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Procedure for Forest Sustainability Using Game-Theory

Forest Sustainability

- The ability for a forest to endure in the environment where it lives.
- Northeastern Area Association of State Foresters has defined criterion for forest sustainability
 - Conservation of Biological Diversity (focus of project)
 - Area of total land, forest land, and reserved forest land
 - Forest type, size class, age class, and successional stage
 - Extent of forest land conversion, fragmentation, and parcelization
 - Status of forest/woodland communities and associated species of concern
 - Six Others

Pacific Salmon Example

- Salmon migrate along Northwest coast, Canada, and Alaska
- Canadian fisherman catch fish born in US and vice-versa (both lose)
- 1985 Solution: each country harvests amount proportional to number produced
- Salmon exploded in Alaska, causing imbalance
- Game theorists were called in to help

Pacific Salmon Example

- Key was to harvest economic benefits from fish in proportion to production
- Adjusted the harvesting limits to take a longer-term view, account for each species, and protect against overfishing



Game Theory

TERMINOLOGY

- Player
- Strategy
 - Decision making
- Incentive
 - Potential winnings for each player
- Payoff
 - Reward or punishment for each player

TYPES

- Zero-Sum
- Non-Zero-Sum
- Variable-Sum
- Constant-Sum
- Sequential
- Simultaneous

Research Goals

- What is the current state of our forests?
 - How “healthy” are they?
- If current rates of forest development continue, what will happen?
 - How will this impact the environment (us)?
- What are incentives for keeping a forest sustainable?
 - How do these incentives vary according to location and biodiversity of forest?
- What kind of payoff function(s) maximizes forest sustainability?

Continued Work

Bird Migration – game theory and cascading networks

- Climate affects bird migration
- Bird migration affects insect populations
- Insect populations affect farms
- Farms affect us

