Aquatic and Riparian Effectiveness Monitoring Program

Decision Support Models Part I: How They Work for Assessing Watershed Condition

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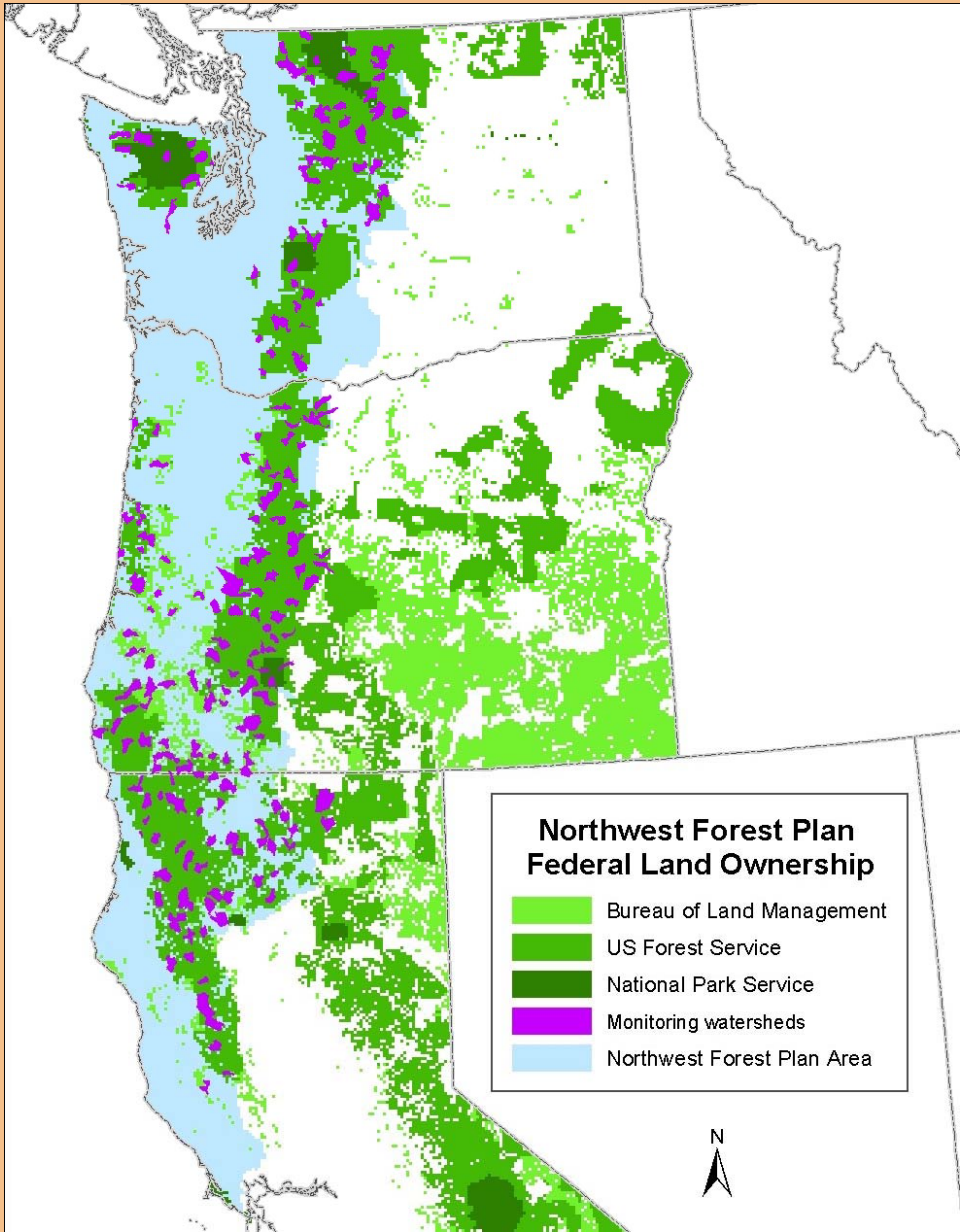
Watershed Monitoring Scope

- 250 watersheds
- Multiple species & processes
- ~10-30 habitat attributes
- 2 scales
  - Reach
  - Watershed



Watershed Assessment Methods

- Statistical analysis — not feasible
- Watershed analysis — not comparable
- Standards — not integrated
- Expert judgment — not repeatable

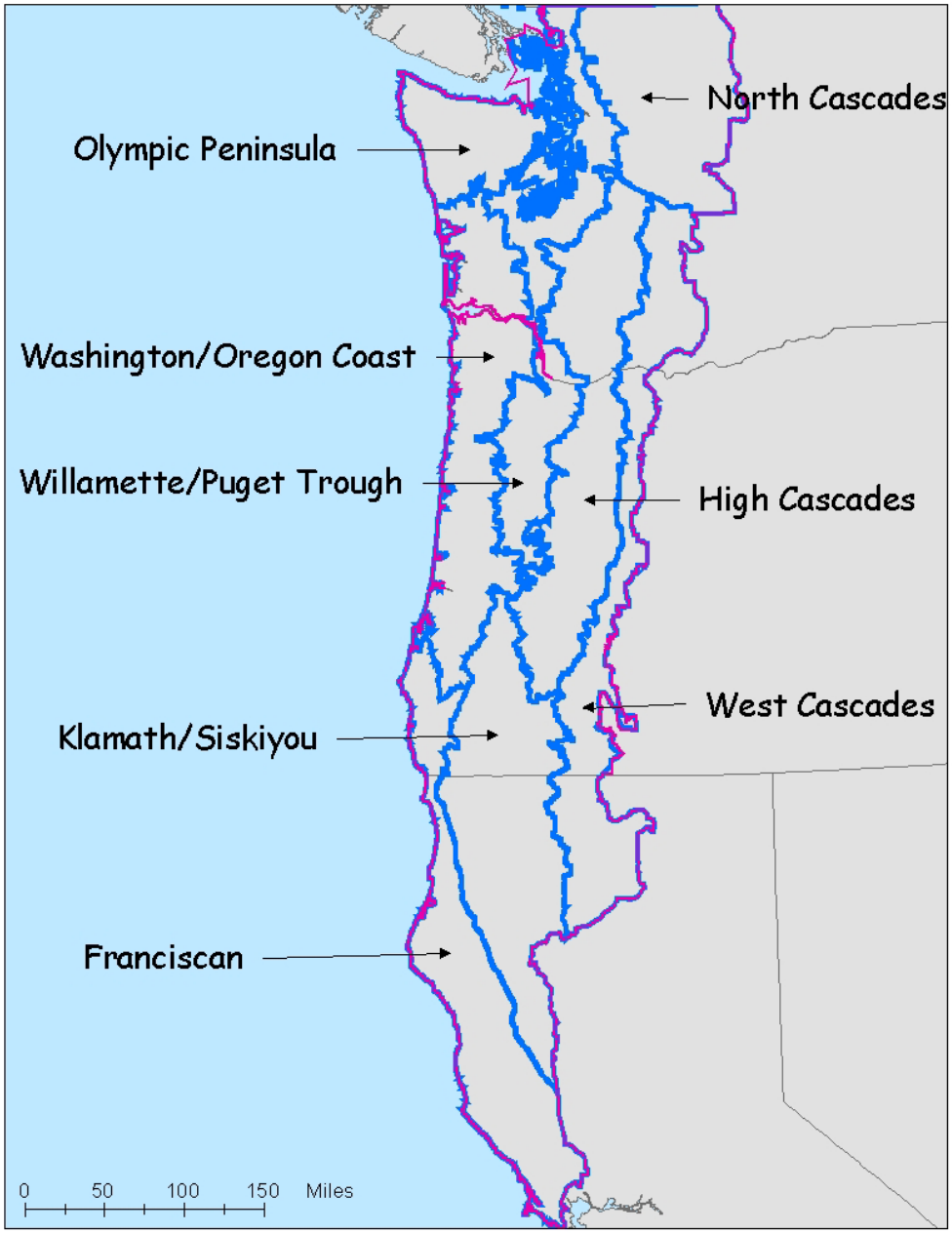
- Expert systems — feasible, comparable, integral, repeatable

Ecosystem Management Decision Support System (EMDS)

- What?
  - software
  - Arc GIS extension
  - developed by USFS
  - freely available
- Why?
  - watershed assessment use
  - easy to understand
  - flexible

- Evaluation
- Not
  - simulation
  - optimization

Expert Workshops



Assessment Task

Modeling Process

Watershed Condition

Roads

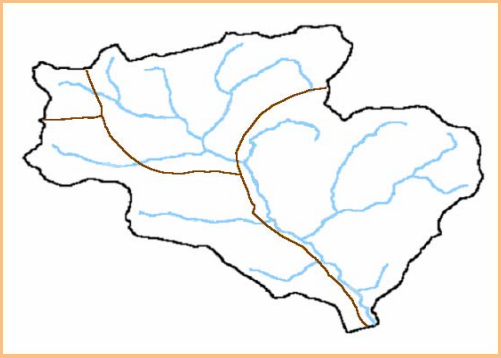
Vegetation

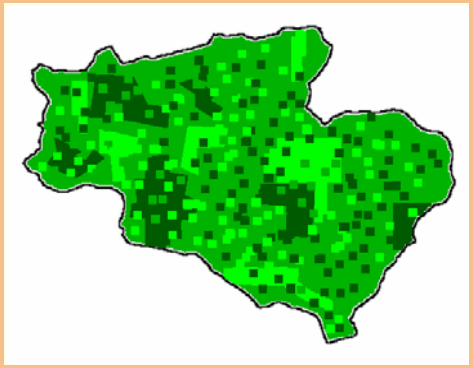
Density

Crossings

Riparian

Upslope





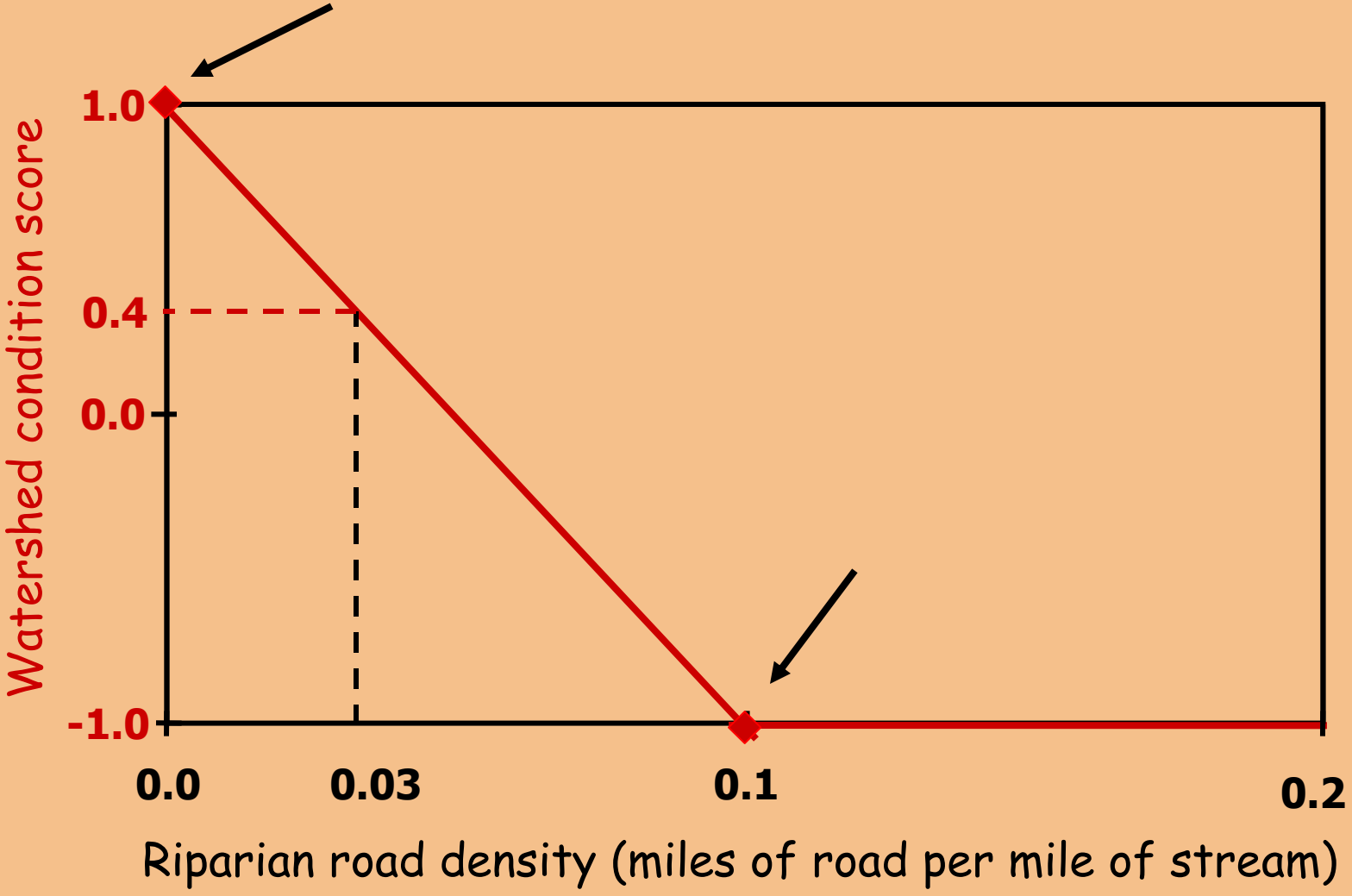
Combined Score

Aggregate

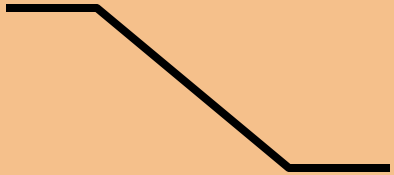
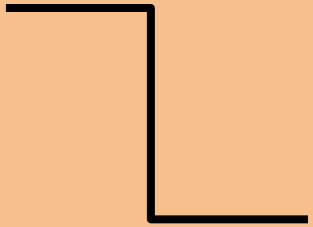
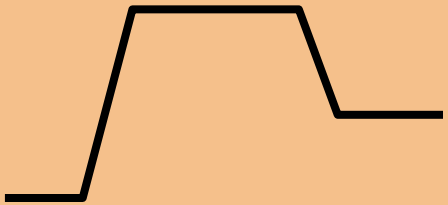
Evaluate / Normalize

Watershed Attributes
(raw data)

Data Evaluation & Normalization



Types & Sources of Evaluation Curves

Attribute	Curve	Source
Upslope Roads		Cederholm & Reid (1987)
Water Temp.		OR DEQ
Riparian Veg.		Prof. judgment

Aggregating Evaluation Scores

Vegetation

Minimum?
Maximum?
Average?

Riparian
75%

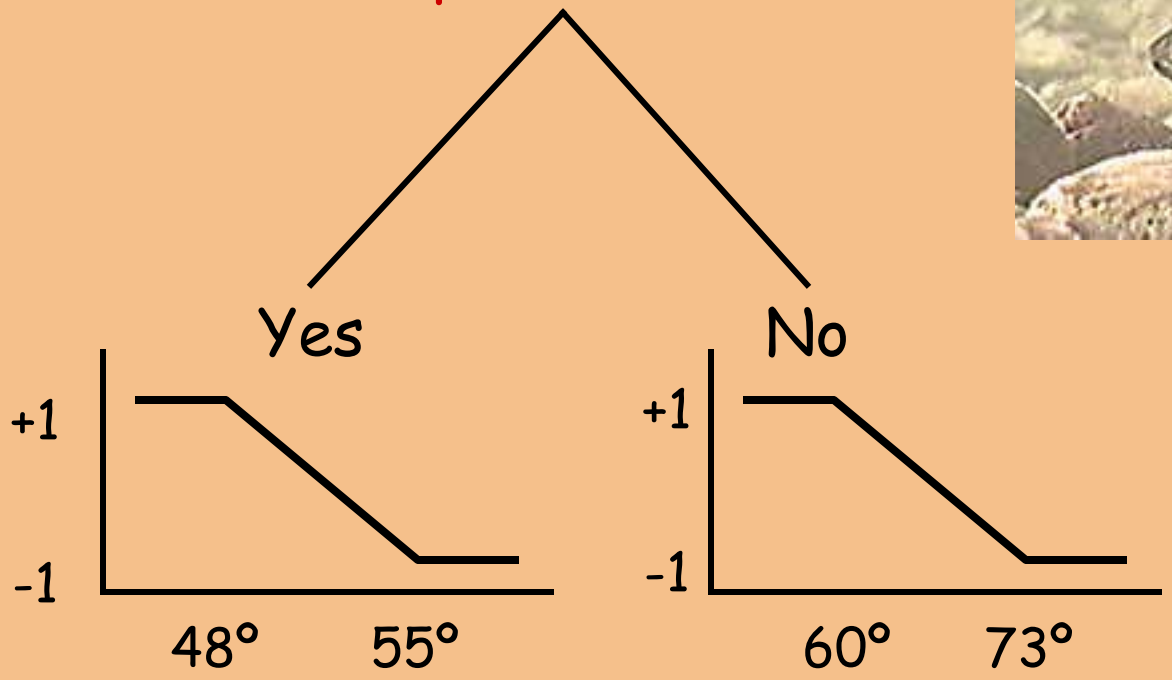
Upslope
25%

Weighting?

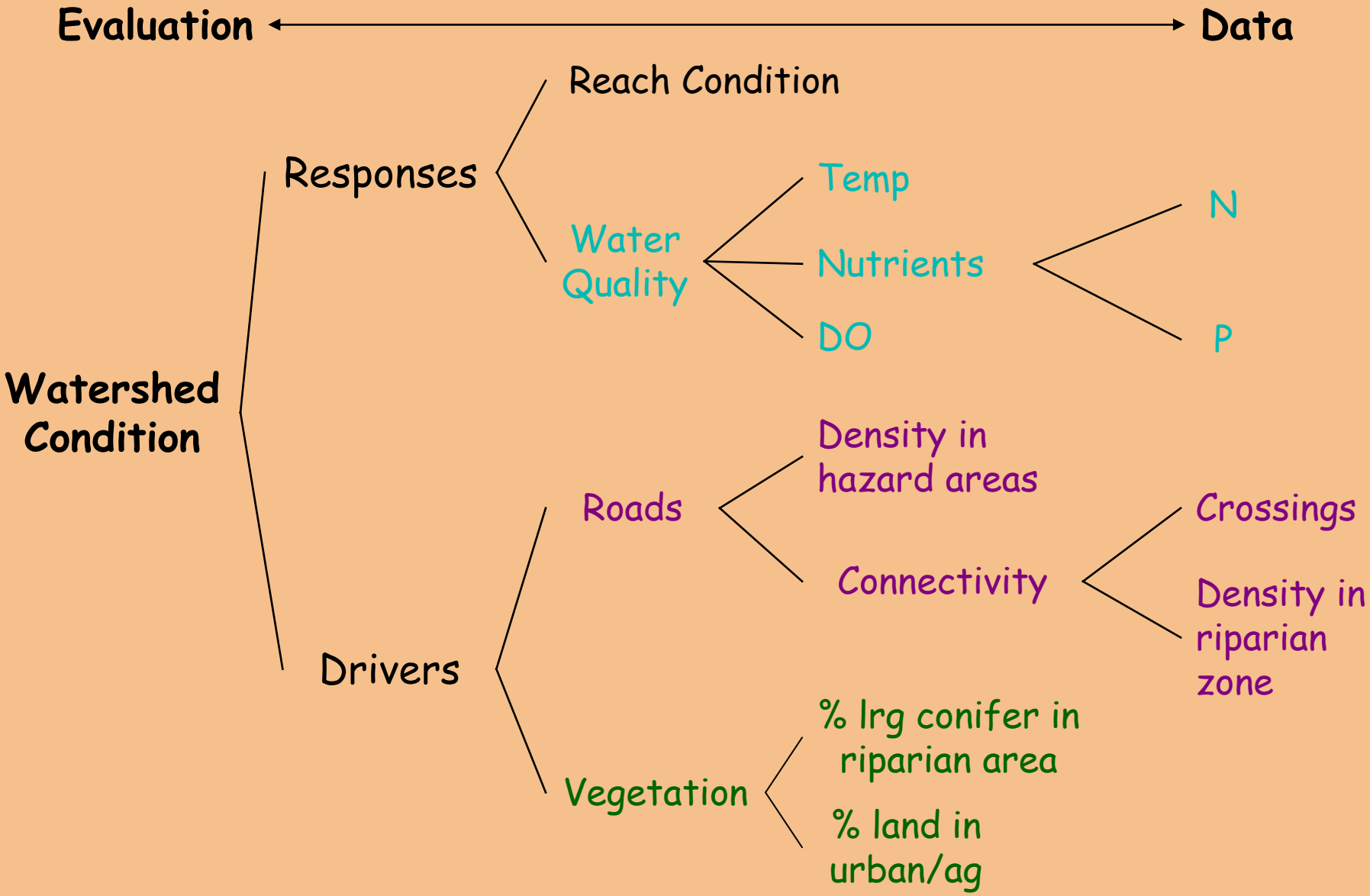
Context Operator

Water Temperature

Bull trout present?

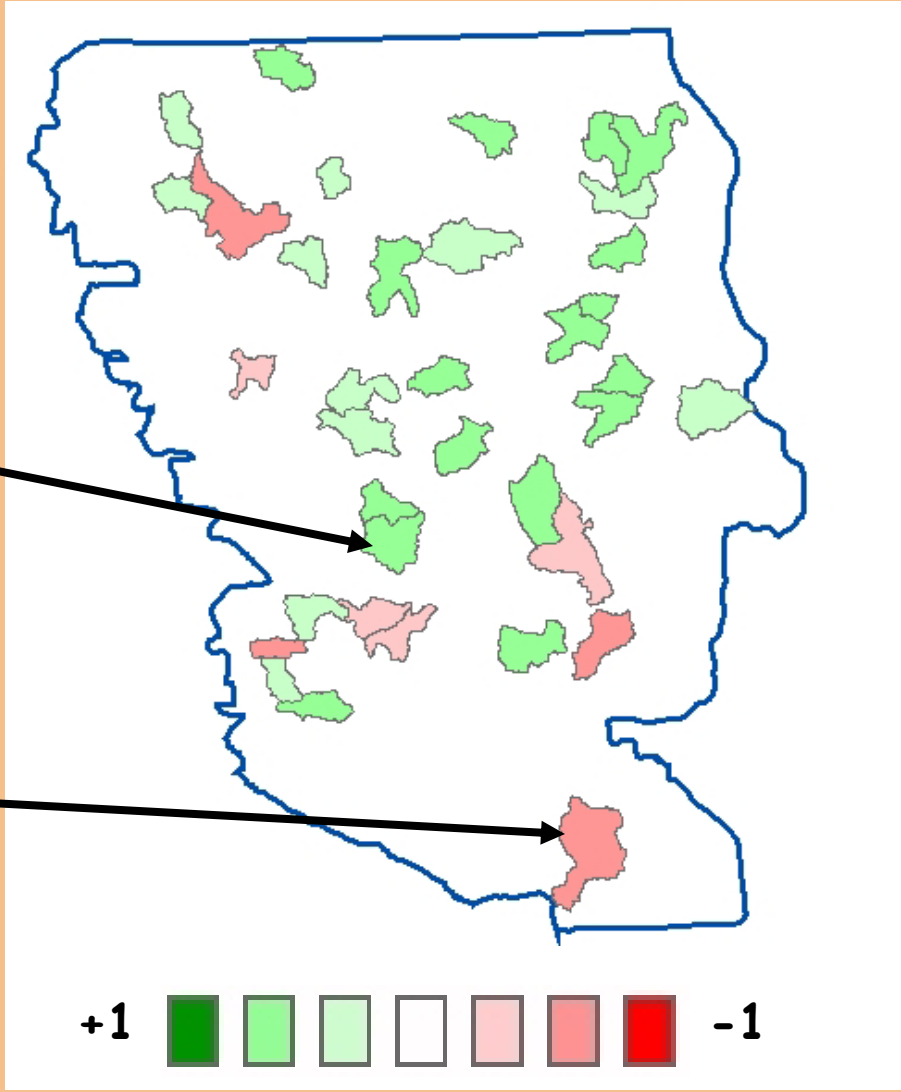


Model Structure

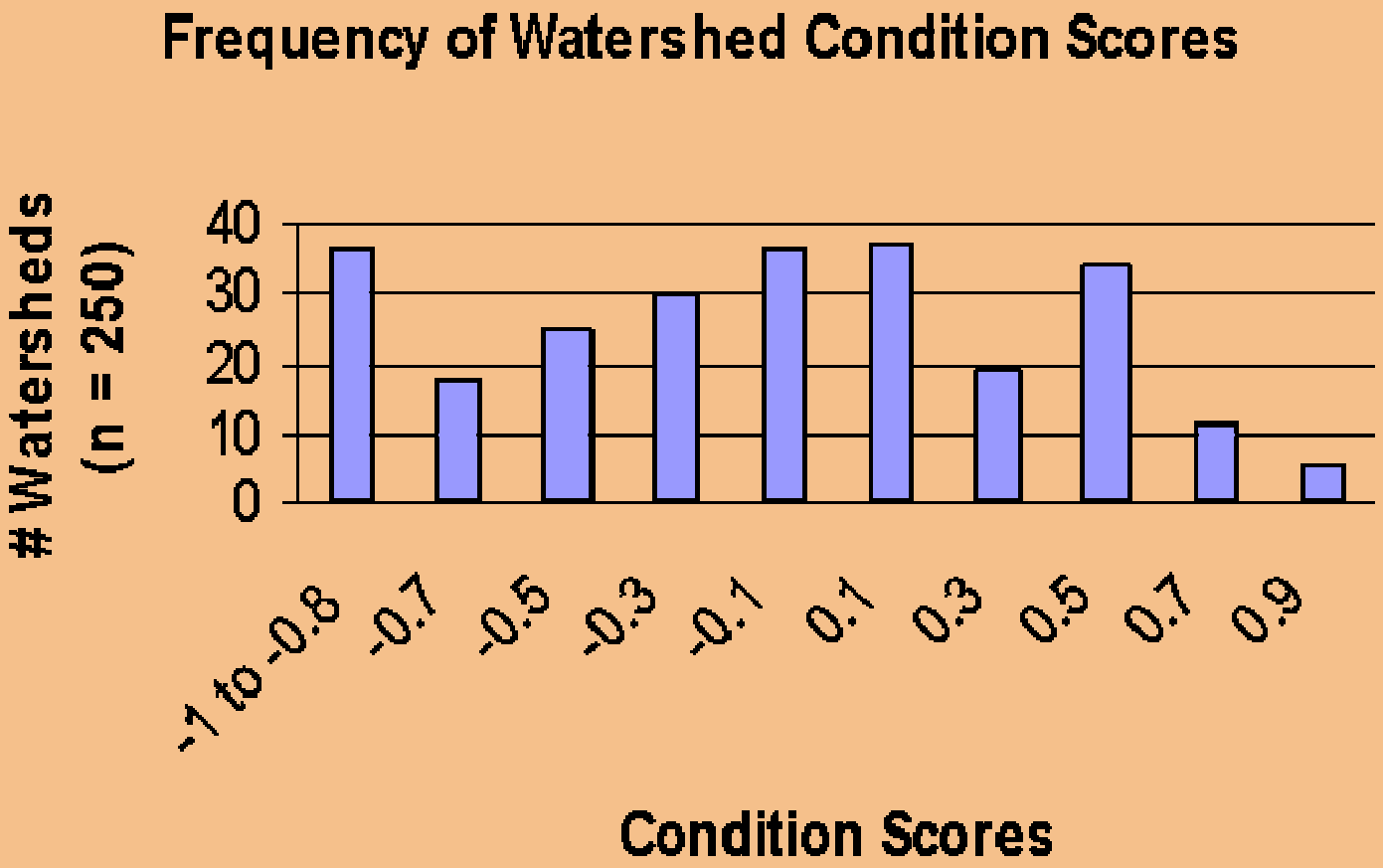


Model Output

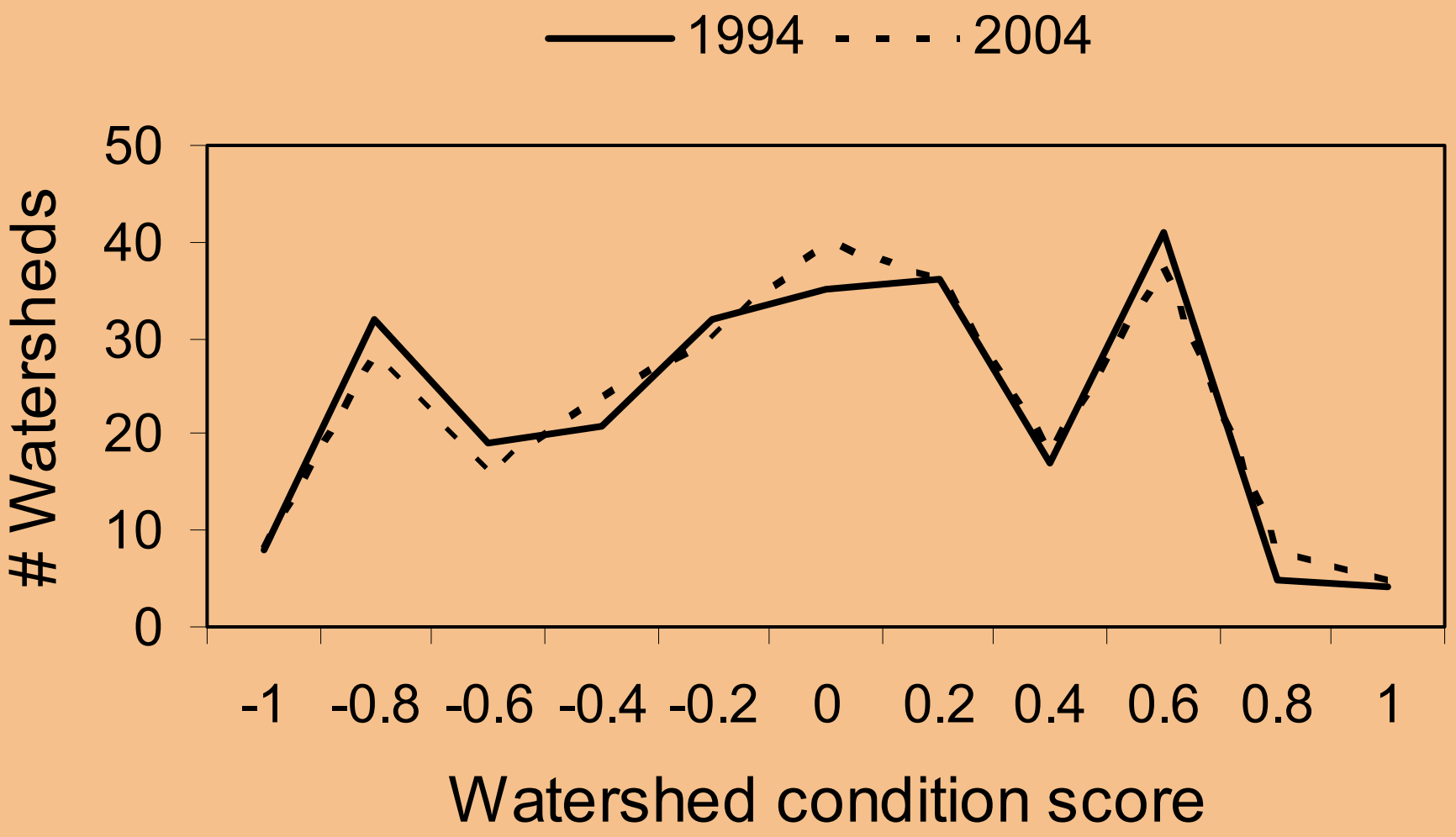
Watershed	Score
Emerald Park Creek	0.52
S. Fork Lost River	0.56
Up. Nf. Skykomish R.	**0.58**
Chumstick Creek	-0.52
Chiwaukum Creek	0.54
Swauk Creek	**-0.58**
Fish Creek	0.55
Boulder Creek	0.51



Overall Assessment



Overall Assessment



Benefits of Using Expert Systems

- Integrate data types
- Comparable
- Repeatable

- Easy to understand
- Document process
- Updateable

Further Uses of DSMs

- Identify principle stressors
- What-if scenarios
- Prioritize restoration (types, locations)
- Consultations on listed species?