Bookends

# Introduction

* Forest management
  + Forests initially managed for high timber yields, or not managed at all
  + Shift in focus to preservation of biodiversity
  + Result of changing values, desire to preserve species (MAMU, marten)
  + Further shift toward ecosystem function, ecosystem services
  + Managing ecosystems is hard
* Surrogate species & ecosystem management
  + Surrogate species, etc. proposed as solutions
  + Discussion of 1-2 select surrogate species concepts
  + Extends single-species management toward ecosystem-based management
  + A few examples of how how surrogate species have been encoded into management
* Case study: spotted owls
  + NSPOW declines lead to NWFP
  + NSPOW management under the NWFP
  + NWFP extended to other species, functions
* Goshawks & Reynolds ’92
  + NOGO declines & listing in parallel to NSPOW
  + A little about NOGO biology
  + Reynolds’s landscape-scale management plan
  + Plan acknowledges ecosystem linkages necessary for single-species recovery
  + Plan similar to ecosystem-based management
* Goshawks in BC
  + PNW very different ecosystem than SW
  + Subspecies description - potential adaptation to ecosystem
  + History of listing
  + Existing management, knowledge gaps

# Conclusion

**Overview**

* Introduction/review of chapter
  + Management depends on understanding basic species biology, ecology
  + Diet has important implications for management, conservation viability
  + Population & ecosystem relationships
  + Review of findings
* Theory
  + Specialists
    - Narrow range of prey, which affects most aspects of life history
    - Diet consistent across range & habitat, range/habitat may be limited by prey
    - When prey scarce, respond with decreases in density, productivity, population size
  + Generalists - v different
    - Wide range of prey, although small number may be important
    - Diet varies across range & habitat, reflecting local abundance/availability
    - When prey scarce, may respond like specialist or switch to other prey
  + Gray area
    - Oversimplification
    - Species contain gradient of generalist & specialist individuals
* Case study: NSPOW - highlights importance of understanding diet
  + Considered habitat specialist, but partially (largely?) due to dependence on specialist prey (range/habitat is limited by prey)
  + High dependence on few spp of prey, but this varies across range (north vs south) reflecting local prey abundance
  + Diet scales up to habitat selection & population dynamics (home range size)
* NOGO & results
  + In contrast - NOGO is generalist although key prey spp may be driver
  + Diet quantification - diverse diet but primarily squirrel
  + Ecological zones - diet varies within study area but squirrel is constant, suggests abundance likewise constant
  + Productivity - no affect of squirrel in diet on productivity - possible explanations

**Directions for future research**

* Knowledge gaps
  + NOGO vs. NSPOW shows clear gaps in NOGO knowledge
  + Prey abundance - used to determine degree of selectivity, affects of prey abundance on pop dy
  + Space use - used to determine home range size, habitat selection
* Review of telemetry
  + Methods - tag info, capture technique
  + Results - home range size (males vs females), maximum range
* Telemetry methods discussion
  + Capture method favors females over males
  + Data retrieval method favors females over males
  + Pros of geolocator vs VHF/satellite
* Discussion of telemetry
  + Despite setbacks, prelim data provide clues for management
  + Irregular shape =/ estimated buffers
  + Irregular use indicates patchy use - some areas outside WHAs clearly important, not captured by nest protections

**Management implications**

* The *laingi* problem
  + laingi protected subspecies whose distribution is estimated based on ecosystem mapping
  + genetic evidence calls this distribution into question
  + this work indicates south coast population ecologically similar to Vancouver Island, Haida Gwaii, and interior-ish BC (Smithers), but dissimilar to SE AK, Washington (grouse-dependent) and also dissimilar to NOGO pops elsewhere in west (hare-dependent)
  + indicates some support for designatable unit status
  + does not indicate blanket management solution for these populations, as squirrels are introduced in Haida Gwaii
  + Highlights importance of population-specific knowledge, which this study provides
* Population level-implications
  + Although this study found no evidence of productivity ~ squirrel!diet, data from other studies suggests it likely that productivity ~ squirrel!abundance
  + Squirrels themselves tied to cyclical food source (seed cone crop)
  + Alternatively, weather may be largest factor influencing NOGO nest initiation
  + Both affected by climate change, so this represents a crucial direction for future research.