

Wildlife Conservation

- Dr. Brad Swanson
- Brooks 184
- T,R 8 - 10am
- brad.swanson@cmich.edu
- 3377



Species-of-the-Day

Kirtland's warbler (*Dendroica kirtlandii*)



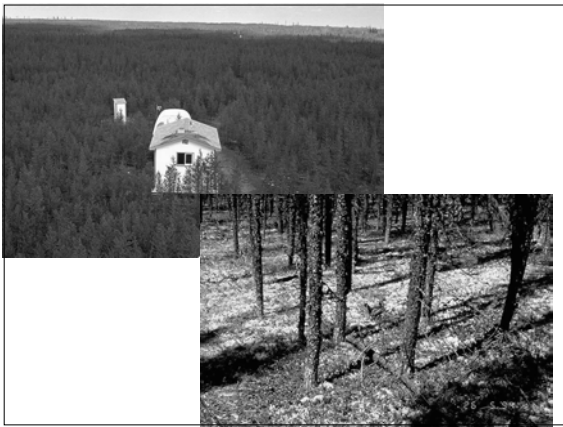
Habitat

NE Michigan jack pine forests

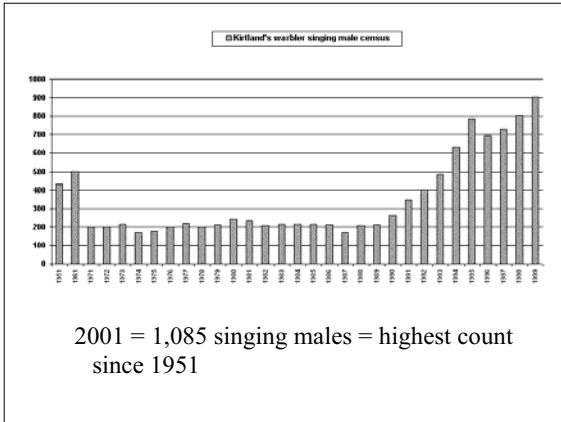
- Nesting habitat = 2-6 m (~5-20 ft) tall young jack pines (<15 yrs) = very dense stands
- Large forest stands = 100+ ha (200+ A)













Food

Insectivores & herbivores

Reproduction

~May, late May = 5 eggs

i.p. = 13-16 days

Behavior

- Migrate to Bahamas
- Return to MI early to mid May (males 1st)
- Influence of brown-headed cowbirds (nest parasitism)



What is Wildlife Management?



- Webster's Definitions
 - Wild
 - Living in a state of nature, as animals that have not been tamed or domesticated
 - Management
 - To control or direct
 - Contradictions?

What is Wildlife Management?

- Means of control
 - Manage habitats
 - Manage people
 - Manage the individuals in a population



What is Wildlife Management?



- For whom do we manage?
 - Hunters
 - Anglers
 - Ranchers
 - Farmers
 - Timber industries
 - Business
 - Landowners
 - Miners
 - Bird watchers

Benefits & Uses of Wildlife Resources

- Economics
 - direct expenditure (all related expenses)
 - market value (no habitat mgt costs)
 - unit-day value (direct + market)
 - willingness to pay
- Consumption
 - food
 - recreation

Survey of Wildlife-Related Recreation

	1955....	1980	1985	1991	1996
	10%	10% (\$ 8.5B)	9 % (\$10B)	7% (\$12B)	7% (\$17B)
	18%	25% (\$17B)	26% (\$28B)	20% (\$25B)	18% (\$36B)
	???	49% (\$ 4B)	74% (\$14B)	39% (\$18B)	31% (\$29B)

Benefits & Uses of Wildlife Resources

- Non-consumptive recreation
 - (truly non-consumptive?)

Benefits & Uses of Wildlife Resources

- Other benefits
 - aesthetics & quality of life
 - cultural
 - education & research
 - ecological

Public Attitudes, Ethics, Values

- Natural resources professionals =
 - stewards of the resource
 - servants to the public
- Stakeholder groups are diverse:
 - loggers
 - farmers
 - homeowners
 - anglers
 - naturalists
 - hunters
 - anti-hunters
 - hikers
 - bird-watchers
 - tax-payers

Public Attitudes, Ethics, Values

- Resource managers must measure, evaluate, integrate:
 - 1) socioeconomic elements
 - 2) cultural elements
 - 3) political elements

Public Attitudes, Ethics, Values

- Components of Public Attitudes:
 - Emotions (positive or negative views)
 - Beliefs = perceptions (cognitive component based on available info)
 - Intentions & Actions

- Attitudes toward animals (Stephen Kellert)
 - 1) Naturalistic – wildlife, out-of-doors
 - 2) Ecologistic – wildlife spp. & habitats
 - 3) Humanistic – indiv. Animals
 - 4) Moralistic – ethical treatment
 - 5) Scientific – attributes & functions
 - 6) Aesthetic – artistic & symbolic
 - 7) Utilitarian – practical value
 - 8) Dominionistic – master & control
 - 9) Negativistic – indifferent, fear, dislike

Public Attitudes, Ethics, Values

- Values – preferred outcome based upon affects & belief systems

e.g., preservation vs. conservation

e.g., animal rights & welfare

What is Wildlife Management?

- Approaches
 - Preservation
 - Hands off
 - Conservation
 - Use of natural resources in such a fashion so as to guarantee it use in perpetuity
 - Management
 - Manipulation of populations or habitats towards a specific goal
 - Increase
 - Remove
 - Stabilize



What is Wildlife Management?



- “Wildlife management recognizes the reality and operation of ecological communities and that man’s activities often greatly disrupt them, thence that it is often desirable from the human viewpoint to work with these communities and attempt to modify or manage them in man’s interest.”
 - Ira Gabrielson - Director U.S. Bureau of Biological Surveys (U.S. Fish and Wildlife Service)

History of Wildlife Management

- Humans colonize N.A. – Quaternary Period, Pleistocene Epoch – ice ages 10,000 ybp
- Large mammal extinctions (exploitation?) = 66% of megafauna extinct
- 500 ybp, Europeans arrive....
 - Spanish bring horses, livestock
 - Other Europeans exploit fisheries, fur, meat, feathers.... (1870-1915)

History of Wildlife Management

- Fur trade & near extinction of beaver (*Castor canadensis*)



History of Wildlife Management

- Fur trade & near extinction of beaver (*Castor canadensis*)
- Market hunting
 - Near extinction of bison : 60M to ~150



History of Wildlife Management

- Market hunting
 - Bison
 - Successful extinction of passenger pigeon - immense abundance (400 km long, 1800)



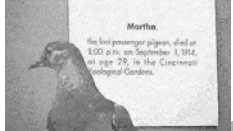
History of Wildlife Management

- Passenger pigeon
 - immense abundance (400 km long, 1800)
 - 1878 – 3 months, 1.5 M pigeons from MI to market



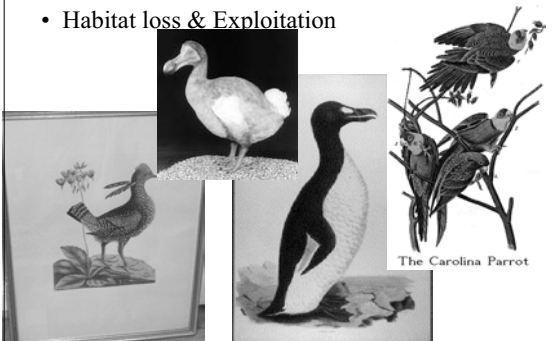
History of Wildlife Management

- Passenger pigeon
 - last sighting 1899
 - 14-yr old boy shot last wild pigeon in Ohio (1900)
 - last captive pigeon died:
 - Male (1912)
 - Female (1914)



History of Wildlife Management

- Habitat loss & Exploitation



History of Wildlife Management

- Fear of losing species at such fast rates (especially game species).....birth of modern wildlife conservation movement...

History of Wildlife Management

Example:

wood ducks

- nearly extinct early 1900's
- overhunting & habitat loss (artificial nests)

wild turkeys

- extirpated from much of range by 1930
- overhunting , reintroduction MI 1950-60's

Species-of-the-Day

Wood Duck (*Aix sponsa*)



Brink of Extinction

By early 1900's, culminative effects of:

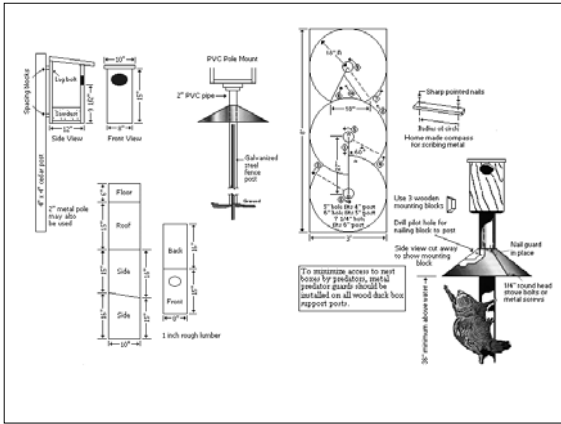
- 1) wetland drainage (ag. expansion)
- 2) deforestation
- 3) overhunting




Habitat

- Wooded swamps & river bottomlands
- Natural tree cavities for nesting (cypress, sycamore, silver maple, black ash)
- Home range changes with flooding events







Food

- * In water <18", feed on:
 - seeds of trees (e.g., acorns)
 - also field grains
- * Young = aquatic insects


Reproduction

Pairing in late Oct into spring (Mar-July nest)

Clutch size = 6-10 eggs

Behavior

- Dump nests (up to 30+ eggs in 1 nest) = "egg dumping" behavior = intraspecific brood parasitism
- may decrease hatch rates to 10%



History of Wildlife Management

Example: (MI)

American marten

- extinct 1930's
- overhunting & habitat loss
- reintroduce 1960's to 1980's
(special concern?)



fisher

- extinct 1920's
- overhunting & habitat loss
- reintroduction 1960's (harvest by 1989)



What is Wildlife Management?

• Aldo Leopold

- “..the art of making land produce sustained annual crops of wild game for recreational use.”
 - Hunting restrictions
 - Predator control
 - Habitat preservation
 - Game stocking
 - Environmental modification



Modern Wildlife Management

• Aldo Leopold

- wrote *Sand County Almanac*
- wrote *Game Management*
- 1st university wildlife program (UW-Madison)
- Land Ethic

• J.N. “Ding” Darling

- political cartoonist/conservationist
- appointed chief of Bureau of Biological Survey (“National Biological Service”) by FDR
- Cooperative Wildlife Research Units

What is Wildlife Management?

Notice what is in the background? EQUATIONS!!

- Aldo Leopold

- “..the art of making land produce sustained annual crops of wild game for recreational use.”

- Hunting restrictions
- Predator control
- Habitat preservation
- Game stocking
- Environmental modification



Wildlife Law

Wildlife Conservation Authority: Legal Sources

- 1) statutory law – enacted by Congress
e.g., Clean Air (Water) Act, ESA, NEPA
- 2) common law – court decisions from traditional law
e.g., negligence, trespass...
- 3) case law – courts resolve dispute over statutory & common law
e.g., suing to prevent listing

Wildlife Laws

- **1900. Lacey Act.** Prohibited the transportation of illegally taken wildlife, fishes, plants, and other organisms across state borders and prohibited the importation of certain exotic species.
- **1913. Migratory Bird Act.** Federal government assumed regulatory powers over migratory birds.
- **1918. Migratory Bird Treaty Act.** Provided for coordination between the U.S. and Canada in managing migratory birds and later amended to include other nations.

Wildlife management historical perspective

- Nineteenth century
 - Wildlife predators widely condemned as thieves and killers.
 - States hired professional hunters to kill bears, wolves, coyotes, foxes, mountain lions, bobcats, skunks, weasels, eagles, hawks, and crows.



Wildlife Laws

- **1931. Predatory Mammal Control Program.** Authorized the Department of Agriculture to study and control predatory mammals causing damage to crops and livestock.
- **1934. Migratory Bird Hunting Stamp.** Required that waterfowl hunters purchase a duck stamp and monies generated be spent on wetland conservation programs.
- **1934. Fish and Wildlife Coordination Act.** Authorized the Department of the Interior to assure the welfare of fish and wildlife in water development programs initiated or licensed by federal agencies.



Figure 2-1. Waterfowl were hunted such that...

Wildlife Laws

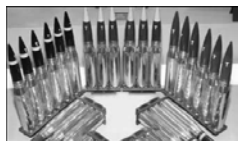
- **1935. Creation of the Cooperative Wildlife Research Units.** The units conducted research and established graduate programs in wildlife science at state universities.
- **1937. Federal Aid in Wildlife Restoration Act.** Imposed a federal excise tax on sporting arms and ammunition with proceeds to be distributed to states for wildlife-related projects.
- **1969. National Environmental Policy Act.** Required federal agencies to submit environmental impact statements describing potential negative effects of any major project on the environment (including wildlife) before the project begins.

Wildlife Laws

- **1972. The Marine Mammal Protection Act.** Established protection of marine mammals under the authority of the Department of Commerce.
- **1973. Endangered Species Act.** Initiated a list of endangered U.S. species. The 1973 version directed federal agencies to protect and restore endangered species and their habitats.
- **1980. Fish & Wildlife Conservation Act** – P-R funds to nongame research & mgt
- **1980. National Forest Mgt Act (NFMA)** – USFS & forest mgt plans
- **1985. Food Securities Act.** The Conservation reserve Program established a voluntary program for landowners to improve soil and water resources including fish and wildlife habitats.
- **1986. The North American Waterfowl Management Plan.** International agreement between the U.S. and Canada for restoring waterfowl populations across North America.

Who pays for Management

- Pittman-Robertson Act
 - 11 percent Federal excise tax on sporting arms, ammunition, and archery equipment
 - 10 percent tax on handguns
- Non-game check off
- Surveys show hunters contribute most of money to maintain wildlife



Wildlife Authority



- **State governments (DNR)**
 - set seasons, limits, and license fees for harvesting game birds, mammals, and fish.
- **Federal agencies (Fish & Wildlife)**
 - Have regulatory powers over migratory birds
 - Manage national refuges
 - Coordinate endangered species programs
 - Administer federal aid to states
 - Negotiate international wildlife agreements

Benefits & Uses of Wildlife Resources

- Economics
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- Consumption
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Natural Selection & Evolution

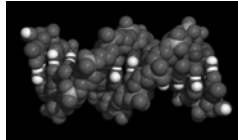


- “Nothing in biology makes sense except in the light of evolution.”
T. Dobzhansky

Natural Selection & Evolution

- Evolution

- The change in allele frequencies over time
- Chromosome
 - A long protein strand consisting of nucleotides and proteins
- Locus
 - A specific location on a chromosome.
- Gene
 - A locus which codes for a specific protein
- Allele
 - An alternate form of a gene
- Nucleotide
 - One of 4 specific nucleic acids which when linked together forms a gene



Natural Selection & Evolution

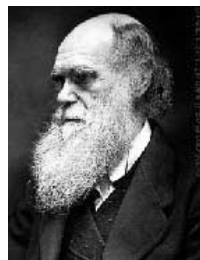
- Forces of Evolution

- Selection
 - Natural
 - Sexual
 - Anthropomorphic
- Mutation
- Genetic Drift
- Dispersal



Natural Selection & Evolution

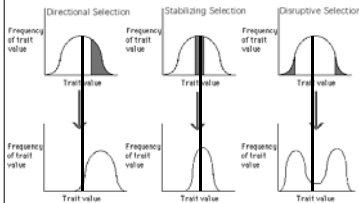
- Selection
- Charles Darwin
- Survival of the fittest?
 - Selection requires
 - Variation in a trait between individuals within a population
 - The variation must be heritable
 - The trait results in differential reproductive success
 - A trait which provides a selective advantage is called an adaptation.



Natural selection for an adaptation results in evolution

Natural Selection & Evolution

- Types of Selection
 - Directional
 - Stabilizing
 - Disruptive



Natural Selection & Evolution

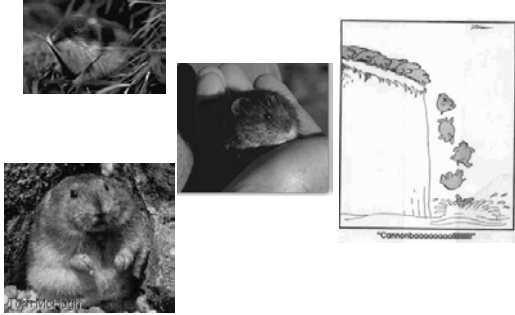
- At what level does natural selection occur?
 - Gene
 - Individual
 - Group
 - Population
 - Species



Darwinian Selection



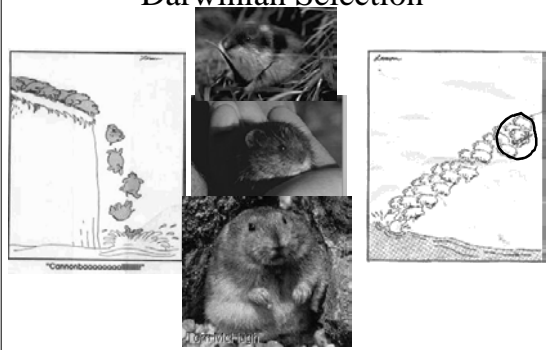
Darwinian Selection



Darwinian Selection



Darwinian Selection



Natural Selection & Evolution

- Selection only works at the level of the individual!
- All animals behave in a selfish way to maximize the number of offspring they leave behind.



Darwinian Selection

**THERE IS
NO
ALTRUISM!**

Darwinian Selection

- Why does it appear that some animals help others at a cost to themselves?



Darwinian Selection

- Hamilton's inclusive fitness
 - Direct Fitness
 - Personal reproduction
 - Indirect Fitness
 - Relatives reproduction
 - $B - C > 0$
 - What are the units of B and C?
- Fitness must be in addition to that which you would have gotten from the relative regardless of the behavior!



Darwinian Selection

- Who will you save from a fire?
 - Brother
 - Cousin 1
 - Cousin 2
 - Father
 - Friend
 - Mother
 - Sister
 - Spouse



Darwinian Selection

- Who will you save from a fire?
 - Brother - Age 21
 - Cousin 1 - Age 19
 - Cousin 2 - Age 20
 - Father - Age 65
 - Friend - Age 23
 - Mother - Age 63
 - Sister - Age 22
 - Spouse - Age 25



Darwinian Selection



Darwinian Selection

- Who will you save from a fire?

- Brother - Age 21
- Mother - Age 63
- Spouse - Age 25
- Cousin (M) - Age 20
- Father - Age 65
- Sister - Age 22
- Cousin (M) - Age 20
- Cousin (F) - Age 19



Darwinian Selection

- Natural selection can only work at the level of the individual.
 - Why doesn't natural selection work at the level of the gene?
- The consequences of natural selection are expressed at the population level.
 - Natural selection, like all forms of evolution results in a change in allele frequencies (or frequencies of a trait).

Darwinian Selection

- The Modern Synthesis
- Combines genetics, geology, and natural selection
 - Gradual evolution results from small genetic changes acted upon by natural selection
 - Speciation and macroevolution can be explained by microevolution given the age of the earth

Darwinian Selection

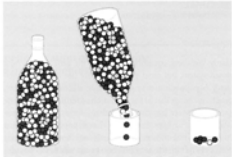
- Modern Synthesis - Darwin's postulates restated
 - Mutation is the ultimate source of all variation, segregation and independent assortment create novel combinations of alleles
 - Alleles are passed between generations
 - More offspring are produced than can survive
 - Individuals with the most advantageous allelic combination for the current situation produce more offspring.

Natural Selection & Evolution

- Sexual Selection
 - Females prefer to mate with a male with a specific trait
 - Sexual selection can work in opposite direction to natural selection



Natural Selection & Evolution



- Genetic Drift
 - Random changes in allele frequencies
 - Can work against selection
 - Strongest in small populations

Natural Selection & Evolution

- Mutation
 - The ultimate source for new genetic material
 - Change in specific nucleotides
 - Changes protein produced
 - Red fox
 - 2 genes each with two allele
 - A single mutation in a single gene produces 9 distinct color types of foxes



Natural Selection & Evolution



- Dispersal
 - Movement of animal from natal population to breeding population
 - Moves alleles from areas of high concentration to areas of low concentration
 - Reduces Inbreeding

Evolution, Natural Selection, and
Wildlife