Biological Resources

- Vegetation (terrestrial)
- Wildlife (terrestrial)
- Aquatic Systems
- Wetlands
- Threatened & Endangered Species

Assessing Impacts to Terrestrial Vegetation

- **Identify Source of Potential Impacts**
  - Clearing and Grubbing
  - Change Hydrology (dewater/flood)
  - Toxic Substances
  - Spills
  - Placement of Fill
  - Mining
  - Shading
  - Non-indigenous Species
- **Determine Study Area**
  - Generally areas of direct impact
- **Determine Existing Conditions**
  - Aerial Photographs
  - Field Visit
  - Vegetation Classification
    structure, dominant species, density, habitat, special species
- **Identify Standard**
  - Usually none except for E & T species

Vegetation (cont.)

- **Impact Prediction**
  - Direct Taking
  - Change in Hydrology
  - Shading
  - Toxins
  - Invasion of Non-indigenous Species
- **Assess Significance of Impacts**
  - Affect on Wildlife Species
  - Percentage/Professional Judgment
  - Unique Characteristics/ Sensitive Species
  - Economic Value
- **Mitigation**
  - Avoid/Minimize Sensitive Areas
  - Re-Vegetate
  - Control Invasive Species

Assessing Impacts to Wildlife/Habitat

- **Identify Source of Potential Impacts**
  - Clearing and Grubbing
  - Change Hydrology (de-water/flood)
  - Toxic Substances
  - Spills
  - Placement of Fill
  - Shading
  - Noise
  - Human Contact
  - Non-Indigenous Species
- **Determine Study Area**
  - Generally areas of direct impact
- **Determine Existing Conditions**
  - Species Likely to Occur
  - Habitat - HEP Modeling
  - Field Visit
- **Identify Standard**
  - Usually none except for E & T species

Wildlife/Habitat (cont.)

- ◆ **Impact Prediction**
  - Direct Taking
  - Change in Habitat - HEP Modeling
  - Shading
  - Toxins
- ◆ **Assess Significance of Impacts**
  - Affect on Wildlife Species of Concern
  - Percentage/Professional Judgment
  - Unique Characteristics/ Sensitive Species
  - Economic Value
- ◆ **Mitigation**
  - Avoid/Minimize Sensitive Areas
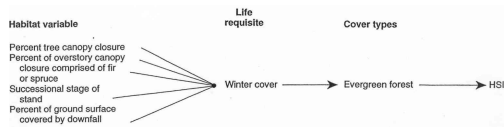 - Enhance Habitat - HEP Modeling

Habitat Evaluation Procedure (HEP)

- **US Fish and Wildlife Service**
- **Objectives**
  - Quantitatively Assess Existing Habitat Condition
  - Predict Impacts
  - Compare Alternatives
  - Consensus Effort
- **Value of Habitat**
  - Habitat Suitability Indices (HSI)- relate to carry capacity
  - Evaluation Species
    - ◆ 4 - 6 Species
    - ◆ Representative of Guild/Niche With Models
  - Suitability Indices (0 - 1)
    - ◆ Cover Requirements
    - ◆ Minimum Habitat Area
    - ◆ Food
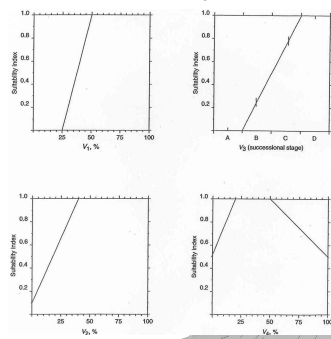   - ◆ Water
  - Data Collection
  - Calculation of HSI

HEP (cont.)

- **Value of Study Area**
  - **Habitat Units = HSI * Area**
- **Years of Analyses**
  - **Baseline**
  - **Intermediate**
  - **Life of Project**
- **Impact Assessment**
  - **Average Annual Habitat Units (with and without project)**
- **Mitigation**

HEP Model

| Habitat variable | Life requisite | Cover types |

Percent tree canopy closure
Percent of overstory canopy closure comprised of fir or spruce
Successional stage of stand
Percent of ground surface covered by downfall

Winter cover → Evergreen forest → HSI

HEP Suitability Indices

Calculating Habitat Value Loss

Baseline year HUs

Predicted conditions
without proposed action

Net Impact

Predicted conditions with proposed action