

What we will cover today

Harvest Models

- 1. Sustainability**
 - 2. Hunting, Carrying Capacities, MSY**
 - 3. Regulation Process and Public**
 - 4. Big and Upland Game Harvest**
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Harvest and Wildlife Management

Sport Harvest as the method of choice for controlling populations of game animals by managers since modern wildlife management began in 1910 with "*The Doctrine of Wise Use*" brought forward by Theodore Roosevelt and Gifford Pinchot.

Before, Wildlife Management primarily dealt with avoiding 'over harvest'.

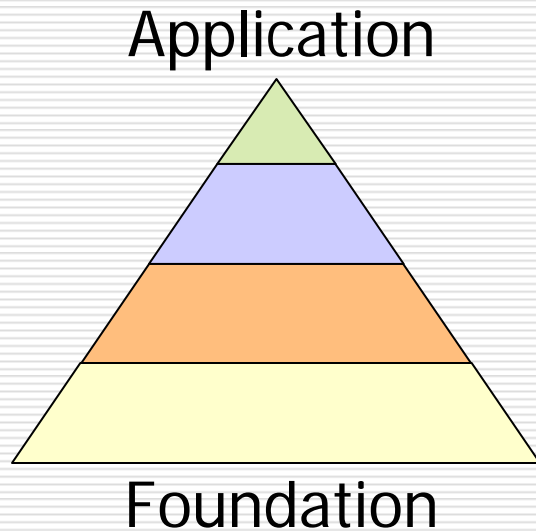
As game animal populations increased, the goal became the control of populations to maintain them within habitat carrying capacity.

Three core topics Population Managers deal with:

- treatment of a small or declining population to raise its density (Conservation/Protection)
- exploitation of a population to take from it a sustainable yield (Sustainable Yield Management)
- treatment of a population that is too dense, or which has an unacceptable high rate of increase, to stabilize or to reduce its density (Control)

(*sensu* Caughley 1977)

Science-based Harvest



Science provides:

- existing knowledge
 - data
 - controls
 - research design
 - experiments
 - quantification
 - advice
 - critical thinking
 - constant challenge
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How to harvest

- rifle, shotgun, bow, black powder or trapping
 - in an ethical fashion
 - with minimal impact
 - sustainable numbers
 - based on wildlife inventories
 - science-based
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Side aspects of Sport harvest

- produces economic benefits from license sales (which support game species management programs, non-game, endangered and threatened species, habitat acquisition etc.)
 - commercial development of nearby communities, e.g. (motels, restaurants, service stations, grocery stores, and sporting goods stores)
 - other business: outfitter, taxidermists, meat processors, landowners
 - political benefits, e.g. political support for management programs, wildlife management agencies, habitat protection, land use planning, and multiple use of public lands
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What is sustainability

"Do not take more than what re-growths"

1. Available population and yearly offspring needs to be known, first.
2. Yield (including its effects) needs to be known and adjusted according to available population and offspring.

PS. Various other Sustainability definitions exist...

How to derive sustainability

1. Population Inventory (absolute, not index/status)
2. Mechanisms to regulate harvest
3. Enforcement
4. Constant monitoring of populations
5. Establish Culture of Sustainability

Most of these items are part of traditional wildlife science

How to maximize sustainability

- support reproduction
 - provide best habitat
 - minimize additional mortality (other than official one)
 - scientific studies to fill knowledge gaps
 - promote concept
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Management Units

Important step and unit because it defines management populations

could be based on:

- biology (climate, land form; usually found in western states)
- politics (usually found in eastern states)
- tradition
- budget constraints
- combination

should be:

- large enough for viable population
- account for movements
- manageable
- recognizable by hunters

Often, do not fully account for biological realities, e.g. movements and latest research findings such as telemetry. Once established they are hard to change...

Production of Large, Harvestable Surpluses

e.g. for upland game animals which have a high reproduction rate

- ruffed grouse
- gray partridge
- cottontails
- rock ptarmigan
- California quail
- northern bobwhite

sometimes up to 300% productivity

= > hunted individuals will reflect this population structure

Establishing Population Objectives

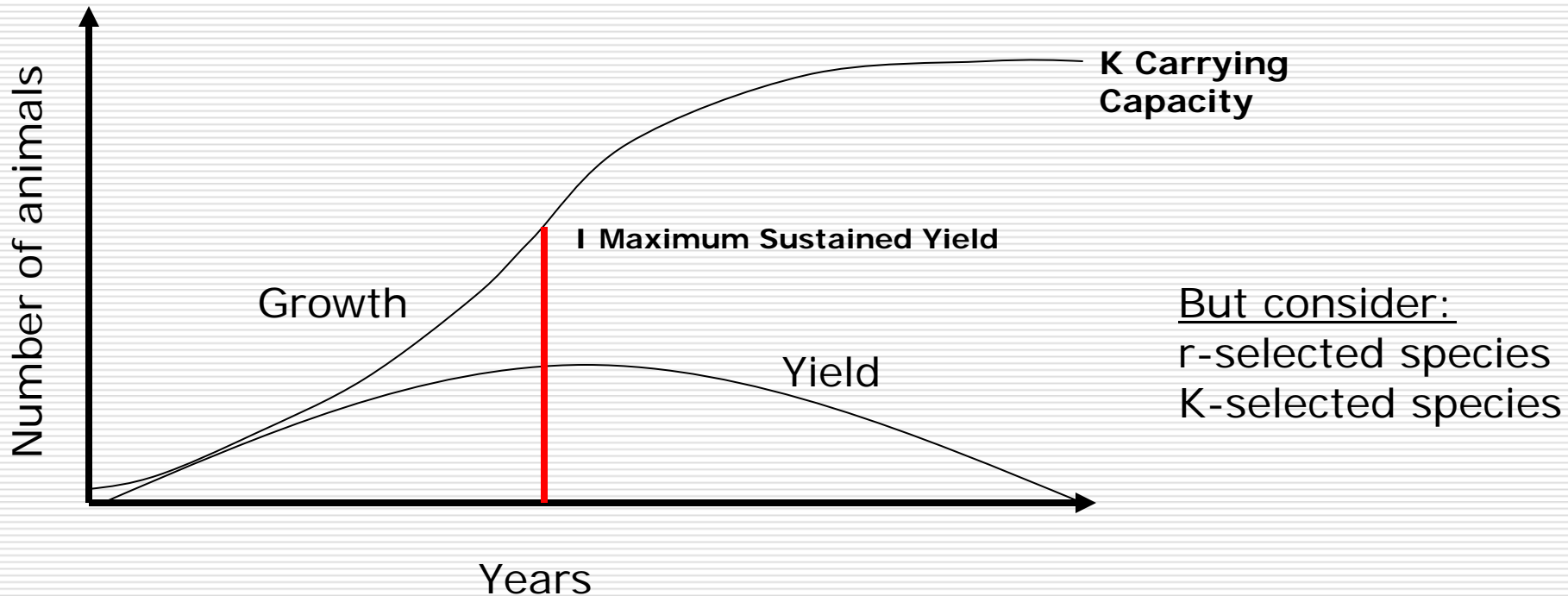
Biological Carrying Capacity (acceptable by habitat)

Sociological Carrying Capacity (acceptable to people)
(Cultural Carrying Capacity)

and how to express them ?

Establishing Population Objectives

Biological Carrying Capacity (BCC)



sensu McCullough (1979)

Establishing Population Objectives

Sociological Carrying Capacity (SCC)
(Cultural Carrying Capacity)

Maximum wildlife population level, acceptable to people

e.g. deer and agriculture, motorists, elk and ranchers

Expressing Population Objectives

Harvest objectives, e.g. adult buck harvest / km²

Population objectives, e.g. population size

Density objectives, e.g. animals/km²

Ideally, all of them to be applied and in the highest (statistical) quality possible

Hunter Attitudes and Preferences

“Wildlife Management is the interplay of wildlife populations, habitat and people” (Gilbert 1971)

- a push by lobby groups towards ‘the more the better’ ?!
- season length, special seasons, hunter density, trophy hunting
- benefits of staying within BCC and SCC

e.g. via SEACA (Development of substantial effective agreement on a course of action)

= > Facilitating conflict resolution involving hunters, nonhunters, protectionists, and the need for population management

Establishing Harvest Objectives

Objectives should be set for several years and for spatial and population units

MSY (Maximum Sustainable Yield) ?!:

requires identification and maintenance of a population level below BCC, usually at ~50% of K of a logistic growth curve.

In reality seldom realized, annual carrying capacity changes constantly.

Trophy Management ?!:

“MSY incompatible with Trophy Hunt” (Conolly 1981)

Antler point restrictions

Antlered-only hunt

Harvest Management Evaluation

Criteria used:

- harvest obtained
 - recreation provided
 - public acceptance
 - economic benefits
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Establishing Hunting Regulations (Methods and Means)

1. timing of season and opening date
 2. season length
 3. sex/age specific harvest designation
 4. bag/possession limits
 5. legal hunting devices
 6. access restrictions
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Regulatory Process

In-house and public process

Based on thorough analysis of data

Public must be exposed to management options before seasons are set

Public review and comment (Alaska)

-State: Fish and Wildlife Advisory Committees / Board of Game

-Federal: Regional Advisory Councils / Federal Subsistence Board
wildlife managers are present for comments and questions

Agency will review and finalize for final public decision

After approval, e.g. by a board, they will become law.

Strategic Planning

1. Determining status of the resource/population
(Where are you)
 2. Defining goals and objectives
(Where do you want to be)
 3. Establish management strategies to obtain objectives
(How do you get there)
 4. Determining how closely the applied management strategy achieved the resource/population objectives
(Did you get there)
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Harvest Management: Migratory Birds

Most hunting in North America is solely regulated by State, Provincial and Territorial Governments.

Migratory bird hunting is primarily regulated by federal governments

Migratory Bird Act:

1916 (Great Britain) Canada and U.S.

1936 U.S. and Mexico

1970s Russia and Japan

Lacey Act 1900

Annual Regulations

Early Season Regulations

Late Season Regulations

Harvest Management: Tribal and Native Hunts

Not for majority of hunters but can have a large effects in specific areas; can be highly political, too

Stocking of Game (Birds)

Has been widely done due to public popularity

Species: Pheasants, Bobwhites, Turkeys

States: VIRTUALLY EVERYWHERE (Canada and Mexico included)

Stocking of pen-reared animals is probably not an appropriate practice for harvest management.

PS. Oppositions exist as well for fish species and National Parks

Hunting Seasons and Bag Limits

Table 4. Components of hunting regulations for big game species and expected effects (modified from Strickland et al. 1994).

Regulation	Characteristics
Unlimited entry “general season”	Maximizes participation, reduces success, control of harvest is low
Limited entry “permit” seasons	Restricts participation, increases success, maximizes control of harvest
Common opening date	Disperses hunters across more area
September season	Rutting males more vulnerable, nonrutting species less vulnerable
Firearms season in October	Deer in rut more vulnerable, animals more vulnerable if concentrated on winter ranges
Long season	Allows more opportunity for harvest especially if weather conditions are favorable
Short season	Concentrates harvest and hunters, reduces differential vulnerability of gender/age in harvest
Weekend openings	More hunters participate on opening day
Weekday openings	May spread participation, decrease vulnerability
Either gender seasons	Increases harvest of younger males, encourages harvest of some females
Male only	Reduces survival of males, allows populations to respond to limiting factors other than hunting.
Antler/horn restrictions	Hunter numbers may decline, reduces survival of targeted males, may increase illegal kill
Legal firearm or bow	Maximizes opportunity
Primitive weapons	Reduces opportunity and participation
Archery	Lowest opportunity, may increase wounding loss

Adaptive management

Box 9. Features of adaptive harvest management for mallard populations in the United States.

Key components of adaptive harvest management (Johnson et al. 1993, Williams and Johnson 1995, Johnson 2001) include:

- 1) a set of alternative models describing population responses to harvest and uncontrolled environmental variation;
- 2) a measure of reliability (probability or “weight”) for each model;
- 3) a limited set of regulatory alternatives (season lengths, bag limits, and framework dates) that differ in their expected harvest rates; and
- 4) an objective function, or mathematical description of the objective(s) of harvest management.

These components are used in a stochastic optimization procedure to derive an optimal harvest policy, which is used to identify the appropriate regulatory alternative for population levels and probabilities associated with the alternative population models (Johnson et al. 1997). The setting of annual hunting regulations then involves a 4-step process:

- 1) each year, the optimal regulatory alternative is identified based on duck breeding populations and resource conditions, and on current model weights;
- 2) once the regulatory decision is made, model-specific predictions for subsequent breeding population size are calculated;
- 3) when monitoring data are available, model weights are updated based on how well the population size predicted by each alternative model agree with the observed population size; and
- 4) the new model weights are used to start a new iteration of the process.

Over time, this iterative process of updating model weights and optimizing regulatory choices should identify which model is the best predictor of changes in population size.

Shooting Preserves

Public access for hunting is limited by a lack of public land and declines as urban areas increased

Run as a club or as a business

Guide and dog sometimes provided

Management of Urban Wildlife

- done with public exposure
- municipal laws might apply
- close to property and humans

e.g. Canada Geese, White-tailed Deer, Moose, rabies...

Management of Endangered Species

Mandate for dealing with endangered species

Designation of Endangered Species

ESA (Endangered Species Act) and others

Implications

Recovery

Critical Habitat

Management of Endangered Populations

Permits

End of Session

Any Questions ?

