

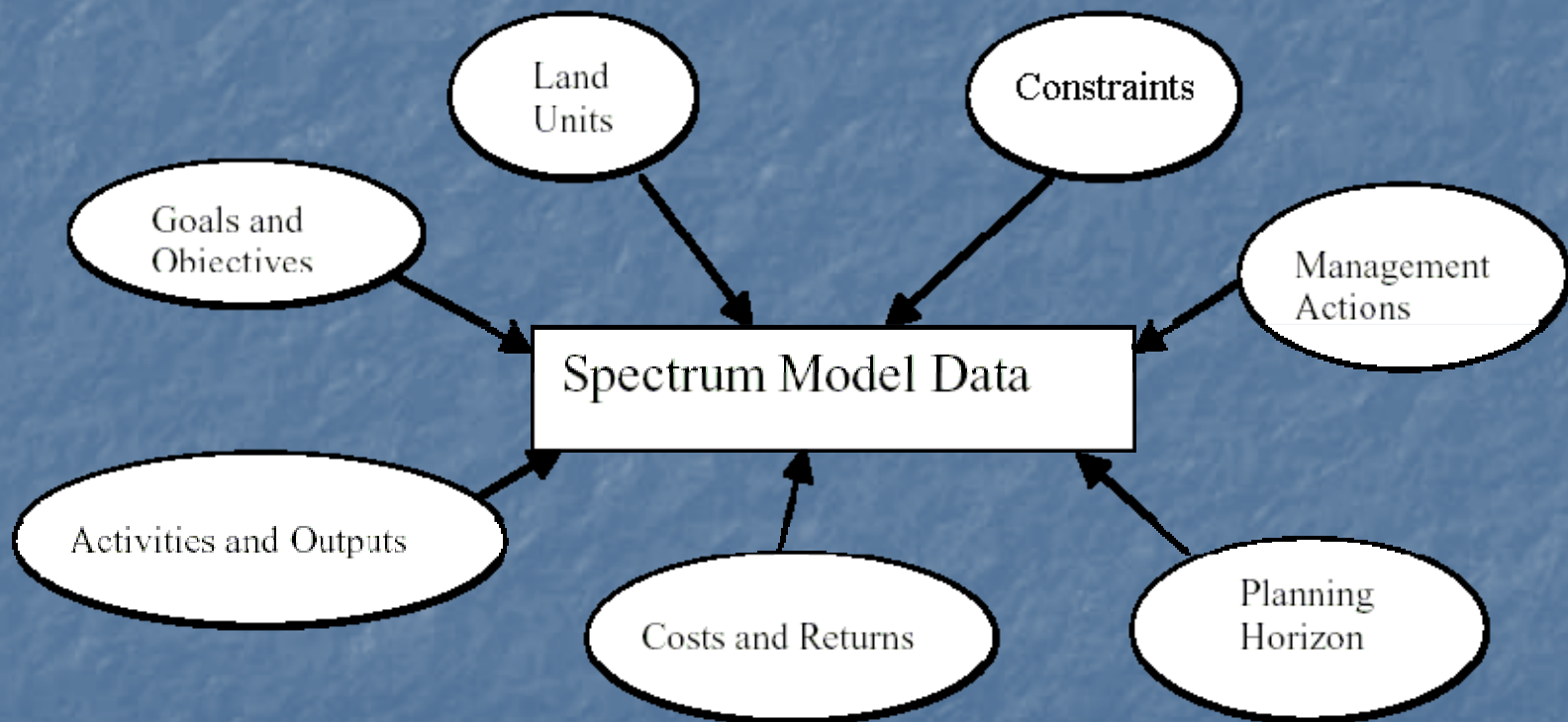


# Tongass National Forest Spectrum Model – Putting it all Together

Eric Henderson



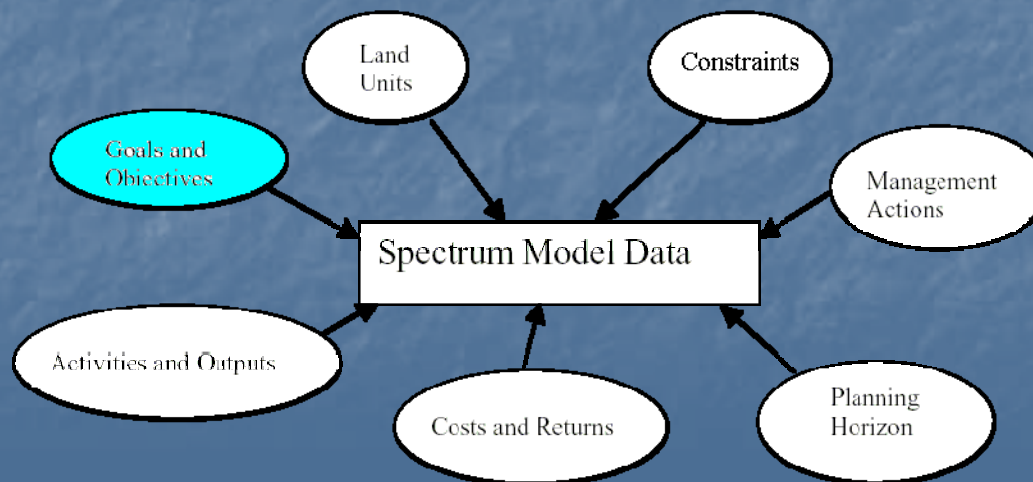
# Pieces of the model





# Goals and Objectives

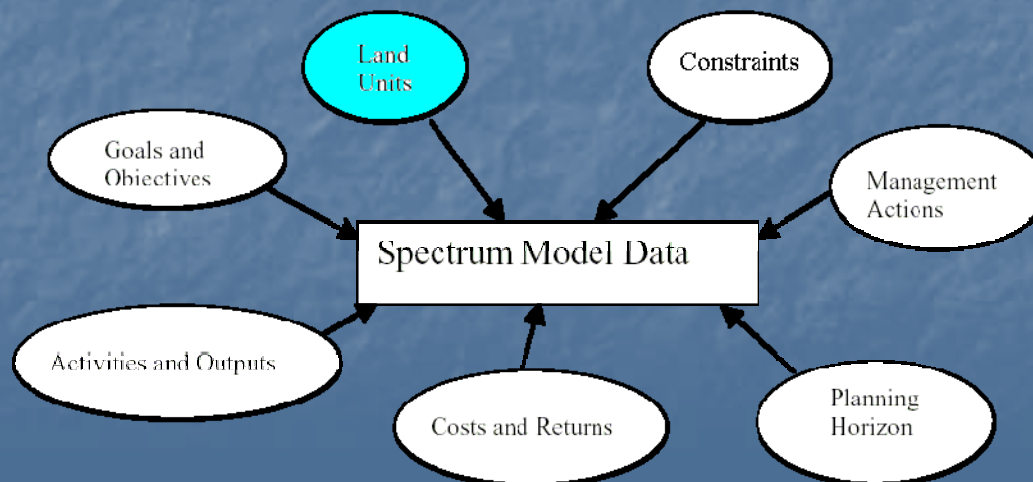
- Maximize Present Net Value
  - 1982 Planning rule
  - Definition





# Land Units

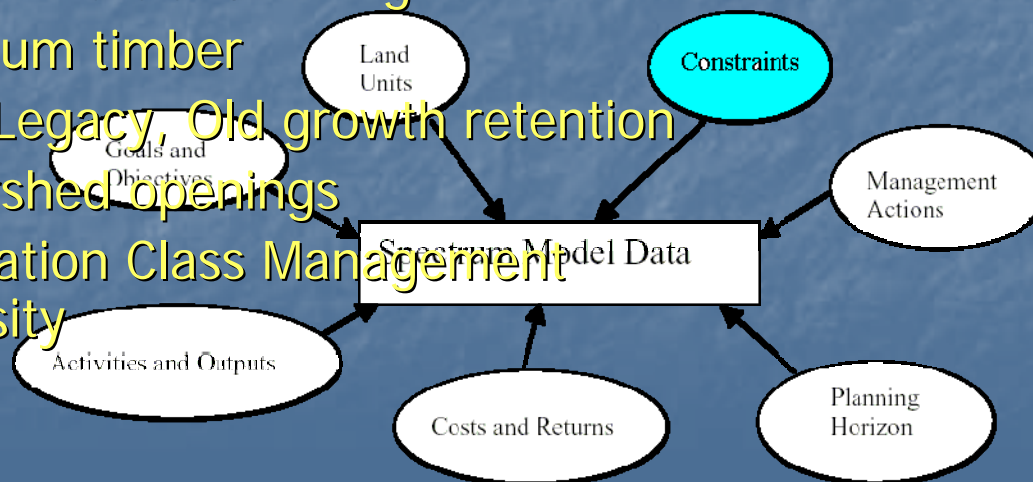
- Unique Combinations of
  - VCU
  - Volume Strata
  - Regulation Class
  - Operability
  - Roded Classification





# Constraints

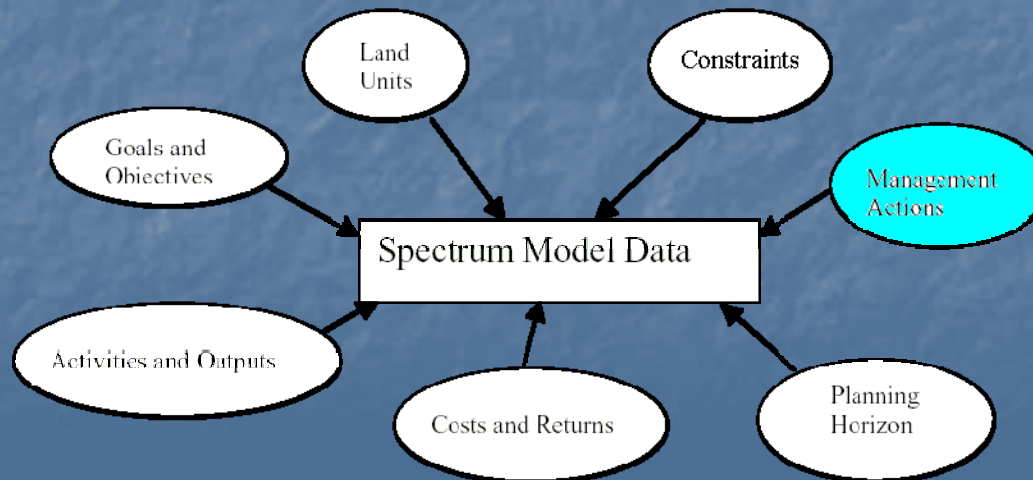
1. High Volume Strata
2. Normal Operability
3. Management Implementation Reduction Factors (MIRF)
4. Regulation Class 3 Harvest (forest-wide)
5. Precommercial thinning
6. Minimum timber
7. G/M, Legacy, Old growth retention
8. Watershed openings
9. Regulation Class Management Intensity





# Management Actions (Prescriptions)

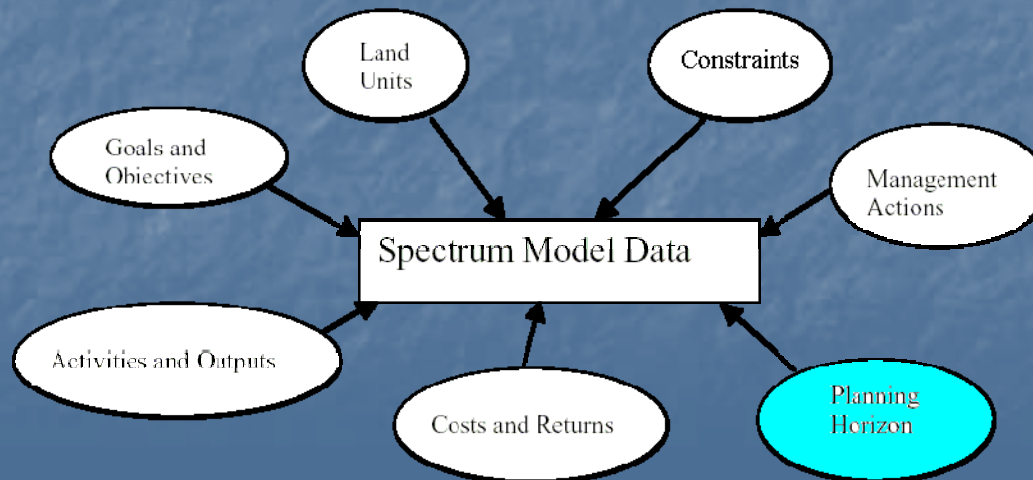
- Clearcut
- Regulation class 3 uneven-aged
- Clearcut with reserves (Partial Cut)
- Precommercial thin – Clearcut
- Precommercial thin – Commercial thin – Clearcut
- Commercial thin - Clearcut





# Planning Horizon

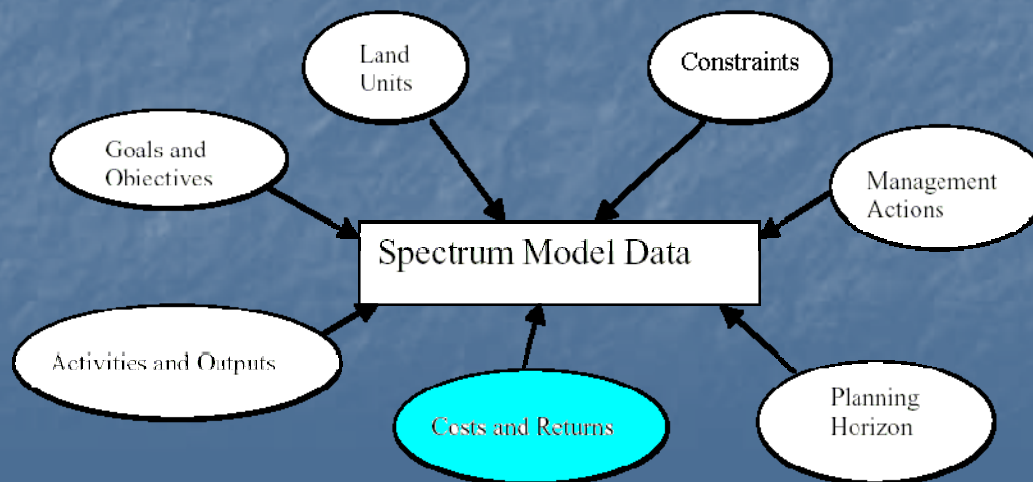
- 160 years
  - Modeled in 10-year increments





# Costs and Revenues

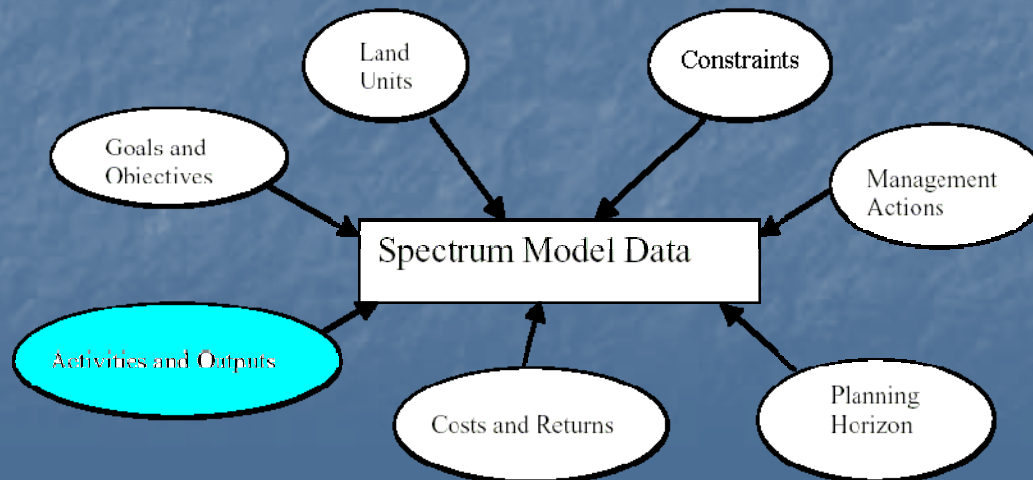
- Logging costs
- LTF construction
- Transportation
- Sale prep/administration
- Sawlog value/MBF
- Utility value/MBF





# Activities and Outputs

- For example:
  - Timber volume
  - Miles of roads constructed
  - Acres of watershed in open status
  - Acres of old growth harvest

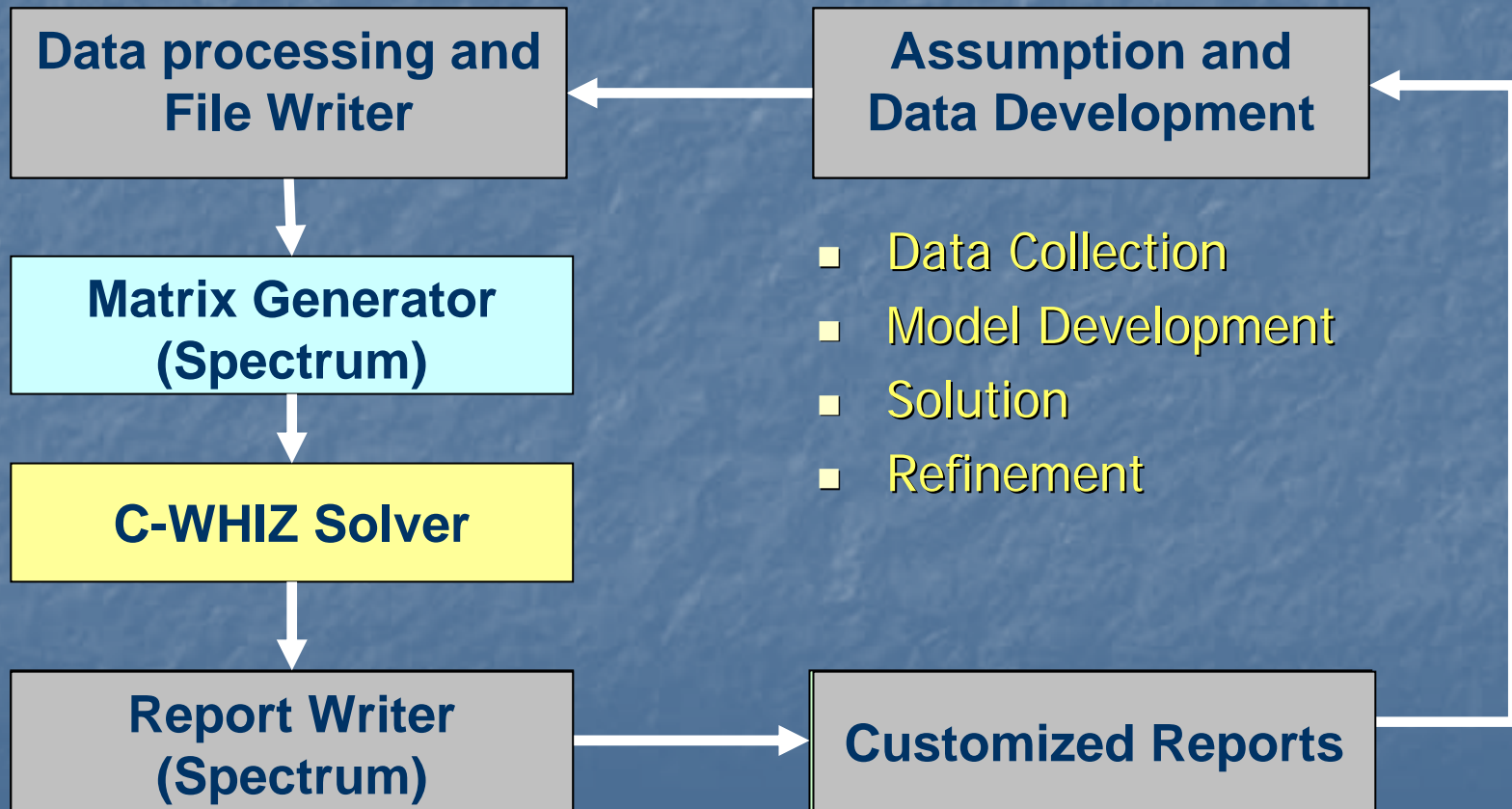




# Analysis process

## Analysis process

## Forest Level



- Data Collection
- Model Development
- Solution
- Refinement

■ Forest Developed



# Spectrum Model Data to Solution

- All this input is boiled down to two components:
  1. Constraints (Define the rules or boundary of the problem)
  2. Objective function (Tongass: maximize PNV)

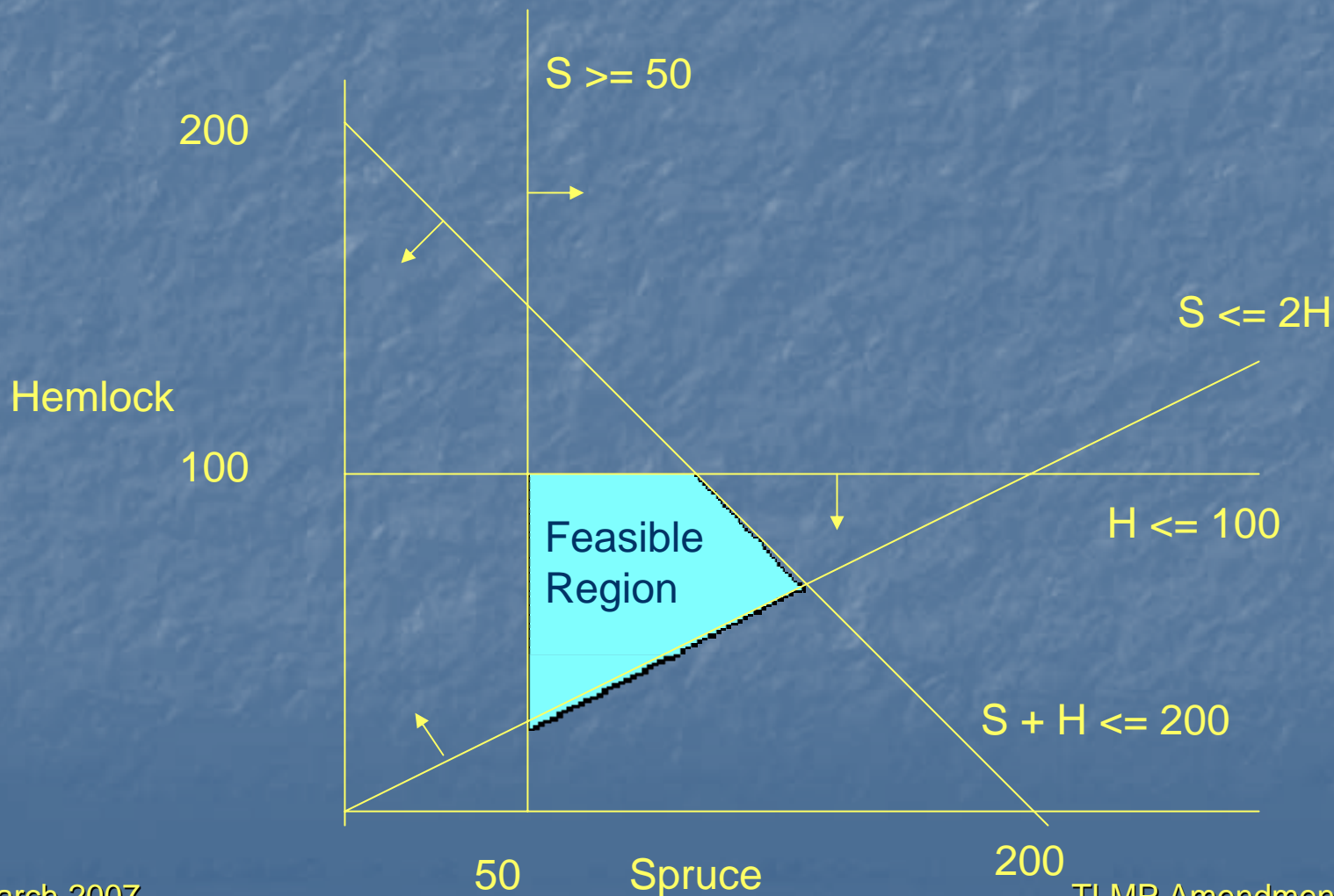


# Constraints

- Derived from information about
  - Land units (VCU, vol strata, operability, regulation class, roaded)
  - Activities and Outputs (watershed openings, old growth harvest, timber volume, etc.)
  - Law/policy (non-declining flow, LTSY, etc.)
- Define the boundaries of the problem (the solution space)



# Example: Graph of 2 variable constraints





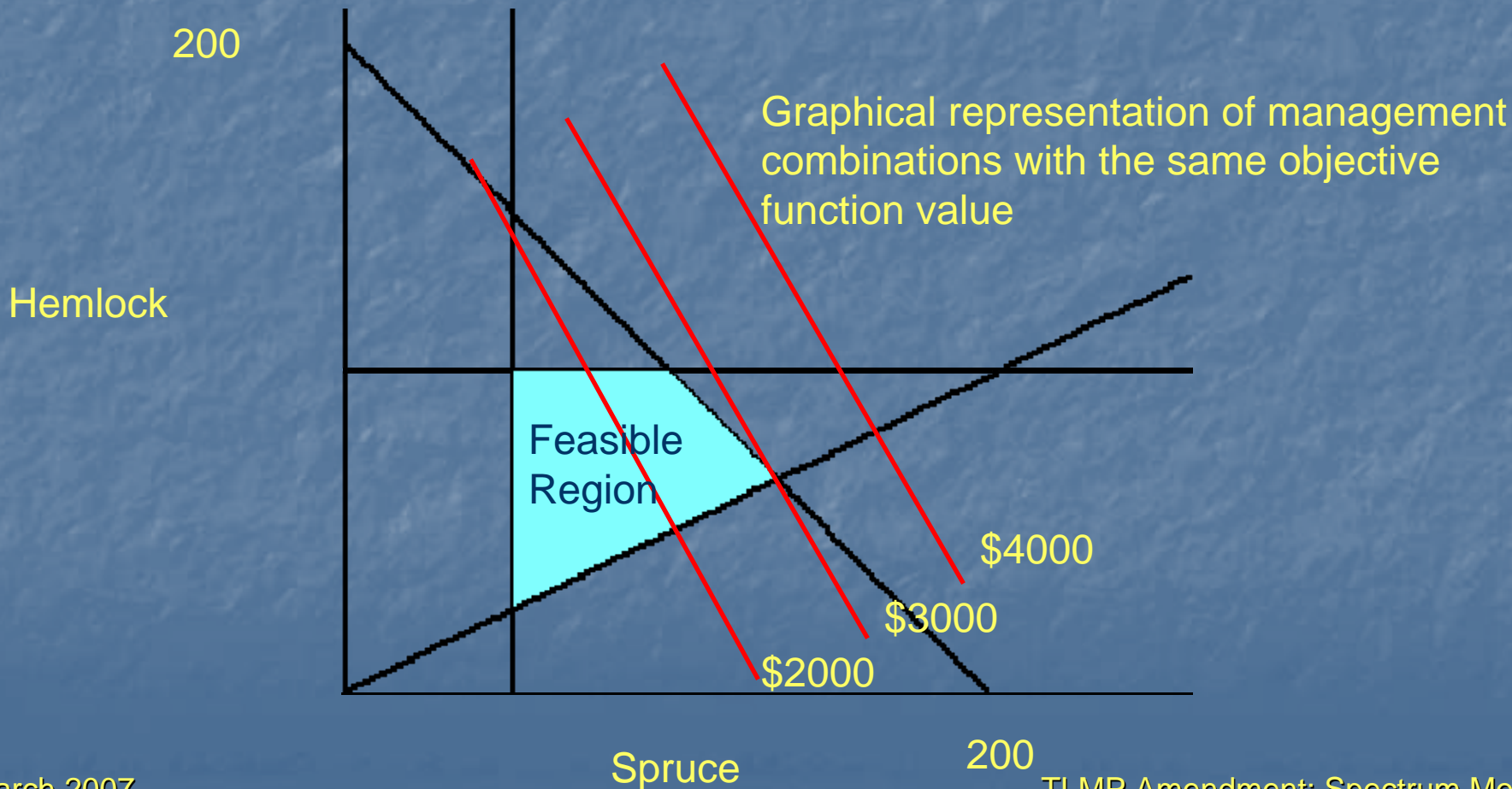
# Objective Function

- Derived from information about:
  - Yields, costs & revenues
  - Available management actions
  - Planning horizon
- Boils the problem down to a single value to maximize.
  - Forest Service: maximize PNV
  - For this example: maximize revenues from management



# Example: Objective Function

Objective Function: \$20/acre for spruce management and \$10/acre for hemlock management



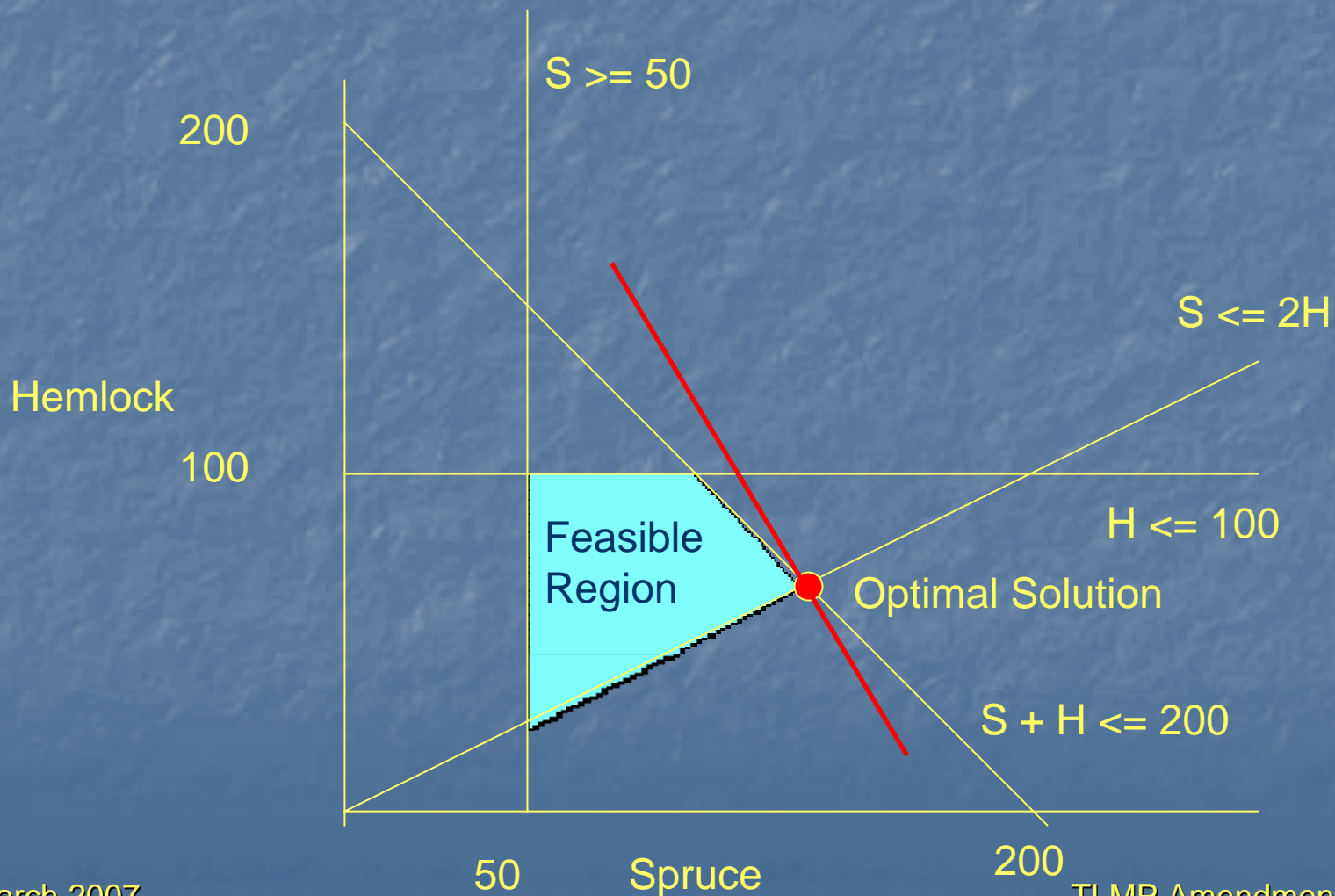


# Optimal solution

- Largest Objective function Value within the boundaries created by the constraints



# Graph of the Solution





# Discussion