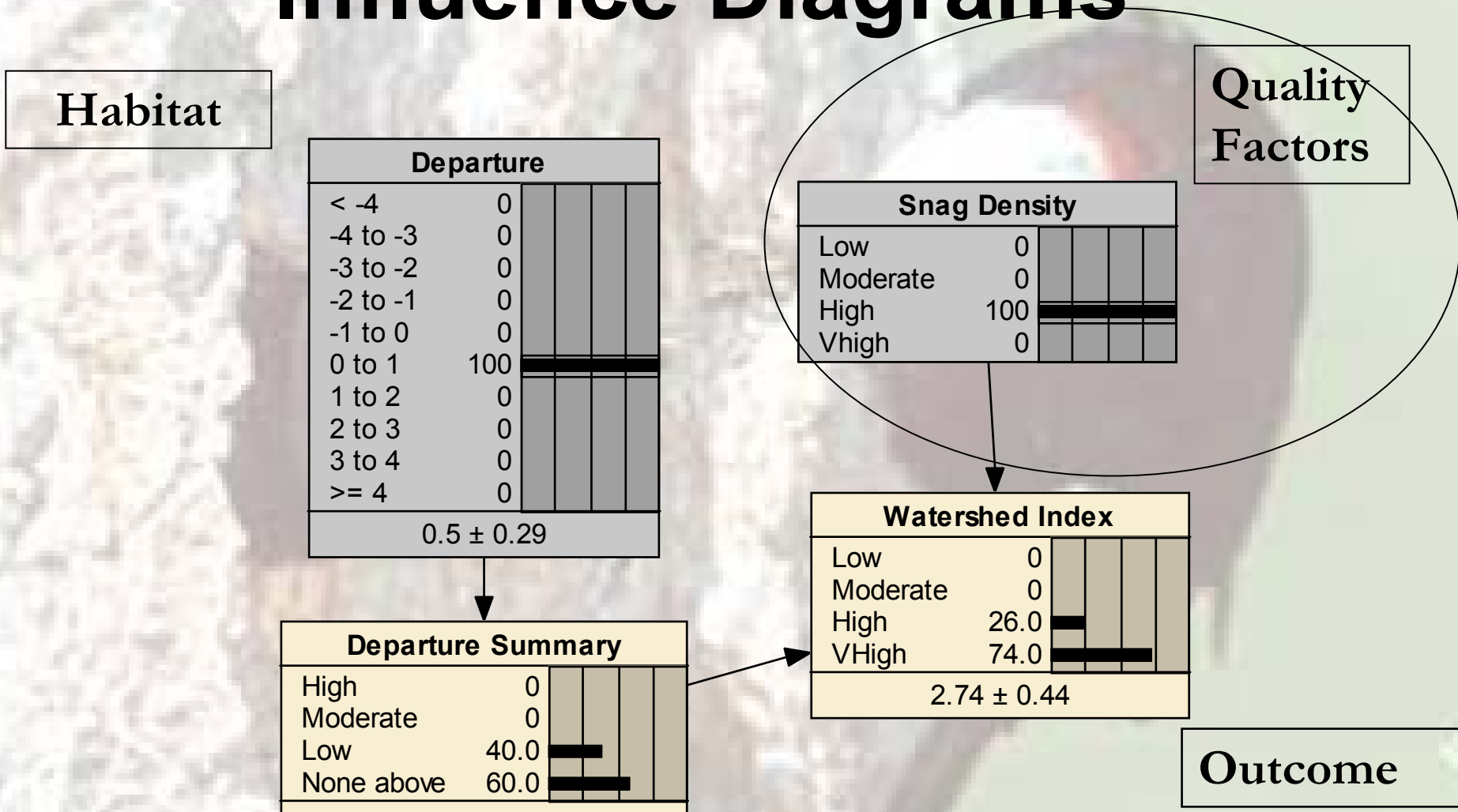
Late-multi, closed canopy, Mesic Forests – example Range of Variation calculation



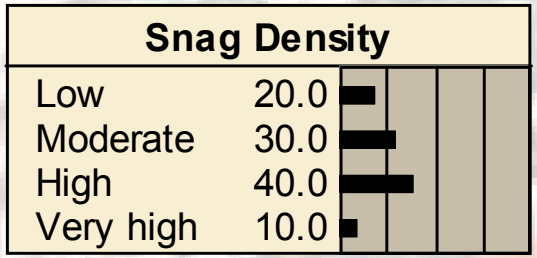
Example Marten Range of Variation



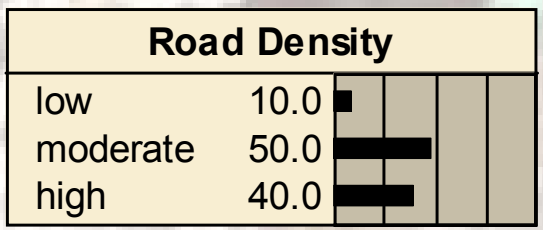
Influence Diagrams



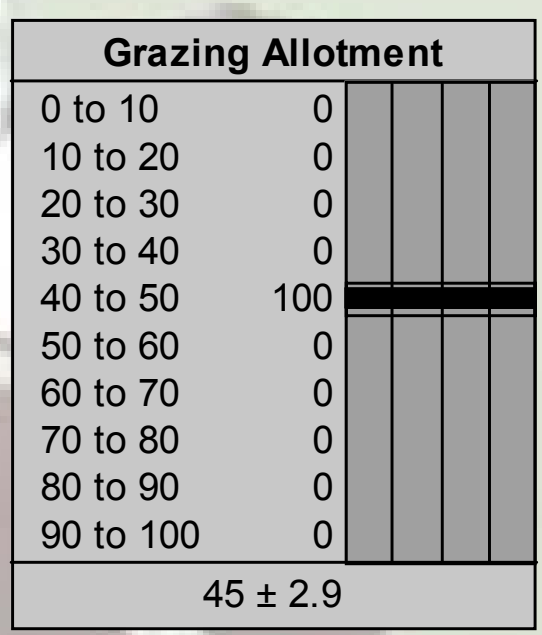
Example risk/quality factors



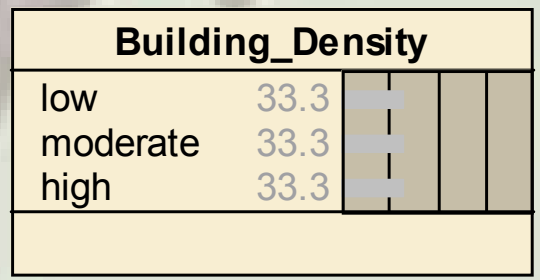
Percent of Huc with different snag densities (from GNN – current)



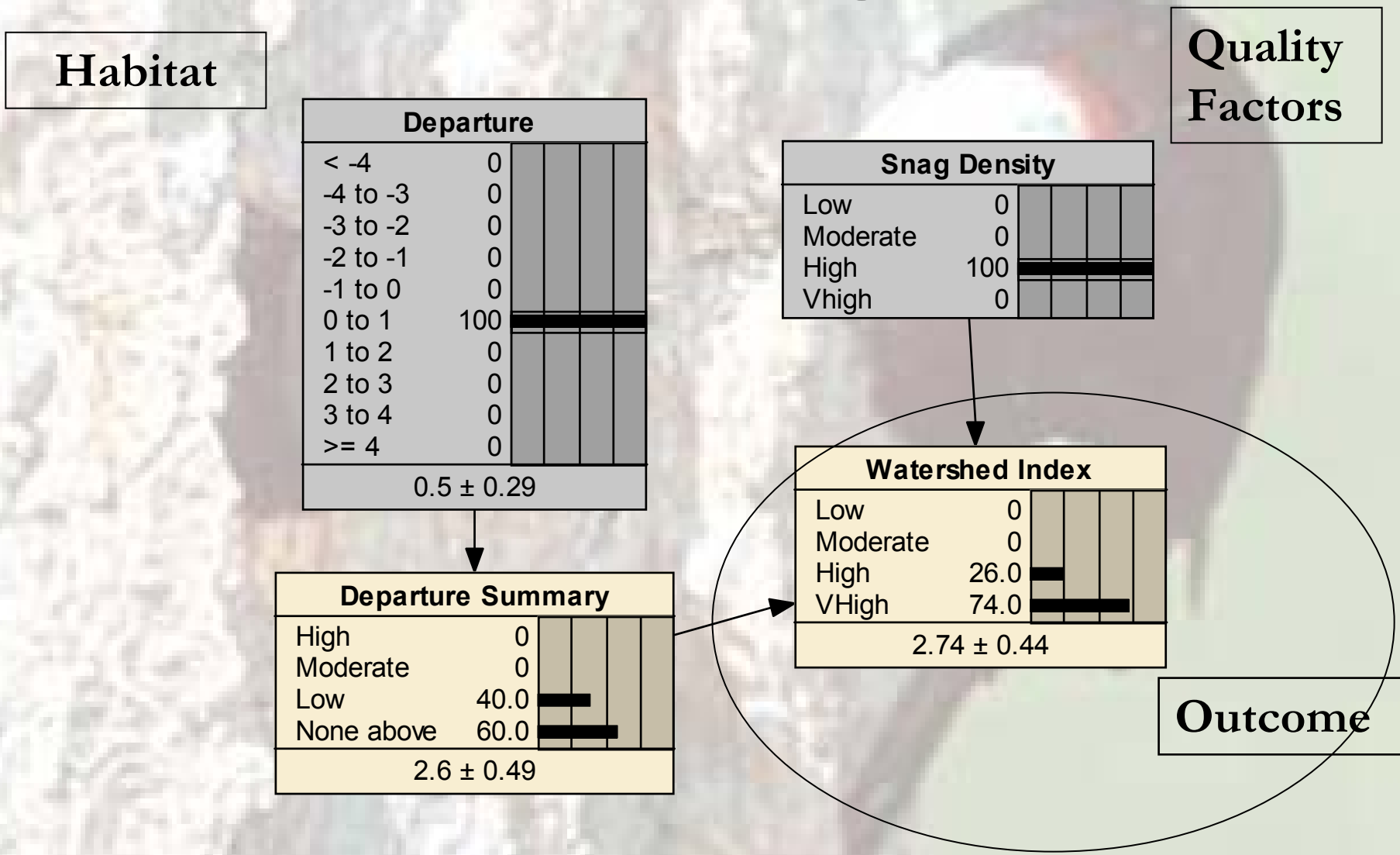
Percent of Huc (or pnvg) With different road densities

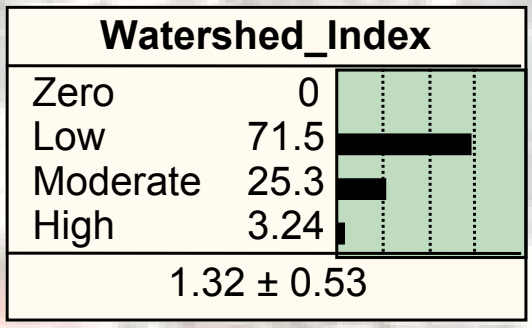


Percent of Huc (or pnvg) that is in an active grazing allotment



Influence Diagrams





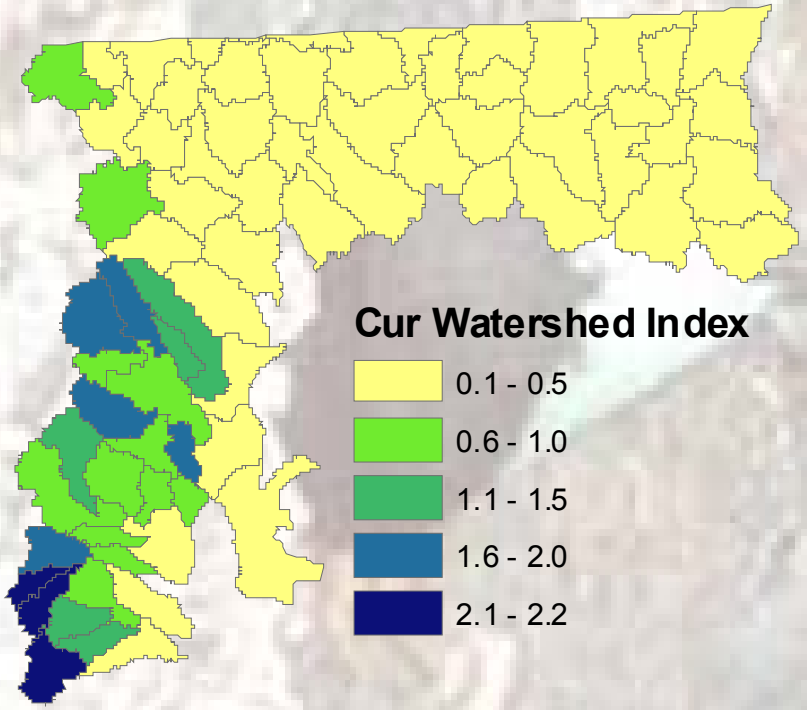
Watershed Index (WI) = a measure of change from historical conditions to current conditions for each watershed in the planning area

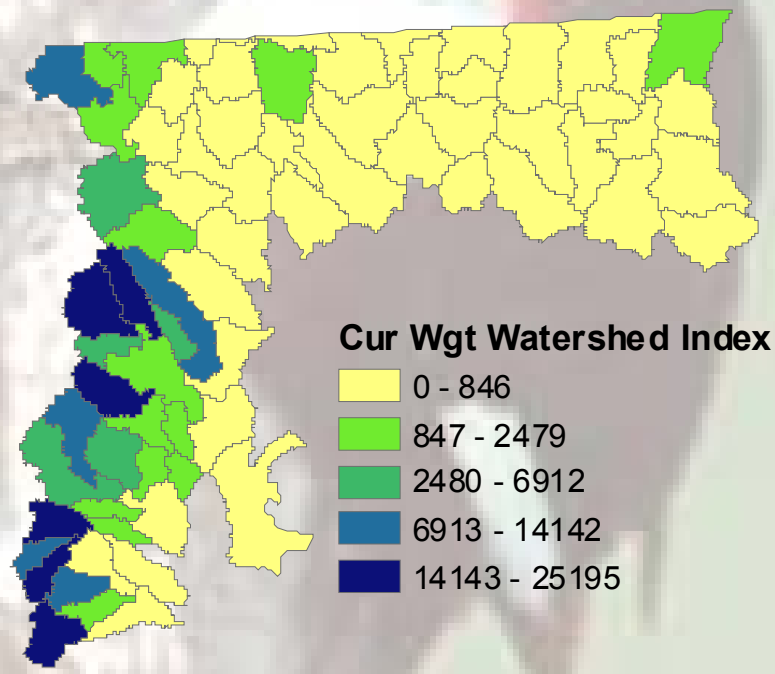
Watershed Index (WI) = a measure of change from historical conditions to current conditions for each watershed in the planning area

Watershed Index (WI) x Hectares Source Habitat = Weighted Watershed Index (WWI)

Weighted Watershed Index (WWI) = a relative measure of the potential capability of the watershed to contribute to the sustainability of the focal species

Example WI and WWI





Step 7: ID Conservation Approaches and Strategies

- **Using results from our models, develop strategies to enhance the habitat of focal species.**
- **Create a network of watersheds that identify: Habitat Protection, Habitat Restoration, Connectivity, Limited Federal Ownership.**
- **Summarize individual Focal Species Results to develop Multi-Species Strategies**

Habitat Conditions	Link to Model Outputs	Strategy
Habitat Condition 1	Source habitat is relatively unchanged from historical conditions (WI>2.0) and the quantity is >40% of the historic median.	The primary strategy would be **Protection** of source habitat. **Restoration** would also occur as needed.
Habitat Condition 2a,b	Source habitat has been moderately reduced (WI1.0-2.0) and a) the amount of **potential** source habitat is >40% of the historical median or b) <40% of historical median.	The primary strategy would be the **Restoration** of source habitats. **Protection** of existing source habitats would also be a priority.
Habitat Condition 3a,b	The quality of source habitat has been severely reduce (WI<1.0) and the amount of potential source habitat is a) >40% of the historical median or b) <40% of the historical median	The strategies could include a combination of **Protection** and **Restoration** depending on the juxtaposition of these watersheds in relation to HC1 and HC2 watersheds.
Habitat Condition 4	Connectivity or habitat distribution indices identify gaps in the distribution of watersheds with >40 of the historic median of source habitats.	The primary strategy for these watersheds would be to manage for dispersal habitat that provides for habitat **Connectivity**.
Habitat Condition 5	Source habitat is <25% in federal ownership.	Landownership limits the strategies that can be used to provide for sustainability.

Step 8. Fine Filter Monitoring
Current Condition and Risk Factor Assessment

Degree of Risk	Sustainability High	Sustainability Low	Sustainability Uncertain
Increased risk	Moderate Priority	High Priority	High Priority
No increase in risk	Low Priority	Moderate Priority	Low Priority
Uncertain risk	Low Priority	High Priority	High Priority

Low priority - Species level monitoring not necessary unless conditions change
Moderate priority - Monitor habitat and risk factors using BBN models as framework
High priority - Monitor habitat, risk factors, and populations if feasible (handful of species for NE Washington)

Additional analysis with VDDT outputs:

- **Summarize for any species amount of source habitat**
  - **by watershed (or accumulations of watersheds)**
  - **for each time period / scenario**
  - **by ownership/allocation**

Other Species

- Elk/ Deer?
- Special Habitats (Aspen, Mtn Mahogany, Wetlands)