

**Modeling to sustain environmental values:
Forecasting our way to a more certain
future**

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Modeling Workshop Richmond

Overview:

- *I Modeling definitions/benefits/pitfalls*
- *II Current decisions that use modeling*
- *III What we are good at: modeling timber volume*
- *IV Modeling environmental risk*
- *V Ecological modeling where next?*

I. What is modeling?

- Knowledge combined with data to make predictions
- Can forecast the future or reconstruct the past
- Aimed at reducing uncertainty but contains uncertainty
- Aimed at making informed choices today

What is habitat modeling?

- Habitat is defined as “*the natural home of an animal or plant*”
- Habitat modeling therefore is confined to single species models
- The *Habitat modeling* label is a problem as it narrows the debate to single species
- Yesterday’s terminology is ill equipped for today’s issue: biodiversity and ecosystems

What is biodiversity?

- Genes, species, ecosystems and the processes and functions that link them
- Habitat modeling is a subset of biodiversity and ecosystem modeling
- **Message:** focus modeling beyond single species to ecosystems

General benefits of modeling?

- More systematic use of information
- Aid to accountability of agencies/industry/individuals
- Aid to setting environmental objectives
- Aid to environmentally informed decisions

Possible pitfalls of modeling?

- Complexity of ecosystems breeds uncertainty
- Scarcity of expertise
- Few legislated requirements
- Can be costly and time consuming
- Results can lead to: delay, study, ignore or shoot the messenger

II Decisions using modeling.

- **Species at Risk**
 - Identified Wildlife (**Chief Forester+DM MELP**)
 - Conservation assessments, part of Code
- **Single species strategies (Cabinet).**
 - Grizzly Bear, Mountain Caribou, Spotted Owl
- **LRMPs; Biodiversity and single species.**
 - Code impacts exemptions? (**Cabinet**)

Decisions using modeling (continued)

- **Timber Supply (Chief Forester)**
 - Focus on removals from ecosystem
 - Timber volume- AAC, salvage, woodlots
- **Wildlife/fish** - regulated harvest limits
- **Water** - licenses (hydro, irrigation)
- **Message:** - focus modeling on what to leave
 - paradigm shift needed

Increasing use of ecological modeling

- Environmental values in land use planning (LUs)
- State of Reporting
 - Environment - Forests - Biodiversity
- Assessment of current practices and policies
 - Biodiversity in Landscape units
 - Species at risk
- Environmental restoration planning

III What we do best: modeling timber volume

- Long history, organized, infrastructure
 - TSAs + TFLs (**Chief Forester**)
 - IFPAs (**Regional Manager Forests**)
 - Silviculture analysis (**Forest Renewal BC+ MYA holders**)
- **Message:** Serious work focused on volume environmental impacts not understood?

Integrating environmental forecasts with timber forecasts

- Current process
 - data, timber forecast (base case)
 - interpretation, timber harvest decision
- Future desired process
 - data, timber base case
 - data, ecological base case
 - interpretation
 - **environmental impacts**
 - timber harvest decision (land use decision)

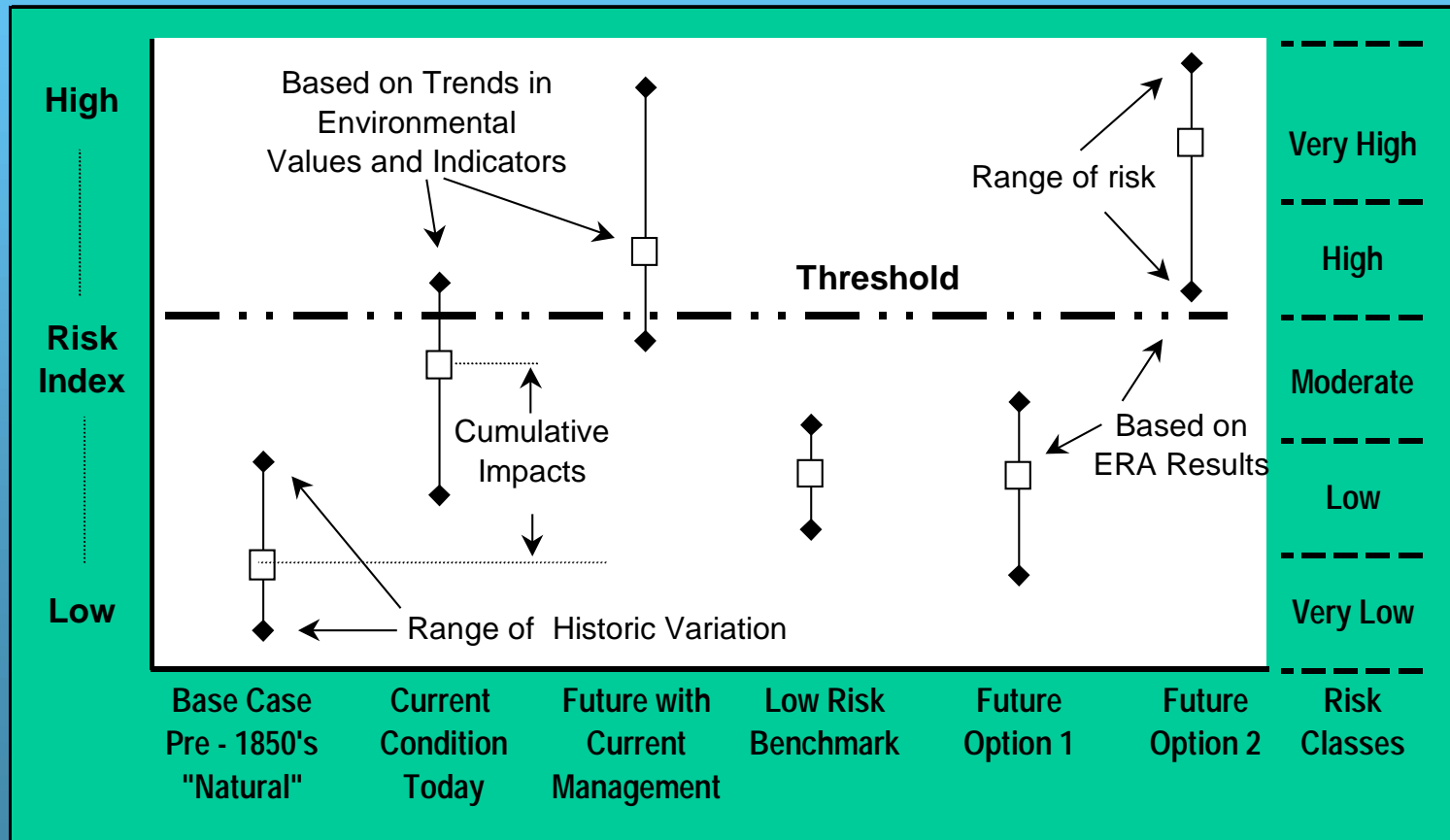
Are we sustaining ecosystems and species diversity?

- Are the ecosystem attributes, landscape and stand patterns sufficient?
- Are forest dependent species going to be sustained?
- **Message:** model coarse filter (ecosystem diversity) and fine filter (species diversity) together

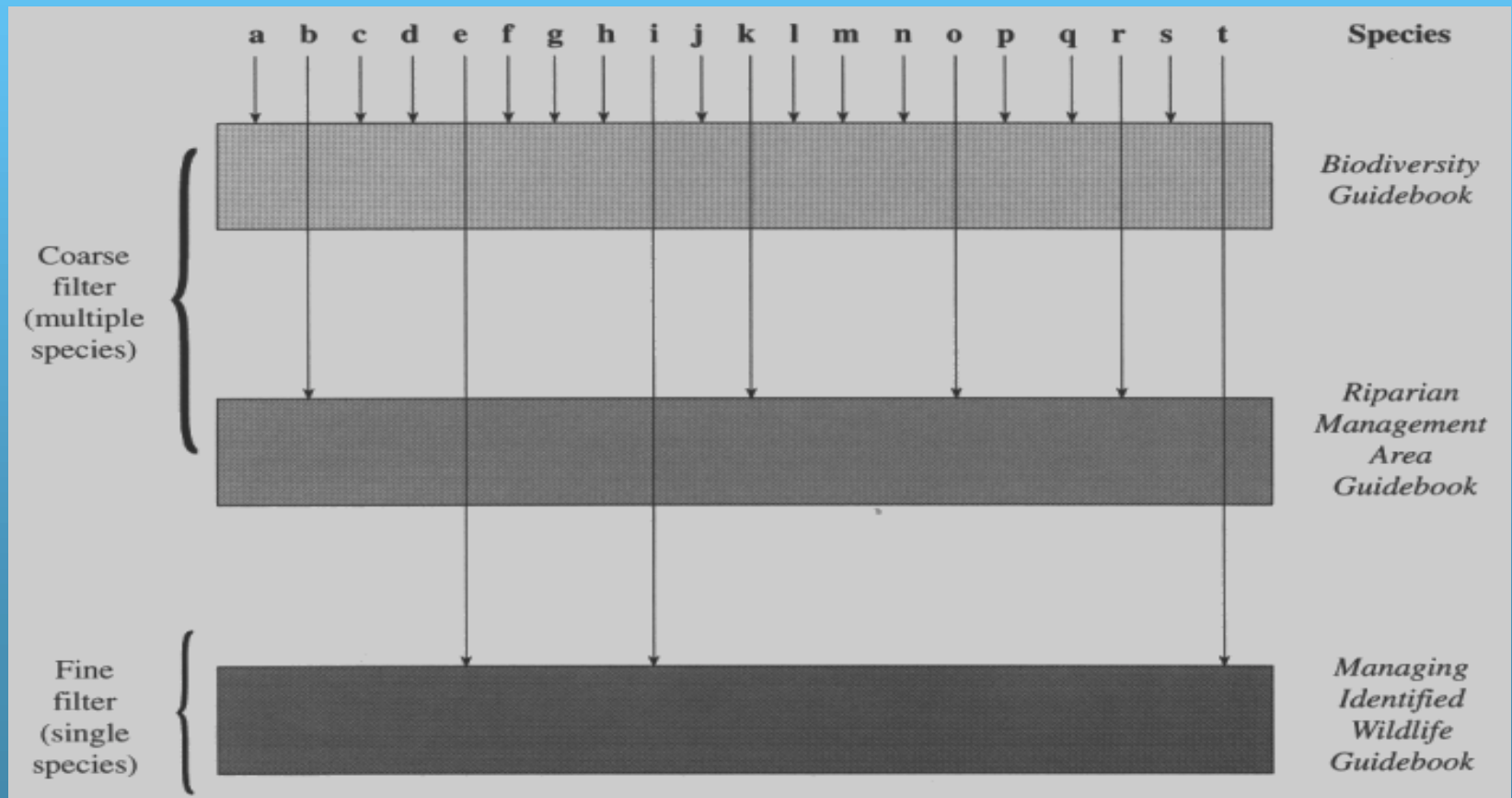
IV Modeling environmental risk

- Select indicators
 - seral stage, representation, species composition, stand structure, CWD
- Use best available data to establish natural range
 - establish a low risk bench mark
- Analyse indicator(s) through time
 - compare natural range (low risk) to current and future ; assess risk
 - risk proportional to the degree to which indicator deviates from natural bench mark
- Adapt practices to reduce risk (if necessary)

Establishing an environmental low risk base case



Modeling Coarse and fine filters conservation (from Biodiversity Guidebook)

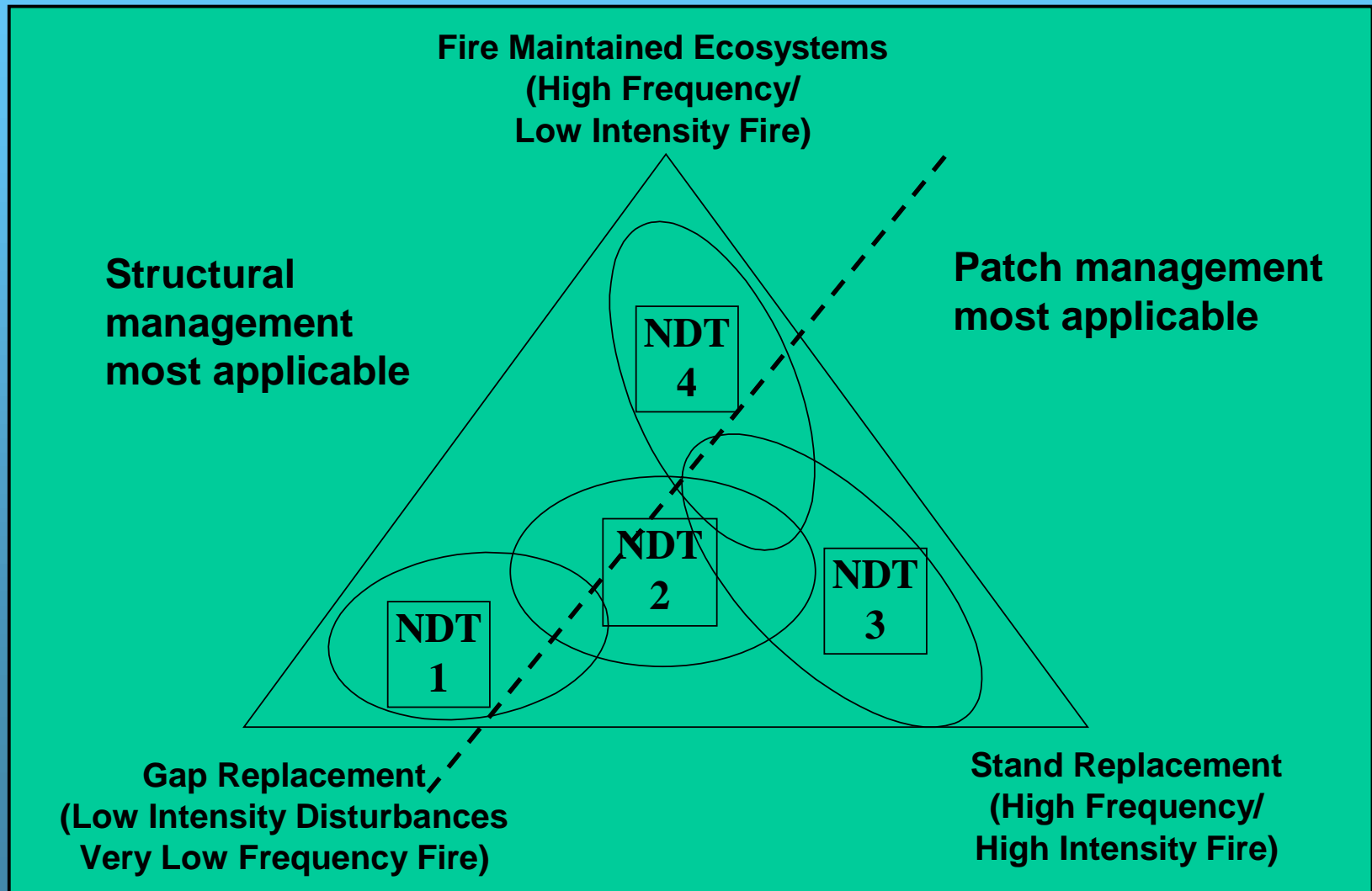


Indicators of ecosystem integrity and diversity?

- Representation
- Connectivity/fragmentation (roads)
- Patch size (old forest retention) (early seral)
- Stand structure
- Species conversion
 - late to early seral species (spruce - pine)

Selecting indicators: Patch size

Modified from G.Utzig (unpublished) with permission



V Ecological modeling: where next?

- Increased use to show accountability for ecosystems and species
- Increased use to meet onus of proof for those manipulating ecosystems
- **Message:** a huge aid; becomes standard practice
 - MELPs biologists central to credibility

An idealistic future?

Modeling Ecosystems

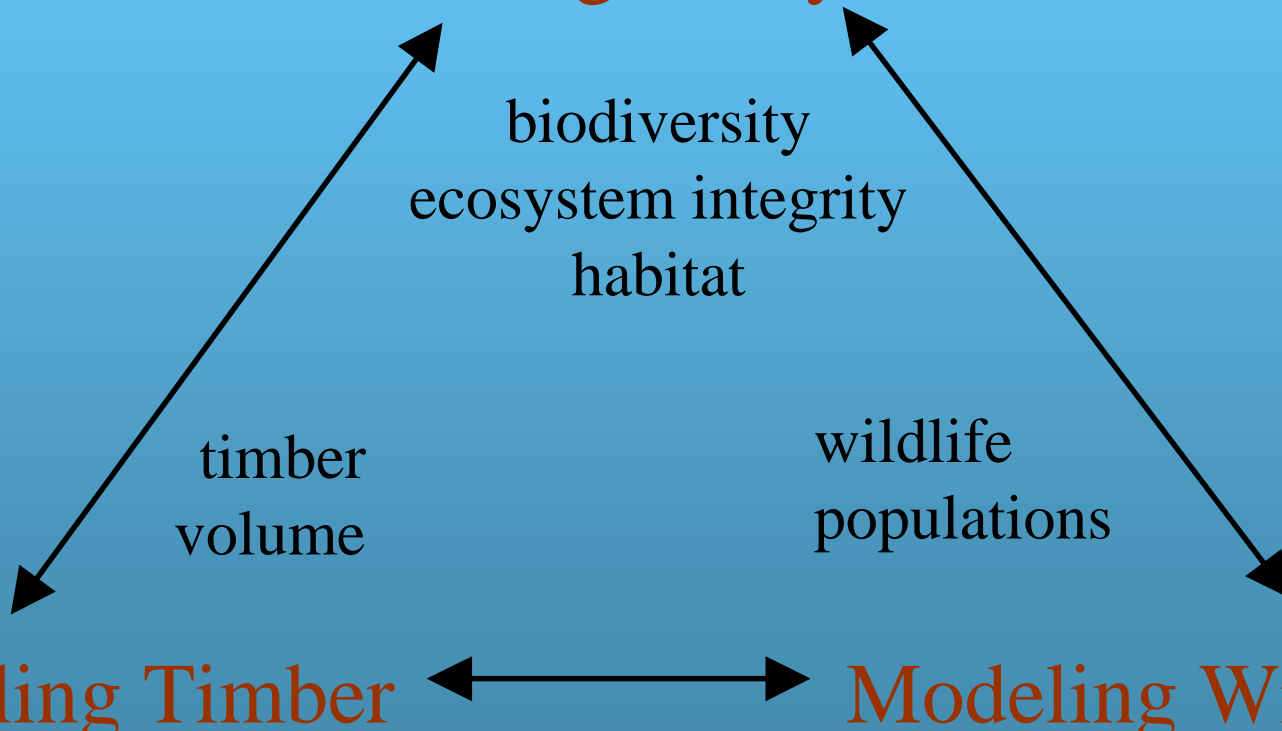
biodiversity
ecosystem integrity
habitat

timber
volume

wildlife
populations

Modeling Timber

Modeling Wildlife



Modeling Ecosystems

- Provides accountability for sustaining ecosystem services/ecological integrity
- Models ecological impacts/risks
- A confirmation of sustainable harvesting practices
- Improved reporting on state of ecosystems

Modeling timber

- Harvest volume decisions supported through modeling
- Focuses only on timber (constraints)
- Forecasts on timber but can also forecast on ecosystems and forest dependent species
- Ecosystem health can to be addressed

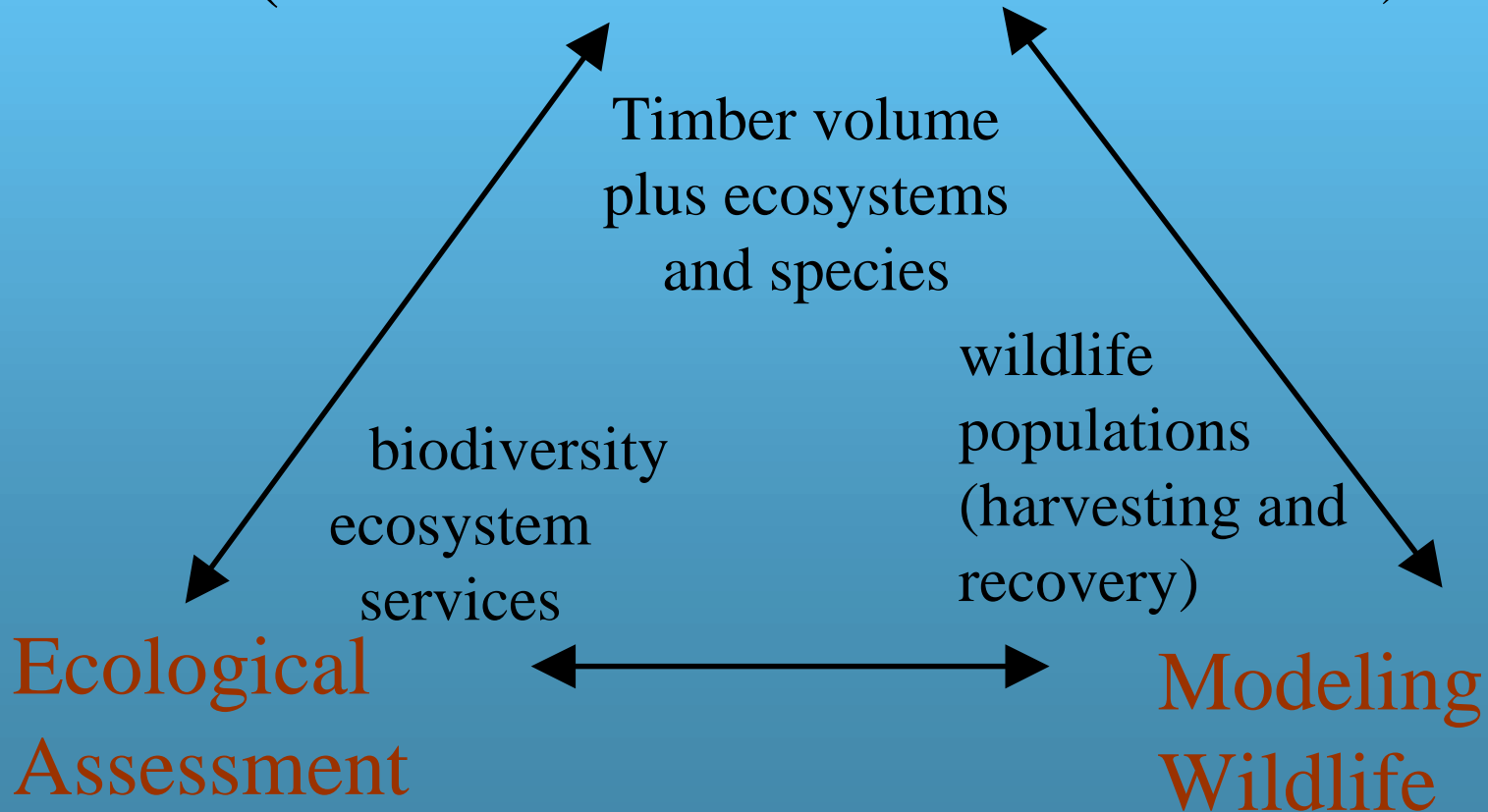
Modeling Wildlife

- May become a staged process like TSR
Wildlife Supply review (WSR) may:
 - draw focus to data adequacy, direct future data efforts, forecast, support rational
 - set and support objectives for populations of endangered species and recovery plans
 - forecast suitable habitat for selected species
 - set and support objectives for hunting/trapping targets

A more likely future

Modeling Timber

(Decisions on Land Use LRMP to LU+ TSR)



A more likely future (Continued)

- Existing institutions; clearer accountability
 - Ecological assessment done better in more land use and forestry decisions
 - sustainable forestry plans, TSR
 - IFPA, Silviculture Strategies
 - LRMPs, LU
 - Ecological modeling development work and application by MELP
- MELP has vital role in both

Conclusions

- Larger environmental data base a reality
- Increasing analytical capability
- Ecosystem health indicators (lessons from medicine/psychology)
- Accountability of government/industry increasing
- Quantitative ecological assessments will increase (huge growth in this area coming)

Conclusions

- There are a number of methods to forecast
 - Bayesian belief networks, null hypothesis, etc.
- MELP is at a stage where MOF was 20 years ago in TSR
- MELP needs to consolidate to some standard operational approaches with others
- MELP also needs to continue involvement with new ways to forecast (leading edge)

Closing remark (from General Colin Powell)

- Don't wait until you have enough facts to be 100 percent sure, 40 to 70% range
- Because by then it is almost always too late
- Excessive delays in the name of information-gathering breeds “Analysis Paralysis”
- Procrastination in the name of reducing risk actually increases risk