

Harvest Management

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Harvest Management

In the past, unregulated harvest has caused wildlife extinctions & near extinctions

- Hunting by primitive humans
- Unregulated harvest by Euro Americans (especially market hunting)

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Harvest Management

- Even under modern regulations, ***commercial*** harvest has endangered certain populations
 - E.g., fisheries like cod and anchovies
- However regulated ***recreational*** hunting/fishing/trapping has never caused a harvested population to become extinct or endangered

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Why Do People Hunt or Trap?

- 13 million licensed U.S. hunters in 2001
 - Declining percentage of population
- Subsistence
- Non subsistence food
- Recreation
- Income (trapping)
- Population control
- Major source of \$\$ for research & habitat
 - State: licenses, stamps, permits; Pittman-Robertson \$\$
 - Federal: federal "duck" stamps & user fees fund national wildlife refuges

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Is Harvest Necessary?

- Population control
 - Some species become overpopulated
 - Few large predators
 - Human activities improve habitat quality
 - Some species don't
 - Unhunted populations of mourning doves not overabundant

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Harvest Management

- **Basic Premise:**
 - Harvest reduces population size but increases population growth rate
 - Therefore, in good habitat wildlife populations can produce a **sustainable yield**

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Harvest Levels

- Who determines the “appropriate” level?
 - Migratory species : federal agencies
 - Nonmigratory species : state agencies
- What is the “appropriate” level?
 - Ideally, harvest should equal what the population growth rate would be in absence of harvest

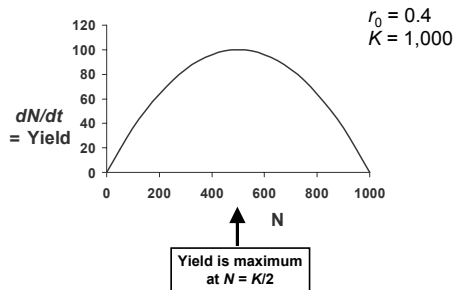
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Factors Modifying Harvest Levels

- Harvest can be higher if it is a **compensatory** mortality factor
 - biased toward individuals that would otherwise die of other causes
 - reduces competition among survivors
- Harvest must be lower if it causes **additive** mortality
 - biased toward individuals that would otherwise survive
- Harvest can be higher if it is biased toward sex/age classes with low **reproductive value**
 - very young or very old females
 - males (most species)

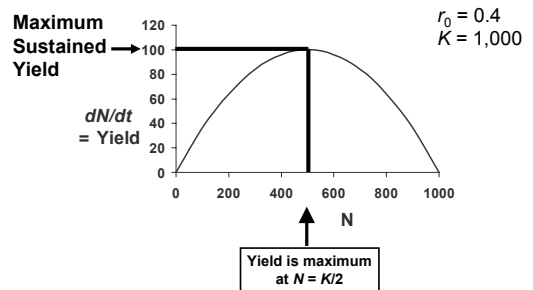
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Yield -vs- population size



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Yield -vs- population size



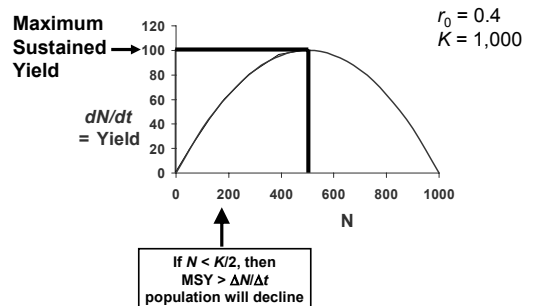
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Why NOT harvest at MSY?

- Maximum sustained yield should NOT be a goal because:
 - assumes the following are **known exactly**
 - Population size
 - Population growth rate
 - Relationship between size & growth
 - Harvest level
 - MSY produces an **unstable equilibrium**
 - If population size starts to decline, it will continue to decline unless yield is changed

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Yield -vs- population size



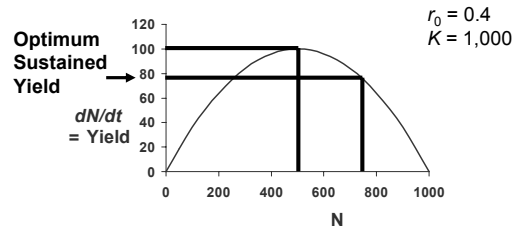
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Why not harvest at MSY?

- Goal should be to harvest at a rate **below MSY**.
 - Amount below MSY should reflect uncertainty as well as nonconsumptive values
- **Optimum sustained yield**
 - balances current harvest with long term persistence of the population and social/economic factors to provide the maximum benefit to society

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Yield -vs- population size



THERE IS NO EQUATION OR SET VALUE FOR OPTIMUM YIELD

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Sources of Uncertainty

- Nichols (2000)
 - **environmental variation**
 - year-to-year variation in weather, food availability, etc.
 - **partial controllability**
 - cannot dictate exactly how many will be harvested
 - **partial observability**
 - cannot know exact population size & growth rate or harvest level in a given year
 - **structural uncertainty**
 - cannot know exact relationships between population size, growth, & harvest
- Because of uncertainty, managers generally try to be conservative (lower harvest)

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Sources of Data From Harvest

- # people buying licenses
- Check stations
 - # animals killed
 - age & sex distribution
- Surveys
 - Harvest Information Program (HIP)
- “Wing Bees”
- Leg-band returns
 - Survival rates & hunting mortality
 - Migration routes

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Planning a Harvest

- Hunting Regulation Options
 - Manage effort
 - limit number of permits, bag limits & season length for an area
 - # harvested tends to follow animal population density
 - harder to find animals when they are scarce
 - overharvest can occur if animals are concentrated

Planning a Harvest (cont.)

- Hunting Regulation Options
 - Manage yield (total take, quota system).
 - Stop harvest when a preset # animals have been killed
 - Most direct approach
 - Difficult to implement
 - Can avoid overharvest when population is concentrated
 - example: Miss. Valley Pop. of Canada geese

Example: Waterfowl Regulations

- Each year, wildlife agencies in U.S., Canada, and Mexico assess
 - number of breeding ponds in spring (aerial surveys)
 - number of breeding pairs (aerial surveys)
 - breeding success (late summer age ratios)
 - survival rates (leg bands)
 - previous year's harvest (HIP)
- Coordinate efforts, share data, and assess suitable harvest levels
- USFWS produces national regulations
- States write regulations that can be more conservative than the national regulations

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Furbearer Trapping

- Differs from recreational hunting because
 - pelts can be sold
 - meat often is not eaten
- Effort is affected by market prices
- Strong ethical disapproval by many people
 - Massachusetts: 1996 trapping restrictions have led to rapid decrease in beaver harvest (from 1700/yr to 100/yr) and increase in beaver population (from 24,000 to 70,000)

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Things To Remember

- Maximum sustained yield
 - how to calculate, disadvantages
- Optimum sustained yield
 - factors involved, advantages
- Sources of uncertainty in planning harvest
- Strategies for managing harvest

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