

4-H Shooting Sports

Hunting, Wildlife and Outdoor Skills Curriculum

Member Manual



Photo by Conrad Arnold

National 4-H Shooting Sports Committee

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Hunting and Outdoor Skills Member Manual

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Section 1. Introduction to Hunting

1. History of Hunting
2. Why We Hunt.
3. Hunting Ethics
4. Hunting Laws and Regulations
5. Hunter and Landowner Relations
6. Wildlife Management and the Hunter
7. Careers in Hunting, Shooting Sports and Wildlife Management

The History of Hunting

Understanding the prehistoric history of hunting and its history in North America provides insight into the development of hunting as we know it today. This understanding also provides support for the notion that hunters have always had an appreciation and respect for the animals they hunt, as well as a vested interest in the welfare of wildlife.

Early Humans as Hunter-gatherers

Early humans hunted because their survival depended upon success as a hunter. Some anthropologists even hypothesize that language developed because of its importance to early human hunters. Skill and success as a hunter often determined whether families and clans would have animal foods. Skins were used for both clothing and shelter as well as for other purposes. Bones, antlers and teeth were used for tools. Animal parts were used as decoration or symbols of authority and status. In some situations hunting skills were used by early man for protection from predators.

Development of Early Hunting Techniques

No one knows for sure how hunting got started among early humans. Anthropologists theorize that hunting of larger animals began with groups of humans driving large predators from their kills - a risky venture at best. Early humans gathered easily captured food items like insects, small reptiles and nestling birds. Simple tools, like twigs, small sticks, or even thorns or pieces of cordage were used to capture prey or force the prey from hiding places.

Humans are social animals, and early humans seem to have lived in clans or extended family groups. These groups demonstrated divisions of labor with some members foraging for easily captured animal foods and plant foods, while others hunted for larger prey. Readily available tools like sticks and stones were used in many cases. Even the terrain was used as a means of capturing and killing prey animals. Cliffs, water or natural corrals were used to gain advantage over animals that could be killed with relatively primitive tools. Using fire hardened poles to make jabbing or throwing spears likely developed fairly quickly, as did the use of flaked stone, like flint, chert and obsidian to make spear points and blades for stone axes. All of these tools required the hunter to be very close to the prey animal. Learning to throw spears and stones accurately was vital to taking larger and more dangerous game animals.

While brandishing, striking or throwing tools might have been adequate protection under some circumstances or for driving predators off their kills, these tools were extremely inefficient as hunting tools. Stone axes, stone-tipped or fire sharpened spears gave some advantage, but propelling devices for higher velocity and greater range were clearly advances. One of the first of these advances was the atlatl or spear throwing stick. This allowed a relatively light spear or javelin to be thrown with much greater force and from a much greater

distance than did throwing with the hands alone. A similar progression took place with leather or cordage slings used to throw stones with much greater force. Blowguns permitted the use of very small darts to take game animals at modest ranges.

The ultimate long range, high velocity hunting arm for early humans was the bow. Many styles and sizes of bows developed with great variation in the materials used. Arrows were similarly diverse. Some societies laminated their bows with sinew, horn, whale bone, or other materials to increase their cast. Bows changed in length, design and cast over time; but they lasted for many centuries as the premier hunting tool. Arrows changed in many characteristics, primarily in the types of points and fletching, but they remained functionally the same from prehistory to the 1400s.

Continued evolution of hunting tools resulted in the development of the crossbow with its heavier cast and shorter quarrels or bolts. These were followed rather quickly by matchlock, wheel lock and flintlock firearms. Flintlocks remained the dominant type of hunting tool for a couple of centuries before being replaced by the caplock which led rather quickly to the development of modern firearms. The time between innovations became progressively shorter and continuing changes in earlier technologies are still taking place as hunters try their skills at more challenging types of hunting tools today.

While the game hunted early in human prehistory was usually small or disadvantaged by terrain or conditions, humans used their developing hunting skills to harvest larger fauna such as ground sloths, mastodons, mammoths and other large game. Their use of natural land features and fire was also effective in harvesting large animals, often in extremely large numbers. Like most predators, however, humans were opportunistic and took many smaller animals.

Hunting skills developed in parallel with hunting tools. American Indians, for example, used many of today's hunting skills in their hunting. They were excellent stalkers and trackers, and they were adept at the use of camouflage, decoying and the use of calls. A wide variety of traps, including snares and deadfalls, were used to increase hunting efficiency.

Hunting in North America

Just as it was critical to native Americans, hunting was critical to the survival of early European settlers in North America. Game served as a primary food supply. Game animals provided clothing, as well as some types of shelter and other necessities. Europeans also hunted large predators or other animals that were a threat to their livestock or crops. The fur trade was also a significant source of income.

The first North American game law was written in New Amsterdam. It established the right of all people to hunt for their survival needs. Within a few generations,

habitat changes and continued subsistence hunting resulted in the depletion of game in the vicinity of towns, villages and settlements. Some pioneers moved westward to find richer hunting grounds. Residents of several colonies or states enacted closed seasons or other restrictions on some species to ensure their continued availability.

As the states became populated, market hunting developed into both a major business and a respected profession. With the development of the country, needs for specialized skills developed in the society. Shopkeepers, blacksmiths, doctors, wagon-makers and other craftsmen concentrated on their trades. While they may have enjoyed hunting as a personal activity, they could not afford to hunt for subsistence. One of the developing trades became market hunting. Market hunters provided a supply of wild game meat to the growing towns. These professional hunters specialized in their trade as well, making a living by hunting, trapping or otherwise providing meat.

Skilled specialists, market hunters were not restricted by bag limits or seasons in most cases. As a result, their unrestricted harvests were able to deplete game populations significantly. Those impacts were enhanced by habitat loss. One state that was nearly completely forested in colonial times had only 16 percent of its forests by 1850. With the loss of that forested habitat came the loss of most forest and forest edge wildlife.

Although today we know that market hunting led to over-exploitation of many species; market hunters provided a necessary service. Immense game herds and flocks seemed limitless, but as demand for meat and market hunting efficiency increased, populations began to suffer. Obvious declines or even extirpations of deer, bison, antelope and elk took place. Waterfowl and upland game birds, including the passenger pigeon, declined under continuous demand for game meat by the growing American population.

As these losses became obvious to modern hunters (non-commercial hunters), they developed a concern for the future of wildlife and began to work for change and improvement. As the end of the 19th century approached, sportsmen conservationists who recognized something was wrong began to call for controls on the harvest of game. They demanded that action be taken to conserve wildlife populations. In 1888 a group of sport hunters started the Boone and Crockett Club which led a crusade to protect the nation's troubled game herds. Their actions led to the development of national parks and wildlife refuges as well as regulation of harvests. By 1900, twenty-three states enacted laws that limited harvest.

The efforts of these early hunter/conservationists started a trend of caring for wildlife that continued into the 20th century. In 1900, the Lacey Act prohibited interstate shipment of illegally killed wildlife. This provided some federal help under the interstate commerce clause of the constitution to control market

hunting. A forester at the University of Wisconsin, Aldo Leopold, wrote the first wildlife management text in North America in 1933 and helped to formalize the emerging art and science of wildlife management. The Duck Stamp act of 1934, lobbied for by waterfowlers, provided funds from federal stamps to aid in waterfowl management and to permit purchase of lands for federal waterfowl refuges. Sportsmen lobbied for an additional excise tax on sporting arms and ammunition to provide aid to states for resident wildlife management. In 1937 the Pittman-Robertson Act was passed, taxing long guns and ammunition for this dedicated purpose. This legislation has perhaps had the greatest impact on wildlife research and management of any legislation ever passed.

Sport hunters and other conservationists continued to build organizations to address their concerns, significantly expanding conservation, restoration and enhancement efforts by state and federal agencies. Numerous private organizations developed on the heels of the Boone and Crockett Club. Dedicated organizations like Ducks Unlimited, Quail Unlimited, the Rocky Mountain Elk Foundation, the Pope and Young Club, the National Wild Turkey Federation, Pheasants Forever, Safari Club International and many others associated with gun dogs, hunting, outdoor sports, and conservation developed. Each of them contributed and continues to contribute to promotion of regulated hunting, high ethical standards and research and conservation of wildlife. Professional associations, like the Wildlife Society and the Hunter Education Association, as well as others related to wildlife and conservation developed. State and federal agencies charged with wildlife management also grew in numbers and quality. Primarily supported through licenses and fees, these agencies are responsible for all wildlife and wildlife habitat kept in trust for the citizens of the states and nation.

Economic Contributions of Hunting

Hunters provide the primary support for all wildlife management, game and non-game. License fees alone bring in approximately \$500 million each year. In addition, excise taxes on hunting arms and ammunition provide nearly \$200 million annually. Direct economic effects of hunting in the United States alone exceed \$14 billion annually. Indirect effects have been estimated conservatively at in excess of \$40 billion annually. Regulated hunting has become a bigger business, in terms of its economic effects in our country, than many blue chip corporations.

Recreational Impacts

Although hunting is a huge economic factor, that is not its only benefit. Hunting is a recreational activity. Its participants spend approximately 200 million person-days each year hunting. Many of them expand that time afield by training dogs, shooting, spending time afield observing or photographing wildlife, or scouting their favorite hunting areas for seasonal prospects. Although hunting involves the potential killing of wildlife, its participants are lovers of natural settings and the wildlife that good habitat provides.

Modern in Perspective

Hunting in North America has grown from a subsistence activity to a commercial activity to being a recreational activity that cannot be replaced for its dedicated participants. Hunters encourage development and protection of habitat for all kinds of wildlife and generate the economic power to manage and sustain wild lands. Hunting provides a sense of independence and oneness with nature and provides a renewal of the human role as a predator. As Aldo Leopold said, "Hunting provides a link to nature, a link to history, and an opportunity for ethical development without the presence of an audience or a referee".

Exhibit and Sharing Suggestions

1. Research the history of hunting in your area or the nation. Develop a report that documents major milestones in the nature of hunting and its importance to the area. Share your report with others in an appropriate setting.
2. Read Leopold's *A Sand County Almanac* and prepare an essay or book report on his orientation and appreciation of hunting for your group.
3. Prepare an illustrated talk on the evolution of hunting from subsistence and commercial hunting to regulated hunting.
4. Begin keeping a journal of your hunting experiences and observations, including your motivations and satisfactions.
5. Learn to make and use an ancient hunting tool. Demonstrate skills like flint knapping, arrow making, or others to your group or another interested audience.
6. Make a set of ancient hunting tools that can be used in a presentation to another group. Study methods of making the tools and their potential uses.

Why we hunt

Humans are part of the ecosystem. We have scavenged or hunted for food, shelter, clothing, tools, or protection since the beginning of human society. Until fairly recently some people hunted wildlife commercially, providing food, skins and furs to a public that needed them. Remnants of these market hunters remain among fur trappers today, but early in the 20th century market hunting was legally banned in the United States. Conflicts with the growing interest in sport or recreational hunting and over-exploitation of some wildlife resources were the reasons for that ban. From a legal standpoint, wildlife belongs to all members of the society and depleting wildlife resources for private gain was no longer accepted. Regulation of hunting was passed to state and federal agencies or even to international treaty. Although people still hunt for food, fur or hides, the main reason we hunt is for recreation.

When asked why they hunt, people share a wide variety of reasons. Most hunters use the meat, hides or fur of the animals they take. Although that is not truly subsistence hunting in most cases, enjoying the food, warmth or other uses of the animal products is a significant reason for hunting to nearly all hunters. Sometimes we hunt to reduce the number of certain species or to eliminate individuals causing specific problems. Varmint hunters harvesting coyotes, prairie dogs, or ground squirrels from agricultural land are hunting in that mode.

The most common reason for hunting is recreation. We hunt to enjoy nature, to feel a part of the natural world, to share time with companions, to be alone, to use our equipment, to enjoy working with dogs or horses, or to seek some personal challenge. Most hunters do not consciously hunt to manage wildlife, even though hunters are the tool of a wildlife manager. No hunter worthy of the name hunts merely to kill something. Hunting is the act of seeking specific wildlife, not simply killing. While the potential for a kill or harvest must be there for a true hunting experience, it is the act of hunting itself that provides the personal benefits. Killing is not recreational, nor is it to be taken lightly.

Although it may be difficult to define, recreation is one of the most powerful benefits of hunting. Recreation, as the structure of the word implies, is an action or activity that rebuilds physical, mental, and spiritual resources. It is not mere play, but a vitally important factor in the health and well-being of all people. For most hunters, the recreational value of hunting cannot be replaced with any other activity.

Hunting is important to wildlife management. Paul Ehrlich, a noted ecologist, once said that if bald eagles were good to eat or came readily to decoys, they would not have been endangered. He implied that having a group of dedicated people with a vested interest in a species provided some protection for that species and its environment. Far beyond their utility to the manager as a harvest tool, hunters have a significant impact on wildlife and environmental issues. They

speak for wildlife and wildlife management. They provide a powerful political support base for voiceless resources that cannot vote or pay taxes.

Hunters also provide economic support for wildlife. They pay special taxes on arms and ammunition to support wildlife and conservation education. License and permit fees form nearly all of the support for resource management programs. Hunters are also the most common supporters of non-game and conservation programs, even where they are not directly connected to hunting activities. Hunters are responsible for the development of the national wildlife refuge system and it was a group of hunters who devised the National Parks system.

Hunters also support many private organizations that work for wildlife and conservation. The list ranges from Safari Club International and the National Rifle Association to groups interested in specific species or groups of species.

Why do we hunt? We hunt because it is what we are. We hunt because we need the benefits it gives us. We hunt to eat. We hunt to protect crops and livestock. We hunt to rebuild our personal reserves, our spiritual strength and our mental health. We hunt because we enjoy it and it makes us better human beings.

Sharing and Exhibit Suggestions

1. Interview several hunters to see why they hunt. Summarize your findings and share them with your club.
2. Study the funding for wildlife management in the United States, looking at the contribution made by hunters to these programs. Make a poster or present a report to your club on what you have found.
3. Study the laws that provide the foundation for federal funding of fish and wildlife programs and the history of their enactment. Share your findings with your club.
4. Prepare a report on the benefits of hunting to those who participate in it. Document your points and share the information with your group.
6. Write your own reasons for hunting or wanting to hunt in your hunting journal. Keep the notes current and use them in discussions with non-hunters about why you hunt.

Hunter Ethics

Ethics is the field of philosophy concerned with right and wrong and the actions of individuals. Society at large or defined groups within the society may develop a code of ethics that defines what is proper, accepted or expected behavior. Societal or group norms or standards are further refined by personally defined codes of conduct. Ethics determine what we view as right and wrong and the way we act.

Hunting ethics are codes of hunter behavior and action. Some of these codes of conduct are generally agreed upon, while others may be regional or local norms. The core of hunting ethics, however, is personal. It is the way hunters behave when nobody is watching in a situation where they must make decisions without the assistance of a referee. Development of hunting ethics involves a complex interaction of socially and personally derived attitudes, skills, knowledge and experience. It is strongly tied to hunter development.

Understanding Ourselves as Hunters

To understand how personal ethics develop, it is important to understand what prompts us to hunt and what we enjoy about hunting. It is equally important to understand how these factors change as we get older, as we develop as hunters, as we get more hunting experience and as we spend more time in the hunting environment.

A model has been proposed and modified to help us discuss and understand hunter development based upon the motivations and satisfactions of hunters. It is important to understand several key points as you discuss these hunter stages.

- These stages of hunting are not good or bad and there is no set time required before going to another stage.
- Some people never go from one stage to another. They just stay at one stage.
- There may be other stages or sub-stages that fit some hunters.
- The speed at which a hunter goes from one stage to another does not reflect their “quality” or “level” as a hunter.
- The stage of a hunter may be different for different game species.

Shooter stage - The shooter's primary motivation and satisfaction is governed by the use of their equipment. Success is most often measured in the number of shots taken. During this stage it is important that the individual refrain from shooting at inappropriate targets like protected species or animals that do not offer high percentage killing shots.

Limit bagger - The limit bagger measures success by achieving the bag limits. Because numbers bagged is the key satisfaction, their measure of success may

cloud excellent days of hunting with failure to bag the prescribed number of game animals.

Trophy hunter- The trophy hunter pre-determines criteria for the game they will harvest. Trophy hunters personally define restrictions they place on themselves. Thus, the doe hunter who is looking for an older, dry doe as a quality meat animal is actually behaving as a trophy hunter. It is important that the trophy hunter not become so focused upon the quality of the trophy that they forget about other elements contributing to the quality of the hunt.

Method hunter - For the method hunter, the tools and techniques of the hunt are more important than the bag or the "quality" of the game taken. How game is taken is the primary measure of success. Generally the method hunter has a deeper commitment to the chase and has acquired specialized equipment and skills to permit pursuit of his or her favorite methods. Lack of tolerance for users of other methods may be a problem with some method hunters.

Aesthetic hunter - Aesthetic hunters, often called the "mellowing out stage," are motivated and satisfied primarily by the processes of hunting. Their satisfactions are based upon the total experience. Bagging game and specialization in technique or equipment is important, but all of these are secondary to appreciation for the total experience of hunting.

Defining Hunter Ethics

The nature of hunter ethics dictates that there are as many definitions as there are hunters defining it. When looking for a single characteristic that is essential to ethical hunting behavior, **respect** is the key element. Self-respect is the foundation upon which the respect for others and wildlife depends. Self-respect outlines the personal and internal reasons for ethical behavior. Respect for others includes respect for other hunters, respect for landowners, respect for non-hunters, and even respect for anti-hunters. Certainly, respect for the game we pursue is an ultimate concern

Respect dictates that the hunter makes every effort to maintain quality relationships with others and to permit them the benefit of the doubt and rights to their opinions and actions. It also demands that they show character traits like generosity, tolerance, understanding, patience and willingness to support their beliefs with actions.

Aldo Leopold, the father of modern wildlife management, noted that the ethical value of hunting could be either positive or negative depending upon whether the hunter abided by his or her convictions when the time to act upon them came. He noted that hunting had no referees or audiences, and that the ethical outcomes were almost entirely internal.

Respect for wildlife and habitat has resulted in development of "rules" for fair chase. These restrictions on hunter behavior modify the early hunter-gatherer into a modern licensed hunter. Today's regulated hunting (as opposed to subsistence or market hunting) still involves the harvest of wildlife for human use. It also includes development of skills and knowledge necessary to become a safe, responsible and effective hunter. These skills are varied and complex. Many of them are ancient survival skills. Others are restraints of the hunter-gatherer to avoid wounding or other problems. Respect for wildlife and habitat also includes involvement and commitment to issues relating to wildlife and habitat. Hunters were among the first conservationists, and they should be in leadership roles in conservation affairs today as well.

Hunter Responsibilities

Every hunter shares certain responsibilities. Among those is the responsibility to project a positive image of hunters and hunting. Like it or not, every hunter is a representative for all hunters and for hunting. Policing our ranks and helping each other become better is part of the hunter's role.

Times change and so does our language. The common meanings of words change over time ("cool", "gay", etc.). We are sometime resistant to change because it seems we are conceding to pressure groups or we are trying to be "politically correct". Some words or phrases however, can cause confusion or may provide fodder for those who want to attack our hunting heritage.

The term "sport-hunter" can be taken negatively. It is commonly used to mean we hunt as a sport or recreational activity – and not because we have to in order to survive. However, the term came about during the era of Theodore Roosevelt. Today, "sport" is seen as competitive and for the "thrill". Because we don't always have the opportunity to define the term when we use it, we should try to use "regulated hunting" when we want to differentiate from market or survival hunting.

"Trophy hunting" is a concept that can be misunderstood. It is important that we value ALL game we harvest, not just those with large antlers. We must always appreciate the table fare, the chase, the challenge of the natural elements, the exposure and interaction with the natural world, the camaraderie with fellow hunters and all the other aspects of the hunting experience. Too much emphasis placed on antler size or bag limits will lead to diminishing the most enjoyable aspects of hunting.

Among the responsibilities toward people are those toward other hunters. Respecting and abiding by all pertinent game laws is one of those responsibilities. Laws related to seasons, bag limits, shooting hours, equipment restrictions and so forth are designed to protect wildlife, protect people and provide for equitable sharing of wildlife resources. The behavior of hunters toward each other while afield is also part of that responsibility. Avoiding conflict

or interference with other hunters, honoring their right to hunt, teaching others about hunting or skills, and respecting them as people and fellow sportsmen is important. Using proper etiquette in field behavior is important. That includes behavior toward other hunters and even toward their dogs. Avoiding criticism of other hunters or will go a long way in maintaining a relationship with fellow hunters.

Responsibilities toward Landowners

Responsibilities toward landowners go well beyond leaving gates the way you found them. It starts with requesting permission to use any private land for hunting, regardless of whether it is posted or not. When asking permission to hunt, accept the decision of the landowner graciously and with thanks regardless of their decision. Work toward developing a personal relationship with the landowner, taking a real interest in their land and showing respect of them. Respect any restrictions they might place on your use of the land. If they do not voice any, ask if they have any restrictions they would like to place on your activity. Behave as an invited guest on the land, treating it as though it were land you were holding in trust. Leave things as you find them, but be sure to report any apparent problems if you notice them. If emergency actions are needed, offer to help - and mean it when you offer. Avoid causing any form of damage to equipment, fences, crops or livestock; and offer to make amends for any inadvertent damage you might do accidentally. Above all, watch the way you act and the things you say while a guest on the land.

Giving something back for the permission to hunt is often helpful to show your gratitude. Lending a hand with a project like mending fence or putting in a wildlife food plot is usually appreciated, even though most landowners will not ask you to help. Staying in touch with cards or emails during the off season is also helpful, as is sending a gift for a special occasion or a holiday. Offering to share game taken on the land is sometimes appreciated. When making the offer, be prepared to spend the time making the game table ready rather than offering an undressed and matted carcass. Skin or pluck the game, dress it and make it as appealing as possible. If the person is unsure how to cook the game, offer suggestions of ways you particularly enjoy. You may find a hunting companion as well as a host.

Responsibilities toward Non-hunters

The vast majority of people today are non-hunters. Their images of hunting and hunters are based upon their observations of hunter behavior. Hunters need to wear hunting clothing when they are actively hunting, and they may stop to eat, buy fuel or purchase other items during the day or on the way to or from the field. If they are well-groomed, courteous and careful with their language, they still present a good image: Association of hunting clothes with purchases of alcohol or with obnoxious behavior damage the image of all hunters. Watching our appearance and our behavior helps.

Apparent disrespect for game irritates many non-hunters. Bloody carcasses being displayed openly or loose talk about gruesome details of lost, wounded or even harvested game animals is completely out of place. Be aware of the fact that the person sitting next to you may not want to have the details of your field dressing as a side order with their lunch. Promote the positive values of hunting to your family and to you as a person without the details of kills, blood and gore.

Responsibilities toward Anti-hunters

The opinions held by hunters and anti-hunters tend to place us at odds by the nature of those views. In spite of that, hunters have responsibilities toward anti-hunters as well. The items mentioned above for non-hunters are important with anti-hunters as well. In addition, hunters need to respect the right of anti-hunters to hold the opinions they do about hunting, even while we disagree pointedly with those opinions. When involved in discussion with an anti-hunter about hunting, feel free to disagree, but avoid being disagreeable. Strive to understand the nature of their concerns and motivations and avoid antagonizing them. Do feel free to defend your own right to an opinion about hunting and to voice the positive things hunting does for you.

Respect for Wildlife and Habitat

Respect for wildlife and wildlife habitat involves several inter-related factors. While fair chase can be defined in many different ways, it amounts to regulating the actions of the hunter so the wildlife has an opportunity to escape or avoid the hunter. Fair chase may differ between hunting companions or in different parts of the country. One may feel that killing a gamebird on the ground or in a tree is not acceptable, while a companion may feel that any gamebird that is foolish enough to provide such a shot may be taken without prejudice. Some may feel that baiting of wildlife of any kind is taking unfair advantage of them, while others promote the use of bait stations to increase wildlife numbers or concentrate them for more effective harvest.

One of the greatest responsibilities of all hunters is maintaining adequate knowledge and skill to take game effectively and with a minimum of crippling or wounding loss. Shooting skills, identification skills, shot placement and shot selection skills, and the ability to track and recover wounded wildlife are important ones. Ancillary skills are also important. Hunters should know how to use calls, decoys, camouflage, water craft, and other equipment safely and effectively. They should continue to learn new skills and refine old ones for their entire hunting career. Hunters must know how to care for game in the field and in preparation for home use. Knowing about wildlife cookery is a bonus that might be appreciated at home.

Involvement and commitment to wildlife issues and the improvement of wildlife habitat is all, advanced responsibility. It is never too soon to participate, and today's hunter needs to gain back the high moral ground of our predecessors who led the conservation movement in the United States. Personal commitment

to local projects is a positive step. Involvement with other conservation issues and evidence of your standing as a hunter-conservationist is an excellent way to enhance hunter images.

Skills for Ethical Hunters

Hunting requires skills, and ethical hunting requires a commitment to developing and honing those skills. Among the skills required is a deep and intimate knowledge of wildlife. The ethical hunter must be able to identify wildlife species effectively, even under poor light conditions or while it is moving. Often this skill is related to regulations as well as ethical considerations. In addition to the ability to identify wildlife effectively, hunters must understand how the animals behave. That understanding increases hunter success makes evaluation of hits easier and aids in the recovery of wounded animals. Understanding the anatomy of game animals is a tremendous aid to proper Shot placement and making quick, clean kills.

Circumstances related to wounding and losing game are one of the greatest concerns about hunting by non-hunters. Hunter responsibility includes having the skills to recover wounded game animals and having the will to make every reasonable effort to do so. Game recover, including hit evaluation, tracking or trailing, and the use of trained dogs are learned skills that demand effort and experience.

Using trained dogs can make hunting more successful as well as more enjoyable. It is also ethical in that the dogs reduce losses of many types of game animals.

Game handling and use is an important element of ethical hunting. Many state and federal laws prohibit the wanton waste of game. Waste can come about by neglect, improper field care, failure to use good home care and preservation techniques or neglecting the carcass in the freezer until it is no longer fit for human consumption. Proper game handling is the key to high quality table fare. Game carcasses that are prepared for use so they resemble a form that might be purchased from a store is more likely to be used at home. This preparation is the hunter's responsibility.

Shooting skills are among the fundamental requirements of the hunter. Every hunter must practice to achieve a reasonable measure of marksmanship under field shooting conditions. They must also understand and stay within the limitations of their equipment and their skill with that equipment. Shooting beyond reasonable ranges (their personal limits or that of their equipment) marks hunters as tyros who have not learned to limit their shots to high percentage ones. This is observed as big game hunters taking shots beyond their skill level and by waterfowlers who seem to believe that they can hit anything they can see. This skybusting behavior tends to reduce their effectiveness and to irritate all responsible hunters in the vicinity.

Proper shot placement and careful shot selection are the keys to clean kills and minimizing wounding rates. Shots should be placed to inflict maximum damage on the vital areas of the animal while avoiding the potential for a wounding hit - one in a non-vital area or in an area that does not affect a quick kill. Generally, shots should be limited to the heart-lung area or the central nervous system on big game animals. Broadside or quartering shots maximize the area of those vital regions presented to the hunter and allow the greatest margin for error. Shots intended to cripple or "break down" an animal should never be considered! Proper shot selection means the hunter has the restraint to wait until an adequate shot is presented. Avoiding high risk shots and selecting, high probability shots is the mark of an accomplished and ethical hunter.

Interpersonal Skills

Although hunting is often a solitary activity or one conducted with a few close friends, the need for sound interpersonal skills is obvious. Every hunter projects an image to others that represents all hunters. Further, every hunter will have occasions to talk about their favorite activity either in its defense or to encourage others to become involved. Those who hunt on private land will also find abundant opportunity to use those skills effectively.

Hunter Image

Hunter image is the perception of hunters and hunting held by other people. It is a projection, positive or negative, of who and what we are. What others think about hunters and hunting is more important in the political environment than facts. If facts and the image are clearly and accurately linked, public opinion is accurate and valid. If they differ, a damaging public opinion may arise toward hunters and hunting.

Actions and words by hunters observed by non-hunters are key elements in the formation of that image. Slovenly, boorish, callous or insensitive behaviors are extremely harmful to the image of all hunters. Nine of the top 15 concerns about hunting by non-hunters related to wounding loss and suffering of crippled animals. Gory stories or laments about hit and lost animals reinforce those concerns and convince non-hunters that they are common circumstances and valid concerns. Dirty, bloody clothing, openly displayed carcasses, loud or foul language and obnoxious behaviors tend to reinforce the insensitive idiot image some groups would like to project for hunters.

Like behaviors that hurt the image of hunters and hunting, many behaviors exist that help that image. Actively share the positive values of hunting to people, including the benefits to families and the positive effect on mental and physical well-being. Program like Hunters for the Hungry promote hunters as caring for people less fortunate than themselves. Finally, involvement with youth programs

and the education and development of new hunters can result creating hunters with higher ethical standards.

Developing a Personal Code of Ethics

Hunting is unlike team sports where a referee watches for infractions of the rules or individual sports where judges sit on the sidelines and assess points or penalties. Hunting takes place individually without a referee or judge. It requires that the author of a personal ethical code be the arbiter and judge of the code as well. You are the only one that can build a personal code of hunting ethics. It should include the agreed upon and codified standards of hunters, but it should go beyond. It should capitalize on the benefits you derive from participating in regulated hunting - aesthetic, physical, mental, re-creative and tangible. It should flow from the experience and govern the nature of the experience.

The Relationship of Laws and Ethics

Law and ethics are related but not the same. Some hunting laws come from ethics. Laws against wanton waste of game stem from ethical demands that every effort be made to recover wounded game. Most hunters would agree that ethical hunting includes adhering to all wildlife laws. However, sometimes ethics and law conflict. For example, going after a wounded animal that crosses property lines may conflict with trespass laws. Such real situations cause an ethical dilemma. Exploring such dilemmas is valuable to ethical development. Young hunters need to explore their responses to dilemma situations and their reasons for their responses. The exposure to these different ways of looking at ethics helps hunters develop internalized ethical codes which is the true source of wildlife law.

SHARING AND EXHIBIT SUGGESTIONS

1. Discuss the elements included in your personal code of ethics.
2. Create one or more dilemmas that challenge young hunters in the development of their ethics. Share them with your family, leader or other interested persons. Lead a discussion on the dilemmas you have created.
3. Select a local conservation project and lead your group in completing it.
4. Write a short essay on what hunting means to you and share it with an appropriate audience, as an illustrated talk, or in some other forum.
5. Make a poster contrasting ethical and unethical behaviors or actions that enhance or detract from the image of hunters and share it with your group.
6. Research a wildlife or conservation group and share their principles, objectives and activities with your group.
7. Discuss why you hunt with a non-hunting friend.
8. Make a set of visual aids to assist in shot selection, shot placement or other ethical considerations and provide it to your leader for use in the program.

Hunting Laws and Regulations

Natural resources can be divided into "commons" and "proprietary" resources. Proprietary resources are those that can be owned or possessed individually. Commons resources are those that are owned by all members of society. The atmosphere, for example, is a commons resource. The gold in a mine is a proprietary resource. The European tradition was that wildlife belongs to the landowner. When North America was settled however, wildlife was designated as a commons resource. It could not be owned by anyone until it was reduced to legal possession. Until that time it was owned by everyone. Since what belongs to everyone belongs to no one, our society created governmental agencies responsible to everyone for the conservation (wise use) of wildlife.

States administer laws related to resident wildlife, the kinds of animals that spend most of their lives in a relatively limited area. Most mammals and gamebirds are resident wildlife. The federal government is responsible for managing migratory wildlife like marine mammals, waterfowl and many songbirds. Often, the actual management requires state and federal cooperation, as well as participation by individuals and non-governmental organizations. The right to pursue or take wildlife is governed by law. Both tradition and legal precedent support harvest of wildlife for food and fiber.

Types of Wildlife Laws

Wildlife laws can be classified in three groups. Some laws provide for the equitable sharing of resources. These would include season lengths and bag limits. Other wildlife laws are designed to protect the resource. These would include license requirements and harvest quotas. A third group of regulations is designed to protect human lives and property. These would include hunter orange regulations and hunter education requirements.

Laws That Provide Funding for Wildlife Management

Wildlife management is funded primarily by the hunting public. Pitman-Robertson funds are gained from special taxes on arms and ammunition. Sportsmen lobbied hard for that tax and the earmarked use of its revenues. Licenses, stamps and permits generate most of the money to support federal and state refuges, agency activities, and wildlife law enforcement. General tax levies are seldom used for these purposes. Check-off programs have been heavily supported by sportsmen even though they are often directed at wildlife that is not hunted.

Wildlife Legislation

Legislative actions are governed primarily by politics. Specific problems may create general laws. For example, declines in whale numbers may result in laws to protect all marine mammals, even though many species are not declining. Hunters need to understand how legislation is developed and to help their legislators understand the realities of hunting. Being well informed and actively

involved in wildlife conservation is necessary for the future of wildlife and hunting in America.

Exhibit and Sharing Suggestions

1. Trace the development of wildlife law in the United States (or in your state) from early settlement to modern times. Develop a poster that shows how the laws have changed over that time span, and share it with your group or another audience.
2. If possible, spend a few hours with a local conservation officer or game warden. Observe his or her responsibilities and actions. Interview them about their education and training needs and the reasons they became interested in this profession.

Hunter and Landowner Relationships

Private landowners control much of the wildlife habitat in the United States. Landowners are very important to both game animals and hunters.

Importance of Private Land

Management of forests, farms and ranch lands determines the quality and quantity of habitat available to wildlife. After climate and soils, the type of land management is the principle factor in determining the habitat types and locations on the landscape. Availability of escape, breeding, resting or loafing, and winter cover is a key to wildlife survival. Private land also provides many of the food and water sources required by wildlife. The location of private lands often coincides with the best soils (therefore the best potential habitat) and frequently includes critical wintering areas. Private lands also provide supplemental foods through agricultural waste.

Landowners are the key people in selection of the management options that will be applied to the land. They may elect to favor wildlife and agriculture or forestry, intensive agriculture or forest management, or even development of housing, malls or other human structures on the land they control. Keeping the land in active production for wildlife and crops, livestock or trees is often a matter of landowner resistance to placing the land in "non-productive" but lucrative uses. Landowners are the primary wildlife managers on their land. They decide how much forage will be used by livestock and how much will be left for wildlife. They decide which windmills are shut off when livestock are not using them and which are left on to provide water for wildlife. They decide whether to leave or eliminate escape cover, whether or not to plow crop residues under in the fall, and many other choices that impact wildlife.

Landowners decide their level of cooperation with agencies and private organizations. They can adopt conservation practices, accept limitations of wetland development or other activities, or elect to maximize production of a crop or livestock species. They control access to their lands, and therefore control to some degree the level of harvest on that land. They also advise wildlife officials of possible poaching or other illegal activities that have an impact on wildlife. Landowner cooperation and action is often the key to creation of quality habitat and successful management plans. Sportsmen must recognize the importance of private landowners.

Incentives for Managing for Wildlife

Most landowners look at wildlife as something desirable on their land. Other landowners see wildlife as a source of competition for forage or crop damage. To some landowners wildlife is an attractive nuisance, bringing hunters who might cause them problems or interruption. However, many landowners appreciate wildlife and promote wildlife on their lands. Their motivations may be complex and interactive.

Profit motivation is significant for some landowners. They may charge access fees on a seasonal or daily basis. Some landowners guide hunters on their land or provide facilities or camp for hunting parties.

Tax incentives or other governmental programs may also provide an incentive for wildlife management. Some states offer payments, tax credits or deductions for wildlife management practices or allowing hunter access. Wildlife habitat programs may provide benefits. Several programs, both governmental and through private organizations, provide for cooperative development of wildlife habitat. Programs like the Conservation Reserve Program (CRP) meet multiple objectives such as reduction in erosion and pollution of waterways, reduction of crop surpluses, and provision of quality wildlife habitat.

Personal interest and a sense of social responsibility are probably the greatest reasons for private land wildlife management. The traditions of seeing and interacting with wildlife on the land may cause multiple generation landowners to promote the kinds of wildlife that their parents or grandparents did. A personal interest in hunting for both recreation and food is often a motivating factor.

Personal pride in producing wildlife on their land is a common incentive for many land managers. Some landowners enjoy the interaction with hunters, particularly those with whom they have developed a friendship. Still others maintain wildlife on their lands out of a sense of stewardship for a resource that happens to be in their charge. Some may even view their wildlife populations as environmental monitors, helping them assess the health of their lands.

Why Landowners Grant or Deny Hunting Permission

Landowners have both a right and a vested interest in knowing who is on their land for any purpose. Many landowners readily grant access to their lands to hunters who seem responsible and respectful. They may grant access as a gesture of good will to hunters with whom they interact in other settings. Often they grant trespass rights to unknown persons who show a sense of responsibility and training and who make their contacts early and introduce themselves positively. They may grant permission to a hunter who shows concern about their land and livestock. Hunters who show a willingness to lend a hand where it is needed are often granted permission as well. Permission is often linked to the impression left by the prospective hunter on the landowner.

The reasons for denying hunting access are a bit more complex. There may be concerns about protecting crops or livestock from damage or disturbance. Hunting or allowing dogs to hunt in standing grain or seed crops can be extremely damaging and reduce yields significantly. Some landowners may have had negative experiences with hunters such as driving their vehicles across fields softened by rain. They may fear careless shooting around livestock, harassment of livestock or even the loss of livestock either by shooting or failure to leave gates as they were found.

Disruption of farming activities is sometimes the reason for denying access. This may come about because the hunting activity would interfere with normal farming or ranching operations or because an insensitive hunter broke into a busy landowner's schedule to push for permission to hunt. Creation of additional work is also a reason to deny access. Failure to leave things as they were found or to report problems that were observed can result in denial of hunting access. Gates that are closed when they should be open or left open when they should be closed can result in greatly increased workloads. Damage to fences and gates creates work for the landowner and can cause loss of stock or crops as well as the fence damage. Damage to equipment, either accidental or deliberate can result in loss of access for all hunters after such an incident.

Safety and behavioral concerns may also result in denial of hunting access. Irresponsible or unsafe shooting or gun handling is a sure way to close lands to all hunters. Violation of safety zones or specific restrictions or directions from the landowner are grounds for denying future access. Rowdy or irresponsible behavior, including loud, foul or abusive language will result in denial of access most of the time. Bringing along unauthorized persons or the appearance of friends of friends tends to make the landowner wary or angry at being misled. Driving or camping in areas where permission was not granted or showing disrespect for the landowner or his/her family, pets, livestock or the landscape (like littering) is a sure way to sour access hopes for all those who follow. Denial of access is often based upon past personal experience or reports from neighbors.

Management for personal hunting may be a landowner's reason for denying access. Perhaps only family members hunt, or the landowner allows hunting only by invited guests and personal friends. Hunting may be used as an income source, where exclusive lease rights have been granted or the landowner acts as a guide or outfitter for hunting parties.

Simple uneasiness about having strangers on the land may lead some landowners to deny hunting access. The landowner may be a very private person who enjoys their privacy and does not want it disturbed. That may be a stated reason that hides a major concern over potential liability risks involved if a hunter is injured on the land and decides to litigate.

Regardless of their reasons, landowners have the right to permit or to deny access to their lands by hunters. Potential hunters must respect that right and the persons who exercise them, without bias toward the response received when seeking access permission.

Obtaining Permission to Hunt on Private Land

Hunters can do many things to increase their chances of success when seeking permission to hunt on private land. If at all possible, visit the area and make initial contacts with landowners well before the hunting season, carefully avoiding very

busy times or seasons for the landowner. Early contact sets you apart from other hunters and may impress the landowner with your seriousness and responsibility. Dress neatly and casually for your visit with the landowner. Your appearance impacts his or her perception of you a great deal. Be particularly careful to avoid dressing in camouflage clothing, face paint or other features that may make you appear a bit odd. Leave guns, bows, dogs and other hunting equipment at home for pre-season visits or at least leave them in your vehicle. If you will be hunting with kids or companions, take them along to meet the landowner; but keep the group size minimal.

Courtesy is vital in gaining permission to hunt as it is in all walks of life. Use regionally acceptable forms of address, including "sir" or "ma'am" when speaking to the landowner and his/her family. Greet the landowner warmly and introduce yourself in a positive way. Let him/her know who you are; where you live, what you do (if that helps to establish credibility), and offer a card with your name, address and telephone number on it. Comment on the good qualities you have observed on the land, and let the landowner know that you are seeking permission to hunt, and continue by letting him/her know that you are a responsible, well prepared and trained hunter who will respect both the property and the landowner's wishes. Look the landowner in the eye and let him/her know that you are sincere; but do not overdo it or you may come off looking like a phony. Be specific with the types of hunting, names of companions (like your child), and times you plan to hunt. Volunteer to phone ahead of the hunt date to confirm your being able to hunt.

Whether permission is granted or not, thank the landowner graciously and wish him/her a good day. Even if access is denied this time, the goodwill you generate will instill a favorable impression of you and other hunters. That good will and positive attitude may open the doors of that property at a later date. Even if the landowner is not polite or friendly, maintain a respectful attitude and courteous manner at all times. If permission is granted, record the landowner's name, address and telephone number in a notebook so you can contact them later. If written permission slips are required in your state, have those available if possible to avoid bothering the landowner later.

A few helpful hints might be useful in gaining access to land for hunting. If you are using any special hunting methods, like bowhunting or muzzleloader hunting or you use well-trained dogs, let the landowner know about those methods. Keep first-time groups small. Two is a good number for a first visit. Leave your guns and other gear at home or out of sight when seeking hunting permission. Leave any dogs in the vehicle and under control. Pet any friendly dogs that may approach you on the farmstead. Be sincere, open and genuine in your comments and behavior. Landowners, like other people, like honesty and sincerity. They do not like people who appear to be putting up a front or pretending they are something they are not. Finally, make a point of outlining obvious restrictions, and ask about any additional ones that you cannot see from a casual look at the

property. Let the landowner know that you consider hunting on their land a privilege and that you are sensitive to their wishes and needs. This includes asking where you should park your vehicle to keep it out of the way of farm or ranch operations.

Hunter Responsibilities on Private Land

Receiving permission to hunt on private land carries a set of responsibilities with it. Safety both around the vehicles and in the field is of paramount importance. Adhering to strict rules of sportsmanship is also critical. Hunters should maintain friendly courtesy and respectful attitudes, and they should avoid rowdiness, including loud, foul or abusive language. Make sure that you initiate any questions about extra restrictions and that you abide by those restrictions when afield. Drive your vehicle only where permitted, and park in designated areas or where access is not restricted. Leave gates as you found them, and report any problems you have observed while afield. Avoid disturbing livestock, and stay out of crops that could be damaged, keeping dogs out of them as well. Pick up your litter, including spent shells, and any other trash or litter you find. Leave the area looking better than it was when you arrived. Make sure that you get specific permission before bringing anyone else on the land, and be very careful not to over-extend your permission to be there.

Show your respect for the landowner in your behavior. Try not to impose upon him/her with additional things like asking for water, permission to cut firewood or towing help for a vehicle problem. Offer to share bagged game with the landowner, and select good specimens that have been dressed properly for that sharing. Always stop to thank the landowner when your hunt is over if possible. If not, call or drop a note to the landowner expressing your thanks. Ask if you can help with off-season chores, like mending fences or other activities where an extra set of hands will be useful. Even if your help is declined, stop by and say hello during the off-season if possible. Treat the landowner as a respected friend, sharing Christmas cards or gifts with him/her at appropriate times. All of these things help you to maintain communication over the year and to let the landowner know that your respect and thanks is genuine.

Exhibit and Sharing Suggestions

1. Prepare a skit or demonstration on asking landowners for permission to hunt and share it in an appropriate forum.
2. Develop a hunter's code of conduct that you can use as a one-way contract with landowners who give you permission to hunt or have other outdoor activities on their land.
3. Create a form for written permission to hunt on private land. Include the important information such as hunter behavior, the types of activity and seasons where they are permitted. Share your product with others interested in using private lands.

4. Locate landowners who are willing to permit hunting by permission and offer to post their lands or access points with "Hunting by Permission" or "Hunting by Written Permission Only" signs as a club project.
5. Interview several landowners about their attitudes toward public hunting on their land. Determine the reasons they give for permitting or denying access to hunters who approach them. Share your findings with the members of your group or another appropriate forum.
6. Develop a set of news releases or articles that can be used by local outdoor editors or other media to inform hunters about the importance of safe and responsible behavior in keeping land open for hunting and enhancing the image of hunters in your community.

Wildlife Management and the Hunter

What is Wildlife Management?

Aldo Leopold, the first professor of wildlife management in the United States, defined Wildlife Management in his early texts as "wise use without waste." We will define wildlife management as "the art and science of manipulating wildlife populations and their habitats to achieve societal goals." The inclusion of "societal" shows recognition that wildlife management is often primarily people management.

Wildlife can be defined in a lot of different ways. Some people include only game animals in their definition. Others include all mammals and birds. Most wildlife professionals include all non-domestic animals. Some even include feral animals like feral horses, burros, goats, sheep or swine, as well as exotic wildlife species introduced into the wild.

Wildlife can be subdivided in many ways. Often these subdivisions are based on the perceptions or uses of the wildlife. Terms like big game, small game, waterfowl, upland birds and non-game wildlife are used to identify a smaller group of animals.

Some Basic Wildlife Management Concepts

Wildlife management is both an applied science and an art. Its fundamental principles are applications of basic ecology, the study of animals "at home." These applications are concerned with the basic needs of animals and animal populations and with the ways animals and habitats interact. These concerns include reproduction and recruitment (the entry of young animals into the population). They also include mortality and population turn-over rates.

Carrying Capacity

A piece of land can support only so many animals on a continuous basis. This basic concept of wildlife management may be most important as wildlife managers set population and habitat objectives. Managing population levels to stay within carrying capacity and managing habitat to maintain or increase carrying capacity underlies most wildlife management decisions.

There are several factors to remember when considering carrying capacity:

- (1) Carrying capacity changes with the seasons. Summer carrying capacity is usually higher than winter carrying capacity.
- (2) Manage for extremes when considering carrying capacity. Habitat will have a higher carrying capacity in a mild winter than during a severe winter.
- (3) Exceeding carrying capacity will have a multiplying effect. If too many animals over-browse and kill shrubs, that same range will support fewer animals than it could have supported before over-browsing.

- (4) One species can affect the carrying capacity of another species. Heavy elk use of an area may increase the browse line to a height deer cannot reach.
- (5) Factors limiting carrying capacity may change from year to year. Snow depth, drought, cover and food are examples that might establish carrying capacity one year but not the next.

Limiting Factors

All living things cope with limiting factors. These are the factors which at any given time prevent a wildlife population from increasing and set the carrying capacity. Understanding the factors which limit the increase of a wildlife population will help identify management actions that will make a difference. It is important to remember there is rarely one factor by itself that limits the size of a wildlife population. Normally, several interacting factors affect population size. For example, coyote predation may appear to be a limiting factor preventing a white-tailed deer herd from expanding. However, if a drought, fire or some other factor has eliminated cover, fawns will be easier for coyotes to find.

Population Dynamics

Many wildlife populations have natural fluctuations we call population cycles. Some of these are short term and some are long-term fluctuations. Some are subtle and some are extreme natural fluctuations.

Many wildlife populations will naturally follow an “increase until crash” population fluctuation. In these populations, the numbers climb steadily until some factor such as food shortage causes the population to abruptly drop or crash. Surviving individuals have an ample food supply, so they are healthy and maximize production of offspring, and the population numbers climb rapidly. Eventually, a level is reached where a limiting factor causes the population to crash and the cycle continues. Wildlife managers try to reduce the impact of this boom and bust cycle. One objective of wildlife management is often to keep the population low enough through hunting so the crash level is not reached. Not only does this prevent death and suffering of the species involved, it prevents habitat degradation and waste of a resource.

Some factors that drive population cycles are density dependent. This means when the habitat is densely populated, a density-dependent factor will kick in. Contagious disease is an easily understood density dependent factor. When coyote populations are low, the few that have mange are less likely to interact with and infect other coyotes with the mite that causes mange. When populations are high, the likelihood of one coyote interacting with others is high and the incidence and mortality from mange increases.

Causes of some cyclic fluctuations are poorly understood. Ruffed grouse, snowshoe hares and cottontail rabbits have populations which increase and decrease for no apparent reason. Some theories use sunspots, ozone and randomness as factors to explain these wildlife population fluctuations.

Habitat Needs

Traditionally we have looked at food, water, cover and space as being the components of habitat that determine suitability for wildlife. Other factors such as disturbance or arrangement of the habitat, may enhance or reduce the value of the habitat.

Food is one of the major requirements of all animals. Since animals cannot capture the energy of sunlight directly, they must get their energy from plants or from animals which eat the plants. Each animal is adapted to use a specific type of food or foods. The availability and quality of the food available is a major element in controlling populations. These needs can be extremely specific. Browsing animals, for example, may not be able to survive on a diet of grasses, even when those grasses are abundant. They need higher quality food sources, like forbs or succulent shoots on bushes. Since food is required essentially all the time, its availability is an important limiting factor to wildlife. If food is abundant for most of the year but lacking in a critical time period, the animals may starve unless they have some way to survive during that time period. Some species may hibernate, aestivate or migrate to avoid food shortages. Others are adapted to store fats for periods of low food availability.

Water is critical to all living things. Some animals get all the water they need from their food or by utilizing dew. Others must drink on a daily basis. If water is limiting, having an abundance of food or other requirements is not enough to allow the species to survive. All requirements must be met within the range of the animal for it to survive.

Cover is a broad term applied to the types of environments required to support the animal or population. Several types of cover can be identified. Breeding, nesting or brood rearing cover is used during the period when animals are nesting or taking care of dependent young. Some animals require secure areas to rest or loaf. This is not laziness, but conservation of energy for more important uses. It may be a shaded area in the southwestern deserts or shelter from bitter winter winds in the far north. It is critical to survival. Feeding cover permits the animals to gather their food effectively and with some protection from predators. Escape cover provides refuges from people or predators. All of these types are included in the general term "cover." It is critical that cover types be matched to the needs of wildlife if the populations are going to thrive.

Space or the arrangement or pattern of habitat components is also a vital concern. The size, interspersion, proximity and accessibility of various types of cover patches or resources is a critical element in assessing the quality of habitat for a given species or group of species. Mountain lions, for example, are very unlikely to occur in packs or herds because their behavior and hunting success requires relatively large amounts of space. A pheasant, on the other hand can do quite well on a few acres of good cover and food.

The “Balance” of Nature

Although people commonly refer to the balance of nature and view it as a static entity, natural systems are constantly changing. That results in a dynamic equilibrium where constant changes counterbalance one another to give the impression of a steady state. If, for example, an area can support six cottontail rabbits, an observer might see six rabbits and think that is the constant population. However, it is likely hundreds of rabbits have been born, bred and died to maintain that apparently static situation.

Landscape Considerations

Whether we are considering public land or private land we must look at a large area of landscape. What one land manager does to manage wildlife will affect neighbors both near and far. For example, prohibitions on hunting, which allow overpopulation to occur, will affect habitat over the entire range of the herds. A lack of winter habitat for migratory populations will affect population potential in summering areas.

Effective wildlife managers must look beyond their land boundaries. When making habitat management decisions, managers must consider what is and is not available elsewhere. Harvest objectives are difficult to achieve when immigration and emigration nullify harvest strategies. The most effective population and habitat strategies are done in cooperation with neighbors. It is worth the effort to communicate with neighbors to be sure wildlife management objectives on adjacent lands are not at cross-purposes.

Population vs Individual Management

An important concept of wildlife management is that our objectives should be directed toward benefits to the population, even at the expense of individuals. Whenever a decision is made or an unpleasant event is observed, wildlife managers must react based on population effects. As unpleasant as deer mortality caused by a train might be, as long as the population effect is acceptable, we would not attempt to eliminate the railroad. Although harvest of pheasant hens is seldom legal or desirable, a hunter occasionally harvesting a hen by accident is not justification to outlaw hunting. As obvious as some of the examples may seem to be, some segments of the public often pressure managers to make wildlife management decisions based on individual rather than population effects.

Wildlife Management Options

Population Management

Managers have several options for managing wildlife. Letting nature take its course is a management option, but one that has little support among wildlife professionals and the general public. It generally involves removing human

beings from the management equation and attempting to maintain functional systems without using any management tools.

Manipulating populations is a second option. It is based on the notion that reproduction exceeds replacement needs, leaving a harvestable surplus. Since only a small portion of the young produced each year can be recruited into the breeding population and the carrying capacity of the land generally reaches a peak during the rearing season, surplus animals that would be forced to emigrate or die may be taken under a regulated harvest to allow people to use some of the over production for their own purposes. Muskrats have the capability of increasing their populations by a factor of 18 while deer have the capacity to double their populations each year if no mortality occurs. Harvesting some of those species for human uses puts their collected energy to use for people. Regulating that harvest allows the population to maintain its productivity.

Reduction in population size takes place in many ways. Predation, starvation, parasites, diseases, natural catastrophes, accidents and intra-species fighting are all common mortality factors. Hunting and trapping are human predation. This has been a natural mortality factor since humans became hunter-gatherers. Human predation changes the type, not the nature of predation. The only major difference is that humans tend to place limitations on their predation in the form of laws or ethical restraints. In many cases, all the mortality factors that are proportional to or dependent upon population size interact to maintain a fairly constant total mortality rate. This is known as compensatory mortality. In other cases, the population responds to higher loss rates by increasing its productivity - compensatory natality. In both cases, the populations remain at or near carrying capacity (biological or sociological) while allowing the use of a surplus population for other purposes.

The primary tools of the wildlife manager in working with population management are related to the control of harvest rates. These include the restriction of seasons, bag limits, types of equipment or restriction of the total take through the issuance of tags. Complex models that show the relationship between the probability of taking an animal and the numbers of tags issued may result in more tags being issued than there are individuals in a population.

Although predator control programs (like bounties) are seldom cost effective, under some circumstances predator management could be a valuable tool to recovery or enhancement of a wildlife population.

Habitat Management

Manipulating habitat is a more comprehensive means of managing wildlife. Most of the time, the objective in habitat alterations is to increase the population size, but decreasing habitat quality can reduce populations as well. Since habitat requirements are specific to each species or cluster of species sharing a habitat type, changing the arrangement of habitat components or the structure of the

habitat or addressing the limiting factors for wildlife can modify the populations on a given site.

Habitat succession is the tendency of vegetation to move from one stage to a more advanced stage. Forests that emerge after a major fire start out as annual plants. They then advance through stages of grasses, shrubs, small sun-loving trees and finally, the “climax” stage of an old growth forest. This is habitat “succession”. Grasslands also go through succession advancing from early annual grasses and forbs to bunch grasses at the later climax stage.

Many game species prefer early or mid-succession habitats. Setting back plant succession is a common tool of habitat managers. Fire or mechanical disturbance like disking or bulldozing an area can be used successfully to return an area to an earlier successional stage. Logging, farming or ranching can provide wildlife benefits by establishing early succession stages.

Habitat management may include prescriptive changes in the habitat to increase carrying capacity for a particular wildlife species. Planting cover or food plots, providing guzzlers for water in dry regions, constructing shallow impoundments or using fire or mechanical means to increase the forb production while opening up the ground cover are all ways to address limiting factors.

Where limiting factors are difficult to identify or the capability of the area to produce abundant wildlife is limited, attempting to address a subtle limiting factor may not be cost effective.

Hunters Can Help

There is much more to wildlife management than can be covered here! The purpose of this section is to show you how hunting and your support of scientific wildlife management can have huge effects on wildlife populations. You can help be a wildlife manager by focusing your hunting efforts on species, age classes, gender and locations that need population management. You can encourage others to support scientific wildlife habitat management. Let your local wildlife biologists know you are available to work on projects or be a voice to generate encouragement to actively manage wildlife habitat and populations.

Sharing and Exhibit Suggestions

1. Explore and report on other 4-H Projects which can further develop your knowledge about Wildlife Management. Especially discuss the Wildlife Habitat and Evaluation Project (WHEP). Forestry and Range Projects will also be of interest.
2. Meet with a wildlife professional and discuss his or her training, motivations and reasons for selecting their profession. Report on your discussions to your group.
3. Write a report on the course work required to become a wildlife biologist.

4. Research management techniques for a species of interest and report those techniques to members of your group or some 'other appropriate group.
5. Study a wildlife management organization and its objectives, returning that information to your group.
6. Study the biology and needs of a selected species. Suggest ways that a local site could be improved to increase populations of that species.
7. Do something related to wildlife management that inspires you. Report it to your group or another group of interest.

Careers in Hunting and Wildlife Management

Adults spend the largest part of their lives working. Those who enjoy their work are happier, more productive and have lower stress levels than those who are working at jobs or careers they dislike. Young people enrolled in this project area have already shown an interest in the field, even though it may be more appropriate as a hobby than as a career. This lesson is designed to assist participants with career and vocational choices.

Career selection is a complex process but several elements can be identified easily. Personal likes and dislikes, as well as personal abilities are important factors in career choice. Exposure to a variety of positions and employment situations as well as deeper exploration of the nature of those positions is also important. This lesson promotes the idea that career selection is a matter of personal choice and personal decision making. While the focus of the lesson is on shooting and conservation careers, the model is applicable to other types of career exploration as well.

Identifying Skills, Likes and Dislikes

The identification of a short list of things the participants like to do or that are important to them addresses the notion that "that man is happiest whose work most closely approximates his leisure." The enjoyment of working is important to both health and success. Rating the activities will begin to clarify the type of values placed upon them by the individual. They will be meshed later with other characteristics to aid the person in thinking about the value of that career choice for them. Skills that they have or are likely to be able to develop also apply here. The nature, of the person, whether they prefer to be alone, independent or in a group with other people, as well as their willingness to learn are important parts of the decision process.

For many people, turning leisure interests into a vocation is not advisable. Some of the positive aspects are outlined above, but negatives also exist. The avocation may provide very few potential opportunities for career development. Preferences may change over time. Finally, when a hobby becomes a vocation, it takes on a different nature with added pressure and often with less enjoyment. Market pressures also may keep the number of viable career openings very low in these areas.

Shopping for Employment

Very few young people, or even adults, are aware of the vast array of possible careers related to shooting sports and wildlife conservation. Young people are encouraged to become well-informed "consumers" of possible careers, exploring them and their requirements before electing a field to pursue. An abbreviated list of possible career areas is listed here for your reference.

Self-employment Careers

outfitter	guide	gun club owner/manager/caretaker
game breeder	taxidermist	ranch or farm manager
hunting lodge operator	shooting preserve operator	trapper
dog breeder/trainer	decoy carver	engraver
outdoor artist	gunsmith	retail sales (sporting goods store)
freelance writer	freelance photographer	game processor
shooting instructor/coach	stock maker	engraver

Industry

firearms manufacturer	manufacturer's representative	wholesale sales
chemical engineer	designer/draftsman	development, manufacture and sales of:
ballistic engineer	machinist	knives
mechanical engineer	secretary	clothing and footwear
metallurgist	shipping	game calls
accountant	gunsmith	first aid and survival equipment

advertising
retail sales

professional shooter
office management

camping equipment
optical equipment
firearms
other hunting or outdoor
products

Physical Education/Therapy

coach
sports psychologist

athletic trainer
sports administrator

sports medicine physician
physical therapist

Sports Media

sporting press
author
editor
publisher
sound production

photographer
advertising
sports radio/television
script writer
sports personality

cinematographer
director
producer
editor
public relations

Wildlife-related Careers

wildlife biologist
wildlife technician
wildlife administration
wildlife science/research
zookeeper or curator
museum curator
information/education specialist
geneticist
animal behaviorist

wildlife management consultant
conservation education
wildlife veterinarian
forensic pathologist
animal damage control biologist
animal damage control officer
biology teacher
physiologist
wildlife economist

wildlife pathology
wildlife veterinarian
public health pathologist
naturalist
statistician
extension wildlife biologist
extension agent
ecologist
wildlife sociologist

Law Enforcement and Military

conservation law enforcement
security guard

security system provider

military careers (including shooting
teams)

Citizen Organizations

Local, state, national or international
wildlife, conservation, hunting,
shooting organizations such as:
National Rifle Association
National Skeet Shooting Assoc.
National Sporting Clays Assoc.
Amateur Trapshooting Association
U.S. Shooting Team
Rocky Mountain Elk Foundation
National Wild Turkey Federation
Ducks Unlimited
Boone and Crockett Club
Pope and Young Club
Quail Unlimited,
Pheasants Forever
Ruffed Grouse Society
Bighorn Sheep Society
Pheasants Forever,
Izaak Walton League

fund raisers
fiscal officers
lobbyists
educators

program developers
biologists
youth program staff
competitions coordinator
coach or instructor trainer
staff biologists
writer
advertising coordinator
editor
auditor
investment advisor

A careful review of this list will reveal many other careers or jobs that are related to the ones listed here. The shooting and conservation industries are huge, with a vast number of potential opportunities for young people.

Outdoor careers tend to focus on people, information, production of material goods, wildlife and habitat, or a strong combination of many of these areas. Many times the true nature of the career is quite different from the image of that career. It is vitally important that a young person considering a given career understands the nature of the tasks and relationships involved. Interviewing a person in a career, having a guest speaker or visiting a person on the job can be extremely revealing to participants and leader alike.

Finding Out More...

While the direct, personal approach to discovering the realities of a position is among the best available, many other sources can be used to find out more about a possible career. Some careers are well-documented in written materials. Others have their background requirements so well prepared that the nature of the position can be determined from the requirements. For example, love of hunting or fishing has little to do with becoming a wildlife biologist; but ability to handle mathematics and science as well as human relations is critical. If the love of the hunting sports is also present, that makes it even better.

Direct observations through field trips, site visits or career day activities can be extremely valuable. Consultation with presenters at wildlife camps or similar programs can also be very helpful.

Guest speakers can give insight into their careers. In addition, the use of a simple interview to determine some of the characteristics of certain careers can be effective. Young people can be dispersed to conduct either formal or informal interviews with local professionals. Once they return, they can share their findings. Mentorships working for and with a professional in the field, can give the deepest insights into career options; but they are often limited and available only to older youth. Often these programs are for volunteers only, so the youngster may need to forego financial gain to gather experience.

As the information is gathered, the participants should develop a listing of things that are critical to them, important but negotiable, nice but not necessary, and definitely unacceptable. As they evaluate the possible career choices they are exploring that list will change somewhat as it helps them to focus on some types of careers while rejecting other types. They must weight their strengths, and weaknesses; likes and dislikes and the type of working situation they prefer. Possible locations should be considered, since many careers require living in specified places like the state capitol, at a major university, or at the home office of a manufacturing plant. Job availability and the level of competition for positions should be considered as well. State or federal positions may be very scarce with modest pay and very heavy competition. If a position of that type is desired, the person may need to develop a specialty or some experiential edge that makes them stand out from the crowd of applicants.

Salary and benefit packages as well as future growth potential are important to most people. In general, private sector positions of equal responsibility pay much better than do public sector positions. While the salary and benefits are being weighed, the level of preparation required to fulfill the position requirements should be explored, along with the level of responsibility the position involves. The need to travel, work unusual or extended hours, or cope with other extraordinary conditions should also be part of the decision making process.

What's Right for Me?

In the end, the young person must choose from among the options that are available. No other person can make that choice, although many people will have an impact on it. Parents, school teachers, youth leaders, peers, and professional mentors will all have some influence upon the choice. Finally, however, the choice must be personal. Most people change their minds several

times over the course of their lives. Their careers may change very little or drastically, but career choice is an evolving process. Every decision and every experience works together to refine and alter the choices being made. Many times young people are pushed to make an ultimate career choice in junior high school or the early high school years. Most college student's change majors several times, and many professionals have made radical changes in their careers after long and successful efforts in other fields.

The best advice we can give to young people is to explore a wide array of career options, prepare for the fields that interest and challenge them the most, and try to keep their options as broad as possible until their ultimate career is found.

Exhibit and Sharing Suggestions

1. Using pictures that depict a variety of careers, construct a collage or exhibit that can be used in career exploration activities by volunteers or with younger youth.
2. Locate a possible guest speaker having a career that is interesting to your group. With the cooperation of your leader, invite that person to be a guest speaker. Ask him or her to share a vision of the career area and any insights into its requirements and rewards with the group.
3. Arrange a field trip or site visit to watch a profession in a field of interest in action. Report back to your group on the career involved.
4. Study a career of interest. Gather as much information and experience with it as possible. Prepare a report on the career that can be shared with your club or another appropriate audience.
5. Interview a person with a career you are interested in. Select from the following questions. Report back to your group.

Career Survey: Shooting Sports and Wildlife Related Careers

Career:

Name of person interviewed:

Address and phone number:

What do you like most about your job?

What do you like least?

What do you do on a typical day at work?

How many hours a week do you work? When? Indoors or Outdoors?

Does your work ever get in the way of your own hunting or fishing?

When and how did you decide on this career?

Who influenced you?

How did you get started in your first jobs?

Do you plan to stay in this career? Why and why not?

What do you hope to be doing in five years?

What kind of level of education did you need for this job/career?

What salary level does your type of work have? Are there chances for promotion?

What types of personality or interests are needed to succeed in your career?

How much do you work with animals? With people? With specific tools?

What experiences in middle school and high school would prepare someone for a career in your field?

Do you have any other advice for young people interested in this type of career?

SECTION 2: TYPES OF HUNTING

1. Hunting with a Rifle
2. Hunting with a Shotgun
3. Hunting with a Handgun
4. Hunting with a Muzzleloading
5. Bowhunting
6. Hunting with a Camera

Rifle Hunting

Many types of game animals are hunted with rifles. In every case, the hunter's objective is to make a quick, clean kill. Shot placement is the most important consideration in reaching that objective. Three major systems form the vital areas for animals, the central nervous system (the brain and spinal cord), the cardiovascular system (the heart and major blood vessels) and the pulmonary system (the lungs). Severe damage to any of these systems results in rapid, sometimes instantaneous, death. Damage to the skeleton, large muscles or the digestive system may cause the animal to die, but these are not prime locations for shot placement. Knowing the vital areas and placing shots in them is a basic responsibility for the hunter.

Rifles fire a single projectile. The bullet kills by transferring the kinetic energy of the moving bullet to the vital areas of the animal. As that energy is transferred, it creates a powerful hydrostatic shock.

The shock is caused by fluids (water) in the animal's tissues moving violently away from the area around the bullet as it passes through. A well-placed bullet of adequate energy will kill an animal quickly and cleanly. Putting it in a vital area is the key.

Bullet Energy, Momentum and Recoil

Bullet energy is commonly expressed in foot-pounds. The impact of one foot pound is about the same

as dropping a one pound can of beans from the height of one foot. The smallest cartridge normally used afield while hunting in the .22 rimfire long rifle, with a muzzle energy in the range of about 100 to 150 foot pounds. Most hunters consider the .22 rimfire cartridge to be adequate for hunting small game animals like squirrels, rabbits, raccoons and smaller varmints up to about the size of a woodchuck or a fox.

On the other end of the energy scale is one of the most powerful U.S. made sporting rifle cartridge, the .460 Weatherby Magnum. This rifle is intended for use on large, dangerous game like elephants, African

buffalo and the largest bears. It fires a heavy bullet at muzzle energies of about 7000 foot-pounds.

Compared to the .22 long rifle, the belted magnum centerfire allows much more propellant (powder) to be loaded in the larger case. Sending a great deal of bullet energy and momentum down range also has a negative side. One of Newton's laws says that for every action there is an equal and opposite reaction. Thus, the momentum of the bullet at the muzzle (mass times velocity) results in a recoil momentum that is equal. Fortunately, the mass of the rifle and the shooter is much greater than the mass of the bullet. Big bore rifles still produce considerable felt recoil, and that recoil sensation is a significant consideration for selecting a hunting rifle. A shooter must be able to tolerate the recoil adequately to fire the rifle enough to learn its characteristics and to shoot it accurately. Shot placement is much more important than energy in making clean killing shots.

Choosing a Hunting Rifle

Selecting a hunting rifle often involves striking a compromise among a number of factors. Legal requirements must be considered. The hunting regulations may require a minimum caliber or minimum muzzle energy for some types of game. The type of action may be important to some shooters. Many actions types are available today, but personal preferences may dictate the action type before the caliber or chambering is selected. Several modern single shot rifles are available, primarily based on rolling block, falling block or hinge actions. Combination guns on hinge actions are available from one American manufacturer and several European ones. These rifle-shotgun combinations can be very versatile game guns. Some big bore, double rifles for dangerous game also are available. Many riflemen prefer bolt action rifles, and most rifle cartridges are offered in a bolt action model by some manufacturer. Lever action rifles are used by many hunters for their speed of operation and handling characteristics in tight cover. The

design of some of them, those using tubular magazines, for example, dictates the type of bullet that may be used safely. In general, they are more "fussy" about case dimensions and require a more conservative approach to handloading ammunition than do single shot or bolt action rifles. Shooters who use slide action or semi-automatic shotguns may prefer similar designs in rifles. Both designs offer excellent operating speed, but they are available in a more restricted selection of calibers and chamberings than are some other action types.

Personal tastes and aesthetics are also a major factor. Some shooters prefer a particular brand or model of rifle because of its reputation, feel or fit and finish. Others may have a history with a particular model or manufacturer that amounts to tradition. Aesthetics are important. The way you feel about your rifle can have a significant impact on confidence and the level of use as well as the pride of ownership. Of course, cost is also important to the majority of rifle buyers.

Once the questions of legality, style and taste are answered, the shooter needs to address some physical considerations. The intended use of the rifle is vitally important. Bullet mass and velocity affect energy, momentum or penetration, trajectory (the arcing flight path of a bullet), recoil and other factors. Heavier bullets retain their velocity and energy better than lighter ones. They also produce more recoil at similar velocities than do lighter ones. Lighter bullets can be driven to higher velocities without excessive chamber pressures while producing lighter recoil. They tend to shed that energy more quickly however, and they may be more lightly constructed. The construction will have an impact on both penetration and tissue damage.

Given the option to choose, most big game hunters like a rifle with adequate energy and bullet mass to carry completely through the animal. Although some of the energy in the bullet is "wasted," the exit wound is likely to be large enough to create a blood trail that is easy to follow if the animal must be tracked for recovery. The hot .22-250 with its muzzle velocity of nearly 4000 feet per second and 55 grain bullet generates energies comparable to the .30-30 with 150 grain bullets. Both of them have adequate retained energy for deer-sized animals out to 150 or 200 yards. The light, fast bullet from the .22-250, however, will seldom leave an exit wound and the entrance wound will leave an insignificant blood trail in most cases. It may even break up on the surface. The heavier, slower .30-30 is more likely to carry its similar energy through the animal, leaving an exit wound and creating a better blood trail to aid in recovery. If, on the other hand, the object of the hunt were woodchucks at 300 yards, the .30-30 with its rainbow-like trajectory is a much poorer choice than the .22-250. The smaller bullet will come apart violently assuring quick kills at long range, and the flat trajectory makes it easier to hit distant targets. Most experienced deer hunters consider the .24 caliber or 6mm chamberings with strongly constructed bullets to be about the minimum for deer.

The intended use of the rifle must be considered carefully. Will it be used as a specialty arm or for a wide variety of game? The assortment of bullet weights and styles available has a strong influence on the versatility of a rifle. Rifles in the 6mm to .308 caliber classes have a wide range of bullet types and weights, making them adaptable to species from varmints to big game. Heavier bullets in larger calibers (.277 to .308) are suitable for the largest species in North America. For the one rifle hunter, these make an excellent choice. Specialty rifles can assume part of the versatile rifle's role and do the job more efficiently. The prairie varmint hunter taking coyotes for their pelts would find a hot .17 caliber rifle or a .222 very useful. Larger calibers would cause more pelt damage. On the other hand, these would not be very useful for black bears or bighorn sheep. A .338 or .375 magnum might be an outstanding choice for moose or coastal grizzly bears, but both of them are gross overkill on whitetail deer or pronghorns.

Rifle selection boils down to a cluster of factors that could be called the normal use of the rifle. Adequate energy for clean kills is essential. Adequate velocity to handle shots that might normally be encountered is also important. This is governed by the species, terrain and hunting methods. The hunter who specializes in whitetail deer in dense cover seldom shoots at a deer over 100 yards away. Flat trajectory is not a critical factor. On the other hand, the pronghorn hunter will find a fast, flat shooting rifle very helpful on the open prairies and sagebrush flats. If

the rifle is to be used in a wide variety of situations, versatility is important. Chamberings like the .308 and .30-06 excel as versatile rifles, as do the .270, 7mms and .30 caliber magnums. If it is to be a specialist; adaptation to the use is a key. Larger animals generally place a premium on penetration, a product of both bullet mass, velocity and bullet construction. Dangerous game calls for overkill within the ability of the shooter to handle the recoil. Action type, model and aesthetics are important to the enjoyment of using the rifle in the field.

Bullet Selection

Bullets are commonly available in diameters from approximately 0.17 to 0.458 inch. These diameters are known as calibers. They may also be expressed in metric units. Thus the .243 is a 6mm, the 7mm is a .284 and the .308 is a 7.62mm. Note that sharing a caliber does not mean that the cartridges are interchangeable. In fact, using cartridges other than those specifically designed for the chamber of your rifle is **extremely dangerous**.

In general, bullet weight or mass increases as caliber increases. The smallest commonly available bullet for .30 caliber rifles is approximately twice the weight of the largest .22 caliber bullet. The amount of powder necessary to drive a bullet at a given velocity generally increases as mass increases. As explained above, recoil and momentum or penetration increase with mass and velocity, and energy increases with mass and the square of the velocity. Adequate velocity and mass result in adequate penetration and terminal energy.

Bullet construction is also important. Lead alloy bullets or cast bullets may be used at modest velocities. Jacketed bullets have a lead core surrounded (more or less) by a jacket of harder materials, usually a copper alloy. Monolithic bullets are formed from a solid piece of metal. Jacketed or monolithic bullets can be driven at higher velocities than cast lead bullets.

Monolithic bullets or those with full metal jackets are designed for maximum penetration and mass retention. Several other bullet types are designed to retain most of their mass while expanding to kill cleanly. Partition bullets, core bonded bullets, hot-core bullets and bullets with variable jacket thickness are designed for that purpose.

Sectional density is a term applied to the relationship between the diameter or caliber of the bullet and its mass. Within limits imposed by stability, bullets with higher sectional density retain their momentum better than shorter bullets with lower sectional density. This has an impact on both intermediate ballistics, the flight path of the bullet, and terminal ballistics, the penetration and energy transfer of the bullet on impact.

When a shape factor is added to the sectional density, a ballistic coefficient can be calculated for a bullet. This coefficient relates to the "slipperiness" of the bullet through the air. Pointed bullets have a higher ballistic coefficient than blunt ones. Round nosed bullets have a higher coefficient than flat nosed or wadcutter styles. Boat-tailed bullets, bullets with tapered bases, have a higher coefficient than flat based bullets. All of these factors combine to govern velocity retention down range.

Selecting a Hunting Rifle

As you can see, picking a hunting rifle is a little more complex than merely walking into the gun shop with a checkbook and a gleam in your eye. It involves some thought and planning. You must consider your personal abilities and desires, the anticipated use for the rifle, and the conditions the hunter expects to encounter.

Exhibit and Sharing Suggestions

1. Prepare a display featuring rifles and cartridges for a particular hunting application.
2. Prepare a consumer decision making exercise where others can select a rifle for a particular use and give reasons. Place the class of rifles in the order selected.
3. Make a bullet board for a selected caliber or calibers.

4. Survey a group of hunters about their preferences in rifles and loads for a given type of game and report their responses to the club.

SHOTGUN HUNTING

Introduction

Shotguns are used for all sorts of hunting, from close range big game to wingshooting. When used with single projectiles they are used like rifles. Shooting shotguns with single projectile involves careful aiming or sight picture control and trigger control for accurate shot placement. For other purposes, they are designed to provide an adequate cloud of shot with enough energy to cleanly kill the species being hunted. Timing and follow through are critical to hitting moving game effectively with a shotgun. The gun should swing smoothly and shoot where you are looking. The skilled hunter must learn to select the combination of gauge, choke, and load to match the game and conditions under which it is being hunted.

Gauge

Shotgun bore diameters are designated by gauge. Formerly, the gauge of the gun was the number of lead balls, the diameter of the bore, that could be made from a pound of lead. Thus, a 10 gauge, the largest gauge currently in use, held a ball that weighed one-tenth of a pound. Lead balls for a 28 gauge weighed one-twenty eighth of a pound. The larger the gauge, the smaller the bore diameter. Today shotgun bores have been standardized by arms manufacturers, with 10, 12, 16, 20, and 28 gauge arms and ammunition readily available in the United States. The .410 bore is the smallest shotgun generally available, but it is a caliber rather than a gauge.

Generally, the larger the bore, the greater the maximum shot charge available. For example, many manufacturers' offer two ounce leads for 3 ½ inch, 10 gauge loads. The normal charge for a 28 gauge is ¾ ounce. In addition to having a larger "payload", larger bores tend to have a shorter shot string with similar loads. Shot would tend to be strung out further in a 1-¼ ounce, 3 inch, 20 gauge load, than it would in a 12 gauge load of the same weight. The shorter shot string may increase the effectiveness of a load under hunting conditions.

Safety Conditions

Shotguns are made with several chamber lengths. Modern shotguns in 12 gauge may have 2 ¾, 3, or 3 ½ inch chambers. In 20 gauge, the chambers may be either 3 or 2 ¾ inches, and .410 bore chambers are usually either 3 or 2½ inches in chamber length. The longer cases used can hold larger shot charges, making the guns more versatile. Some older 10 gauges may have 3 inch chambers, and some 16 gauge guns may have 2 7/16 inch chambers. It is safe to fire shorter shells in long chambers, but very dangerous to fire longer cases in the shorter chambers.

When hunting with a shotgun, only one gauge of ammunition should be carried at any given time by the hunter. Mix-ups of some gauge combinations can cause dangerous bore obstructions. The most common combination is a 20 gauge in a 12 gauge. The smaller case will lodge just beyond the chamber of the larger bore, causing dangerous pressures and a possible burst barrel. Other combinations are equally dangerous - 28 gauge in 20 gauge and 16 gauge in 10 gauge.

Chokes

Early shotguns had uniform bore diameter from chamber to muzzle. Someone discovered that constricting the bore a small amount caused the shot charge to stay together longer, increasing the effective range of the shotgun. Chokes were used in a variety of ways. Jug chokes were made by slightly increasing the inside diameter of the barrel just before the muzzle. Swaged chokes were made by forcing the muzzle into a tapered jig, constricting the bore slightly. Machined chokes are cut with a reamer. They may be tapered or parallel. Recently, choke tubes that can be screwed into the threaded muzzle of the shotgun are produced by many manufacturers. They are an advancement of variable choke devices which could be opened or tightened by turning a collet.

The most commonly encountered chokes are skeet, improved cylinder, modified, and full. True cylinder has no choke. Most slug barrels are built to snug cylinder full length. Skeet chokes are designed for optimum patterns at about 22-25 yards. Improved cylinder is designed to be best at

25-30 yards. Modified chokes are best at about 35-40 yards. Full choke is designed for 40 yards and beyond.

A pervasive myth in shotgunning is that longer barrels shoot "harder" and "tighter". Barrel length beyond about 18-22" has little effect on velocity. Choke, not barrel length determines shot dispersion. The major advantage of long barrels in long range shooting is having a longer "sighting plane" and a more muzzle-heavy, smoother swing.

Shotgun Ballistics

All projectiles have kinetic energy when they are in motion. That energy is defined by the mass and the velocity of the projectile. In shotgun pellets, the range in muzzle energy is from about two foot pounds to 225 foot pounds. Usually shotgun patterns become too thin to assure hits before the pellets lose striking energy.

Pattern density is an interaction of shot charge, shot size, choke and distance. Larger shot charges hold greater numbers of pellets, yielding larger numbers of effective pellets in the pattern (usually measured in a 30" circle) at the same percentage. Larger pellets have more energy, but their pattern is less dense than smaller shot. Shot size selection is usually a trade-off between energy and density. Increasing the choke constriction usually increases pattern density, but excessive choke may cause patterns to begin to open again. Finally, distance increases pellet dispersion. Shot hardness affects the degree to which pellets drift from the pattern. Softer shot, because of greater deformation (flattening), spreads more quickly than magnum, or hard, shot. All these factors figure in selecting a shotgun load for game.

The effective ranges of 12 gauge standard loads were listed earlier. Going to 3 inch magnum loads may add up to 10 yards to those ranges with similar shot sizes. Dropping down to 20 gauge reduces the effective range a few yards, perhaps up to 5 yards. The 28 gauge requires a reduction of about 5 more yards, with about 35 yards the maximum realistic range on game. The little .410 is a gun for experts willing to limit shots to 20-25 yards.

Shotgun Selection

Many factors contribute to decisions on shotgun selection for hunting. Cost and personal preference, as well as intended use, are major factors to be considered.

Single shots of all action types are usually least expensive, but they are limited to a single round before reloading. Stock design on singles may have excess drop with rather strong recoil. Bolt actions are a bit more expensive and slightly faster on second and third shots than single shots. Stock dimensions are much more rifle-like.

Slide or pump actions are very popular. They are very fast, readily available in many models at a variety of costs, and adaptable to many shotgunning situations. Experienced pump gun shooters are as fast as semi-auto users, and the pump is usually lighter than a semi-auto. In addition, the pump gun may be more reliable under severe conditions where a semi-auto can become an expensive single shot.

Semi-automatic shotguns are fast, relatively reliable, and available in a wide variety of models and costs. Their extended action cycle and greater mass tend to soften felt recoil. The greater weight smooths swings, but is a cost for the walking hunter.

Double barrel shotguns, either over-under or side-by-side, are among the most expensive shotguns. They offer nearly instant choke selection because the barrels are usually choked differently. They have a shorter action that places balance between the hands without excess weight. Like break action singles, they are easily checked for obstructions or loads, making them very safe.

Selection is largely a matter of finding a gun that looks good to you, fits your shooting style and matches your pocketbook.

Matching the features to your intended use is also important. Specialized guns for special uses are available, but many guns fit a variety of purposes. Most skeet guns, for example, are excellent upland bird guns. Short, light guns are fast, but not very smooth. Long, heavy guns are slower but smoother to swing. Slug guns and turkey guns are usually relatively short barreled. Turkey and goose guns are usually tightly choked and big bored. Pass shooting guns tend to have long barrels for smoother swings. Upland bird guns for dense cover are usually short and quick. Interchangeable barrels and screw-in choke tubes make most modern shotguns extremely versatile.

The 3 or 3½ inch chambered 12 gauge shotgun with screw-in chokes or interchangeable barrels is probably the most versatile shotgun for all hunting. The mighty 10 gauge is a heavy duty specialist for waterfowling, turkey, predators, and perhaps deer. The 20 gauge with 3 inch chamber is an excellent and versatile lighter gun that serves well in upland or marsh. The 28 gauge and .410 are expert's guns demanding good shooting and better judgment.

No matter what hunting situation presents itself, ethical choices are critical. Hunters need to keep their shots in a sure-kill range. Leads and ability to hit must be considered as does the density of patterns and pellet energy. Optimizing those factors reduces the chance of crippling or wounding loss.

Matching Tactics to the Game.

Some species of wildlife are easy to stop or kill. Other species seem to be very tough and tenacious. Those species demand heavier, denser loads of larger shot for sure-kills and easy recovery. Squirrels, pheasants, turkeys, foxes, coyotes, and most waterfowl are tough customers. Most other upland birds and rabbits are relatively easy to stop. However, they may need heavier shot when they are heavily feathered or furred and layered with fat late in the season. Balancing loads to the work at hand is very important.

Big Game Shotgunning

Shotguns can be very effective big game arms within their effective range. Many states require shotguns either with slugs or buckshot. Both slugs and buckshot carry high energies and are potentially very dangerous down range. Therefore, backstops must be safe and sure. The notion that distance is an adequate backstop, so common to shotgunners, must be reconsidered in this situation.

When hunting with slugs, good sights and careful sighting-in are essential. Shots must be kept inside the accuracy range of the slug/shotgun/shooter combination. For most of them, that means keeping shots inside 75-100 yards. Specialized equipment may be capable of a few yards more. Slugs from 10 gauge and 12 gauge guns have impressive energy and killing power. In fact, they are often the preferred choice for following up medium sized dangerous game that has been wounded. In contrast, the tiny 2 ½ inch .410 slug is underpowered and inadequate for use on big game.

Like slugs, buckshot has better potential as a big game load in big bore guns. Wise hunters will invest in patterning several sizes and brands in their gun/choke combination to be sure they are getting the best performance and to determine maximum ethical ranges. Caution on shot selection is essential with buckshot to make sure of clean kills and to minimize wounding. Careful attention to possible downrange hazards is also vital with these large, high energy pellets.

Summary

Most of the ammunition manufacturers have recommendations on shot size, choke and load combinations for a variety of game. They are a good place to start in determining the ones that

work best for you, but you may find that another combination fits your hunting style and game animals better. The only way is to try them in the field and to keep careful notes on your results.

Exhibit and Sharing Suggestions

1. Develop a shot selection chart for game animals in your area.
2. Using wet newsprint or a similar material, experiment with the penetration of various shot sizes at different hunting yardages. Use your results to help in selecting shot sizes for various game applications.
3. Study the development of shotguns as hunting arms, preparing an illustrated talk for presentation to your 4-H group or another interested group of people.

HANDGUN HUNTING

Introduction

Handgun hunting is a challenging sport that is expanding in popularity. Like all other forms of hunting, it demands careful attention to safety, ethics, and personal responsibility. The basic considerations of hunting safety - self-control, absolute target identification, muzzle control, and knowledge of where the projectile will stop – are just as important with handguns as with any other form of hunting. Because of the way handguns are carried and their short length, particular caution with muzzle control is needed.

Accident figures from a state where handgun hunting was recently permitted showed that nearly all the accidents associated with handguns took place when either drawing or holstering the firearm or dropping a loaded handgun. Handgun hunters must be acutely aware of the need to exercise appropriate caution with the firearm, like never cocking a handgun until ready to fire at a game animal. Self-control is critical to safety here as in any other shooting or hunting situation.

Like other firearms, handguns are built for specific chamberings. Some cartridges may be safely interchanged, but others could create a dangerous problem if mixed. The owner of a .357 Magnum can safely fire .38 Special ammunition; but the opposite exchange is dangerous, even if the case could be chambered. For the sake of safety, the shooter must be absolutely sure that the firearm is chambered for the cartridge being used. In some cases, like .44 Remington Magnum or .45-70 Government loads, that includes being sure that the cartridge was loaded for use in pistols rather than in rifles chambered for the same cartridge. Check the headstamp and the cartridge box label against the chambering information on the pistol.

Handgun Actions

Hunting handguns use four basic designs. All of them are suitable for small game or use on a trapline, but very few semi-automatic pistols are chambered for cartridges suitable for big game.

Single action or double action revolvers dominated big bore handgun hunting for many years, and several potent handgun rounds are available for the handgun hunter. Varmint hunting, metallic silhouette shooting, and serious big game handgunning resulted in the development of bolt action, break action, and cannon breech pistols chambered for high velocity or high powered cartridges. Commercially available pistols like the Thompson Center Contender and the Remington XP100 come in a wide variety of chambering from .17 to .45-70 and in barrel lengths from about 10 inches to 18 inches. These firearms permit rifle-like performance from a hunting handgun. The choice of action is mostly one of personal preference and availability of chamberings desired.

Bolt action or break action pistols are very strong, have little gas loss, and are easily chambered for almost any suitable cartridge. Revolvers offer multiple shots quickly. Single action revolvers require cocking before each shot, but they are generally more durable and simpler than double actions.

Hunting Sights

All kinds of sights are useful for handgun hunting, but they must be precise and easily used under a variety of light conditions. The standard partridge sight may be difficult to use under low light conditions, particularly if it is simply blued. Many shooters use white, orange, or red inserts or outlines on their sights to improve visibility and to make the front sight stand out. These are also easier to see under low contrast conditions when aligned with the game animal.

Optical sights have the advantage of keeping everything on the same focal plane. Non-magnifying optical sights, like the aim-point, visually project an aiming spot on the target. They are quick to use and easily seen. (Note that laser sights that actually project an image are illegal in many states.)

Telescopic sights help with precise aiming once they are used enough to become acclimated to them. They will increase the apparent amount of wobble and may make it difficult to locate the game animal at higher magnifications. In addition, higher magnifications can make shot placement difficult at close range because the small field of view makes it hard to determine where the sights are being placed. Most hunters stick to scopes in the 1.5 to 7 power range, even for long handgun shots. Most long range varmint handgunners use scoped handguns as well. Practice on the range or on metallic silhouettes is excellent training for using hunting handguns in the field.

Caliber Selection

Like all firearms, handguns kill by hydrostatic shock and the disruption of vital functions. Water moving away from the bullet damages tissues around the wound channel, expanding the area of damage beyond the wound channel itself. When game is taken for food or fur, the shooter tries to balance sure-killing power against meat or fur damage. Varmint shooters may opt for higher velocity and energy regardless of damage, since most varmints are not eaten.

In comparison to even mild rifle cartridges, most handgun cartridges deliver only moderate terminal energy. Rimfire ammunition is suitable for small game and furbearer hunting. Where it is legal, a rimfire handgun makes an excellent "finisher" for downed big game. Light centerfire loads, like "mid-range" or target loads, may be used if they are well placed. Centerfire shot loads are poor, even in comparison to a .410 shotgun, but they have some limited usefulness for short range shooting. Make sure that you check all regulations before attempting to use a handgun with shot loads for hunting any game animal. Some states may restrict the use of handguns for upland birds, and no steel shot loads are available to make waterfowling with a handgun legal.

Big game hunting with a handgun requires careful decision making and adequate equipment. The decision making involves getting close enough, careful shot placement, and proper load selection.

Load selection and having adequate trigger and sight control to place the bullets adequately are critical to making clean kills. Many states place some legal restrictions on handguns being used to hunt big game. In a few cases, those regulations may deny the use of some excellent cartridges while permitting the use of other, inadequate cartridges. Regardless of legal considerations, no handgun developing energies less than those generated by a .357 Magnum should be considered for deer-sized game. (In fact, many hunters consider the .357 marginal, at best.) Many rifle cartridges and wildcats, like the Herrett cartridges, are excellent for big game in appropriate guns. One of the major considerations after adequate energy is getting adequate bullet performance at hunting ranges. Often that requires the use of a softer or more easily deformed bullet than would be used in rifle hunting.

Hunting Tactics

In many ways, handgunning resembles bowhunting. Ranges are relatively short. Careful shot selection, staying inside a personally determined sure-kill zone, and frequent serious practice are necessary. Sound knowledge of game behavior and anatomy are needed for success. Hunting with a handgun offers a potential to grow ethically as a hunter, but that potential is only realized when self-respect and respect for the resource is joined by adequate preparation and equipment equal to the task. Handgun hunters can use all types of hunting tactics: stalking, still hunting, or hunting from a stand are all effective. The key is getting close enough to deliver an effective killing shot. Handgun hunting is a challenge. It is not for everyone, but those who adopt this means of hunting find it extremely satisfying.

Sharing and Exhibit Suggestions

1. Develop a comparative display of popular rifle and handgun hunting cartridges and their ballistics for use in instruction and share it with your leader.
2. Interview a handgun hunter to see what their preferences in cartridges and firearms are and why they have selected those tools for their hunting. Share your insights with others in your group who are interested in handgun hunting.

3. Research your state's laws on handgun hunting. Share your findings with your group or another interested person.

Muzzleloader Hunting

Interest in muzzleloading firearms and hunting with muzzleloaders is one of the fastest growing areas of hunting today. That growth has been both the product and the driving force behind creation of special seasons for muzzleloading. To many hunters, using muzzleloading firearms is the ultimate single-shot experience, an opportunity to increase the quality of the hunt through greater challenge, rebirth of hunting history and reduced hunter pressures. Like bow hunting, muzzleloader hunting provides an opportunity to increase the quality of the experience.

Muzzleloaders as Hunting Arms

Muzzleloader hunters share the desire for quick, clean kills with other hunters. Like modern firearms, muzzleloaders kill by delivering a lethal level of energy and tissue damage to vital parts of the body. Shot placement and absorbed energy are the keys to clean kills. While modern high velocity bullets may kill by spectacular levels of hydrostatic shock, muzzleloaders operate at a lower energy level with excellent penetration power. Black powder projectiles kill by a combination of shock and blood loss.

Shock is provided as kinetic energy in the moving bullet and is absorbed by the vital organs of the animal. This energy is calculated by taking the square of the velocity and multiplying by the mass of the bullet divided by two. In common American practice, it is measured in pounds-feet or foot-pounds. A .54 caliber muzzleloading rifle firing either a 430 grain maxi-ball or a 230 grain round ball at maximum loading has approximately the same energy as a .25-06 at the muzzle. Its momentum, a measure of its ability to penetrate, is greater than that of a 175 grain 7mm Remington Magnum bullet traveling at 2800 feet per second. These slower, more massive bullets do not produce the spectacular hydrostatic shock seen in high velocity rifle bullets, but they produce adequate shock and deep penetration of vital tissues. They are *extremely* effective in downing big game. Their soft lead bullets deform and shed energy quickly, resulting in quick and clean kills when the bullets are properly placed.

Mass and velocity interact in several ways. Obviously, it is more difficult to move a 430 grain bullet than it is to move a 100 grain bullet. It takes more energy to accelerate it. At the same time, it takes more friction to slow it down once it has been accelerated. The shape of the projectile also influences the drag or friction of the air. Round balls are relatively inefficient, shedding their energy rather quickly. Long bullets, with more mass for their diameter tend to lose their velocity more slowly. The relationship between mass and basal area is known as sectional density. Higher sectional density increases retained energy and penetration.

Bullet construction also influences bullet performance. Soft lead bullets like those used in muzzleloaders deform easily. That reduces their penetration ability but increases the transfer of energy to the vital organs of the game animal.

Shot Placement

Regardless of the energy or momentum applied, the key to quick, clean kills with any firearm is accurate shot placement. The shot should be placed to provide maximal disruption of vital functions. The central nervous system (brain and spinal cord), circulatory system (heart and major blood vessels) and the respiratory system (lungs or air sacs) all provide the potential for nearly instant kills.

Shot placement is a combination of good marksmanship and self control. Since muzzleloading is a one shot game in almost all cases, the hunter must exercise self control to make the best use of a single shot. Firing should be delayed until a clear shot at a vital area is presented. The heart-lung area on the lower rear area of the shoulder is the best choice. It offers a greater margin for error while providing quick kills. The shooter should remember that the vital area is in the middle of a three-dimensional space, so they need to think of an imaginary line representing the path of the bullet through the area containing the vital organs.

Ignition Systems

Black powder traces its history to either China or Europe, appearing in both places at about the same time. Its earliest use was in fireworks. Within a relatively short time it was adapted to military uses in hand cannons and artillery pieces. The powder itself has changed very little since its creation. It is still composed of sulfur, sodium or potassium nitrate (saltpeter) and charcoal, with the burning rate governed by the size of the grains.

Early ignition systems for black powder arms included the use of hot wires, matches or fuses. These devices were inserted through a touch hole to detonate the powder charge. The matchlock action used a slow match or fuse that was held in a serpentine. When the trigger was pulled, the serpentine lowered the match into a flash pan or touch hole setting off the powder charge. These arms depended upon a source of fire and relatively calm and dry conditions for best operation. Next came the wheel lock. A mainspring was wound and held in place by a sear attached to the trigger mechanism. When the trigger was pulled, the spring caused a pyrite wheel to whirl against a steel much like a modern cigarette lighter. The shower of sparks ignited a priming charge that detonated to ignite the main powder charge. While wheel lock arms were effective and a great improvement, they were expensive.

The flint and steel fire starting principle was used in flintlock arms. These arms were more weather resistant, since they included a frizzen and a pan cover that were integrated. Properly primed and in reasonable weather, they were dependable and accurate. Flintlocks were in use when the first Pilgrims came to Plymouth and Jamestown and they continued to be used well into the American Civil War.

The discovery of pressure sensitive chemicals led to the development of a new ignition system in the middle of the 19th century. A thin copper cup containing a small amount of a pressure sensitive explosive was fitted to a nipple which had a fire channel to the main powder charge. When the hammer fell on the percussion cap, the explosive detonated and sent a hot flash into the powder charge, igniting it. Percussion or cap lock guns were a bit quicker to load and fire, since they required fewer steps. In addition, they were somewhat more weather resistant than flintlock arms. Cap lock arms carried the seeds of their own obsolescence. When the cap was inserted into a cartridge that could be loaded into the breech of a firearm, firing speed and weather resistance both improved, and the era of the breech loading firearm began.

Today's muzzleloading hunter most frequently uses either cap lock or flintlock firearms. Both systems are available in a variety of firearms suitable for many hunting conditions. Since the hunter must be hunter, shooter and reloader at the same time, the use of any muzzleloading firearm for hunting increases the knowledge needed, the safety considerations and the demand on the hunter's skills. Cap locks are somewhat easier to manage for the beginner, with greater weather resistance, less apparent distraction for the shooter and fewer tools and skills needed to use them. Beginners should learn to use cap lock arms effectively before using flintlocks for hunting. Flintlocks are more sensitive to weather conditions, and priming errors have a significant impact on ignition speed.

Charging and Cleaning Supplies and Equipment

Powder --Only two propellants are currently available for muzzleloading firearms. Black powder in the appropriate granulation and pyrodex are used in cap lock firearms of all types. Flintlock shooters should stick to black powder only, since pyrodex is more difficult to ignite and may not ignite consistently in flintlock arms. Smokeless powder of any type should NEVER be used in any muzzleloading firearm.

Black powder is available in several grain sizes for sporting arms. The granule size is designated by F's. Single F or Fg powder is the coarsest sporting powder. It is used in big bore muskets. Double F or FFg powder is used in most rifles and shotguns. Triple F or FFFg powder is used primarily in small caliber rifles and pistols. In a pinch it can also be used as priming powder for

flintlocks, although four F (FFFFg) or pan powder is the best choice. FFFFg powder should **NEVER** be used in the bore of a muzzleloading firearm. It is used **only** in charging flash pans! Be sure to follow the manufacturer's recommendations on both the granulation and the charge of powder being used.

Pyrodex comes in three grades, C, RS and P. C pyrodex is used in cannon. RS pyrodex is used in rifles and shotguns, while P pyrodex is used in pistols. Because of its ignition characteristics, pyrodex is not suitable for use in flintlock arms.

Although some other types of powders have been advertized for muzzleloading arms, no other powders besides black powder and pyrodex have been approved by firearm manufacturers.

Loading Tools -- Since muzzleloaders need to be handloaders as well as shooters, they require a few additional tools. These tools are often carried in a "possibles bag" or shooter's bag. Some hunters carry pre-measured powder charges. Others carry a powder horn, flask or bag and measure each charge as it is needed. In either case, a powder measure of some non-sparking material is needed. Powder measures are commonly made of brass, copper, horn, antler, bone or some non-sparking plastics. They may be fixed to the charge the shooter has settled upon or adjustable. The main requirements (beyond the non-sparking characteristic) are that they hold the appropriate amount of powder and that they measure the powder both reliably and consistently. Powder always must be measured carefully for both safety and accuracy. Powder measures set for a given charge of black powder can be used to measure the equivalent charge of pyrodex, since pyrodex delivers equivalent performance on a volume for volume basis even though it is lighter than black powder.

One of the fundamental safety considerations for muzzleloading is that powder is always dropped into the barrel from a powder measure. It should never be loaded directly from any primary container, **even those equipped with a measuring spout!** If the powder should flash, the container becomes a small bomb - much worse than a singed coonskin hat!

Projectiles -- The traditional projectile for muzzleloading rifles and muskets is the patched round ball. These pure lead balls are cast slightly smaller than bore diameter, with the remainder of the bore being taken up by a lubricated patch. Balls used in cap-and-ball pistols are cast slightly larger than bore diameter. In either case, balls with a sprue are loaded with the sprue pointing upward. The sprue is a slight imperfection on the ball left over from the casting process. Although this looks like it would have an impact on accuracy and bullet flight, placing the sprue straight up (on the leading edge) causes the least interference with accuracy. Although round balls are the traditional muzzleloading projectile, they have some disadvantages from the hunter's point of view. Their shape is inefficient, so they lose both velocity and energy rather quickly. In addition, they have relatively low sectional density (a measure of their weight relative to their diameter) which reduces their penetration ability. They also tend to deflect rather easily if they encounter obstacles. Finally, they require patching material and a lubricant, the use of which may slow the process of preparing to shoot a second time.

The short-comings of round balls brought about the development of the minnie ball or "conical" bullet for muzzleloading rifles and muskets during the 19th century. In more recent times, muzzleloader manufacturers have developed specially designed bullets for the big game hunter. Maxi-balls, buffalo bullets, and similar projectiles have greater mass, higher sectional density, and better retained energy and velocity than do round balls. They are somewhat easier to load, particularly if they are pre-lubed. Since the top and bottom bands on the bullet obdurate the bore, they need no patching material and are generally easier to load - particularly in a slightly fouled barrel. Some manufacturers have gone a step further, using a plastic sabot to load a jacketed rifle or pistol bullet in the muzzleloading firearm.

Sabots should be used **only** as directed by the manufacturer of the firearm.

Muzzleloading shotguns use the same sizes and types of shot that can be fired from a breech loading firearm. Shot size and type should be selected to match the game being hunted. The shot and powder charges are matched to the shotgun being used. Unlike the rifle and pistol charges, shotguns use several patches in constructing each load.

Patches and Patch Lube -- All rifle, single shot pistol and musket balls must be patched with an appropriate type and thickness of material lubricated with an appropriate lube. The lubricated patch serves several functions. It seals the bore, keeping the expanding gases behind the bullet and maximizing the energy imparted to the ball. It impresses its weave on the ball while engaging the rifling, causing the ball to spin for greater stability in flight. It also provides a buffer between the steel of the barrel and the soft lead of the ball, preventing lead fouling. A very tight fit usually produces the best accuracy.

Patches should be made of cotton, linen, wool or similar natural materials. Many synthetics melt under the heat of firing, leaving a sticky residue that is very difficult to remove from the bore. Patches of several thicknesses are available as pre-cut patches from a number of sources. Many shooters prefer to make their own from pillow ticking or similar material. The patch strip is trimmed with a knife after the ball is started into the bore.

Many substances can be used to lubricate a patch. Spit patches are lubricated with saliva. They have the advantage of being handy, but they tend to dry out and lose their lubricating ability. In addition, they do not give the same level of accuracy that might be expected from some of the other types of lubricants. Vegetable shortening, animal fats, natural waxes and oils and petroleum based products have been used successfully as patch lubes. Non-petroleum based products are advised by some manufacturers in an effort to reduce fouling and bore damage from powder residues. For the shooter who uses both patched balls and bullets, a bullet lube that doubles as a good patch lube is an excellent idea. All lube grooves in the bullet should be completely filled with the lubricant.

Patch materials for shotguns are somewhat different. Once the powder is loaded, the shooter inserts a snug-fitting card wad (nitro card) or two wool wonder wads and presses them down onto the powder. Many shooters who use the nitro card wad add a "felt" or composition wad to cushion the shot. After the shot has been added to the load, a very thin card wad, is seated on the shot charge to keep it in place. During this operation, the gases trapped under the wad may force the wad back up the bore slightly. Maintain pressure on the wad until the ramrod remains in place when it is released.

Cleaning Equipment

Loading and cleaning equipment is essential for every muzzleloading firearm. The ramrod usually is fitted with adapters that allow it to be used for loading and light cleaning. For range use or for heavier cleaning chores, a range rod or work rod is valuable. Either type of rod can be fitted with a variety of attachments to make cleaning the firearm easier. A cleaning jag can be attached to rifle and pistol rods to wipe the barrel between shots, clean the bore of residue after shooting or apply bore conditioners. A mop can be attached to a shotgun rod for the same purposes.

If a charge must be pulled, a ball puller or bullet screw may be attached to the heavy rod. The exposed screw is turned into the bullet or ball which is then pulled through the muzzle. Note that it is essential to deactivate the powder by thoroughly soaking it before attempting to pull a bullet. Most muzzleloading sources agree that a silent ball discharger using a CO² charge to push the load from the bore is the safest way to "pull" a charge.

In addition to these basic tools, the shooter should have a vent or nipple pick for cleaning the flash holes in either cap lock or flintlock arms. Cap lock shooters should have a nipple wrench

with extra nipples to fit their firearm. Flintlock shooters should have the necessary equipment to nap and/or replace a flint in the field.

Charging a Muzzleloading Firearm

The first step in loading any muzzleloading firearm is making sure that it is not already loaded. The use of a marked ramrod is strongly suggested, with marks on the rod for both the normal hunting load and the empty condition. The marked rod makes it easy to determine the status of the firearm.

Alternatively, the barrel may be plumbed with the rod. Mark the top of the barrel with the thumbnail, then place the rod along the side of the barrel. If it comes to the flash hole or nipple or very close to it, the firearm is empty. If it does not, consider the arm loaded and proceed as required.

Next, clear the flash hole or nipple by firing several caps or pans of powder. As a safety precaution, even with empty muzzleloaders, **ALWAYS** fire the first cap or pan of powder with the muzzle pointed downrange at an appropriate backstop. Next, point the muzzle at a light object, like a leaf or blade of grass, and watch that object as the second shot is fired. If the barrel is clear, the material should move. This clearing process eliminates many of the causes of misfires with muzzleloading firearms.

Carefully measure a charge of black powder or pyrodex using a powder measure. Make sure that the type and grain size is appropriate before measuring the charge. Re-seal the powder container by screwing the cap in place or inserting the plug. Holding the muzzle away from the face and body, carefully pour the measured charge into the barrel. Strike the side of the barrel several times with the flat of the hand to settle the powder.

Load a ball by centering a lubed patch over the muzzle and centering a ball with the sprue up in the patch. Place the short starter on the ball and either push firmly or give it a pop with the hand to start the ball into the barrel. If a strip of patching material is used, trim the patch flush with the barrel at this time with a sharp knife. Next, use the long starter to push the ball about 4-6 inches down the bore. Complete the seating job by taking short strokes with the ramrod, holding it close to the muzzle to prevent breaking it. Be sure that the ball is fully seated on the powder with no air space trapped between the powder and the ball. Finally, withdraw and replace the ramrod before capping or priming.

Maxi or minnie balls are loaded in a similar fashion. No patching material is needed, and the bullet itself is lubricated by filling all the grooves with lubricant. Usually light pressure with the thumb or a fingertip is adequate to start the bullet into the barrel and the ramrod can be used to seat it.

As noted above, shotguns require some additional modifications of the loading procedure. Once the powder charge has been loaded, one or more over-powder wads are added. Usually that is a combination of a nitro card wad and a felt or composition wad or a pair of wool wonder wads. Next, the shot charge is measured and dropped using the same measure that was used for the powder.

Finally, a thin over-shot wad is inserted into the bore and pressed firmly down onto the shot charge with the ramrod. Some back pressure will be experienced at this point, and it is important to continue the pressure until the ramrod stays in place when it is released. When double barreled guns are being loaded, be sure to use a system that keeps everything straight, like leaving the ramrod in the barrel being loaded or keeping the wads visible until ready to perform the next step.

Loading cap-and-ball pistols is slightly different. Each cylinder is both a chamber and a muzzle. The chamber is charged with powder, then a slightly oversized ball is rammed down onto the powder. A thin ring of lead should be shaved from the ball as it is seated flush with the cylinder

mouth. After all the cylinders are loaded, a layer of lubricating grease should be applied to each cylinder mouth. While this was thought to prevent chain fires, its primary purpose is to lubricate the ball as it enters the barrel. Be sure that each chamber has a cap firmly pressed into place before firing the pistol. Any loose caps carry the potential to ignite a chain fire.

Cap or prime the firearm only when ready to fire. On cap lock firearms, press the cap firmly into place. Some hunters use beeswax or fingernail polish to seal the cap in place in foul weather. On flintlock firearms, be sure to keep the level of priming powder below the flash hole. If the flash hole is covered, ignition will be very slow, even if it produces a superior "flash in the pan." The firearm is now ready for firing.

Selecting Loads for Hunting

For hunting purposes, muzzleloading shotguns can be treated much like breechloading shotguns of similar gauge. The standard loadings are very similar to the standard target loadings for each gauge with 10 gauge guns firing a 1¼ ounce load and 12 gauge guns firing a 1½ ounce load of lead shot. In general the shot charge uses the same volume as the powder charge, so a single dipper or measure can be used. Velocities and patterns are similar to modern guns with the same load and boring. Many muzzleloading shotguns are made with cylinder bores, but they are also available with choked barrels or choke tubes.

Like other kinds of shotgunning, the challenge is in adjusting the load to the needs and the legal requirements. Most guns may be used with either lead or steel loads, and the shot size may be adjusted to the game being taken. Payload and velocity can be adjusted within the ranges specified by the manufacturer, but the shooter should stick to established loading data provided with the firearm.

Hunters using rifles and muskets should consult the state regulations for the game being taken and the season. Some states restrict the type of projectile or even the type of sights that may be used in special muzzleloading seasons. Most states have minimum caliber restrictions for big game hunting, and some have higher caliber requirements for larger species, like elk or moose.

Manufacturer's guidelines for powder types, powder charges and projectile types and weights should be followed religiously! Be sure that you are using data developed for the particular model of firearm you intend to use. Data developed for one model may not be transferable to another, even in the same caliber from the same manufacturer. If any doubt exists, contact the manufacturer for a set of loading tables for the arm in question.

Within the range of loadings available and recommended by the manufacturer the hunter needs to experiment to find the right combination of projectile, powder type and charge weight that produces the desired combination of accuracy and energy. In general, the bullet-shaped projectiles will be more efficient at retaining velocity and energy than will round balls. Some manufacturers have a variety of bullet weights available for their arms, and experimentation will lead to finding the one your rifle prefers. Accuracy is more important than minor differences in energy, but make sure the terminal energy is high enough to affect clean kills. A good general starting point for target loads is about one grain of powder for every caliber (for example 50 grains of FFg for a .50 caliber rifle). A good load for hunting may be considerably more potent. With accuracy and terminal energy considered, determine the maximum range at which you can realistically expect to take game effectively. Once that is determined, pass up shots beyond that distance.

Regardless of their caliber and poorly written game laws in some states, muzzleloading handguns are not suited for taking big game. With the relatively mild loads published, these firearms may be used for taking small game and varmints at fairly close range. The limit for a good shot might be somewhat less than 40 yards, and many shooters will need to limit themselves further to make consistently clean, humane kills.

Special Safety Precautions

Muzzleloading hunters must abide by all the same safety rules and guidelines followed by other hunters. The nature of their sport and the tools used in it adds another layer. The hunter must be a good hunter, a good shooter and a good handloader in order to be safe and effective. A few additional rules are listed here for your consideration.

No smoking, fire or flames around muzzleloaders. Black powder has an explosive burning rate. A single spark or ember from any source is enough to set it off. There is no room for error around black powder. No source of flame or sparks should be permitted anywhere near exposed black powder.

Keep all powder containers sealed except when actually measuring a powder charge. Any open container, from a powder horn to a can of powder is a potential bomb if a stray spark or ember can get into it. Since muzzleloading firearms tend to produce some sparks and embers when they are being used, make sure that you close all containers immediately after measuring the powder and before dropping the powder into the bore.

Always use a suitable powder measure to measure and transfer powder into the bore.

Using any container to pour powder into a firearm is an invitation to disaster! The small amount of powder dropped from a powder measure is a minimal hazard. The amount contained in a flask, bag or horn is much more dangerous. Never use one of these containers to transfer powder to the bore.

Handle all misfires with great caution. Occasionally a muzzleloader misfires. When it does, the shooter must keep the muzzle pointed in a safe direction, anticipating a delayed discharge for at least 10 to 30 seconds. After that wait, lower the firearm with its muzzle pointed downrange and wait another minute or so. Once you are sure that the firearm is not going to fire, clear the pan or cap, check bullet seating, and attempt to fire again.

Make sure all projectiles are firmly seated on the powder. All shooters know the dangers of an obstructed barrel. Failure to seat the projectile firmly on the powder charge creates a barrel obstruction.

Keep the barrel clean. Keeping the barrel clean prevents problems with bullet seating. In addition, wiping out the barrel between shots eliminates lingering sparks that could cause a nasty surprise when the next powder charge is dropped. A solvent, alcohol or saliva make good cleaning agents for this operation.

Develop consistent loading procedures to keep things straight. Practice and follow proper loading sequences. Remember to replace the ramrod before capping or priming the firearm. Joining the "order of the arrow" is not an honor in muzzleloading circles, and losing your ramrod makes hunting a whole lot more difficult.

Double check all doubles and your procedures. Checking yourself (and anyone else who handled a gun) can keep you out of difficulty. Check both barrels of double before and after loading. If anything is in doubt, pull the charges and start over! Develop a loading sequence that keeps things straight as you load the firearm.

NEVER put anything you need over the muzzle. Since the muzzle is the business end of the firearm, a wise muzzleloader shooter minimizes his or her exposure to the muzzle at all times. Some carry that so far as to push the ramrod home by hooking the tip of the little finger over the end of the ramrod and pressing the bullet home with it. Keep the muzzle pointed away from yourself and anyone else while loading. Finally, in spite of anything you might have heard or seen in the past **NEVER** blow down the barrel of a muzzleloading firearm to make sure it is empty. Someday it might not be! In addition, the moisture from your breath will react with the powder

residue to form acids that attack the barrel and you run the risk of ingesting minute quantities of lead, a toxic heavy metal.

Sharing and Exhibit Suggestions

1. Make your own "possibles bag", powder horn, patch knife, bullet block or other accessory for muzzleloader hunting.
2. Study the history of muzzleloading in America and report on the topic to your group.
3. Locate some muzzleloader hunters and ask them to explain why they choose to hunt with a muzzleloading firearm. Summarize your findings and share them with the group.
4. Take a hunting trip with muzzleloaders, record your experience in your journal and report your experiences to your group.
5. Build a muzzleloading firearm for use in a selected type of hunting.

Bowhunting

Until the 1960's most bowhunters were primarily seeking a primitive experience. Most of them savored the idea of going after game in a manner that mirrored a more primitive time. They accepted the need to make most of their equipment from scratch and knew there were only limited commercial products available to help them pursue their sport.

Today, many bowhunters still enjoy the challenge of getting within bow range of an animal and depending on their skills to make an accurate shot with equipment that takes more skill to master than modern firearms. But today, there is the added benefit of hunting seasons that are open only to archery hunters. These are seasons that take place at times when weather, minimal competition from other hunters and relatively unwary game makes bowhunting a very enjoyable endeavor. Just as importantly, the equipment available to the modern bowhunter makes it within reach for almost any dedicated hunter to master the skills to become a successful bowhunter.

Bowhunting skills.

Make no mistake, bowhunters must meet the challenge of stalking or luring game to close range. This close range makes it essential for a bowhunter to understand and heed the extraordinary sight, hearing and smelling capabilities of game animals. But meeting these challenges is what has made an increasing number of men and women join the ranks of the bowhunters.

Bowhunters need to learn and practice stalking skills. The importance of moving slowly and taking advantage of the quietest place to place a foot is a habit that must become subconscious. Soft soled boots, sneakers or even wool socks worn over your boots can help quite footsteps.

Learning to stay in the shadows and take advantage of cover is necessary to move close enough to game for a bow shot. Camouflage clothing is a great aid in getting close. The function of camouflage clothing is to break up the predator into non-threatening parts or to cause the predator to blend into the environment. The first type of camouflage is known as disruptive camouflage. It should feature some strong contrasts that tend to disrupt the outline of the hunter's body. The second type is cryptic camouflage. It should cause the disrupted form of the hunter to blend into the background. Most types of camo clothing involve the use of both strategies. Think about the cover, then plan the clothing to blend with it while disrupting your outline.

The construction of the clothing is also important to success and utility. The clothing should be soft enough to be quiet in contact with twigs and brush or during necessary movement in preparation for a shot.

Bowhunting is a close range affair that involves necessary motion. As a result, the bowhunter needs to pay attention to details of his or her camouflage. Bare skin shines. As contrast between the skin and the background increases the need for concealment increases. Head nets and gloves are one solution. The use of camouflage creams or waxes is another.

A good camouflage hat is very helpful to the bowhunter, as well. By shading the eyes it makes them less prominent. It seems to sharpen perception, particularly in areas with patches of sun and shade.

Staying conscious of wind and air currents is critical. More stalks have failed because bowhunter scent was detected than from any other reason. No amount of scent-cover or odor proof clothing will prevent a deer from smelling a hunter that is upwind. Carry a small bottle with baking soda that can be squeezed to expel a small amount of powder to indicate the faintest air currents.

The ability to spot hidden animals is especially helpful and can only be learned through practice and experience. Use binoculars. Look into the deepest shadows. Look for parts of animals such as an ear, an antler or a leg.

Learn to call game. Many species from coyotes to elk, deer, hogs and turkeys can be called into bow range. Numerous DVD's are available to get you started. Then have fellow hunters critique your skills. Then let the ultimate critic, the game animals themselves, teach you the finer points of calling.

Learn about the animals you hunt. Learn their habits and their habitats. Learn about their behavior. Then decide on the methods you would like to use. Spot and stalk strategies work well in some areas if cover provides stalking opportunities for spotted game. Ground blinds, pit blinds or just trail sitting can be effective hunting strategies.

Properly located tree stands can be great if the hunter has the patience to let the game come to them. It is very important that tree stand hunters practice from elevated platforms so they know the effect of shooting at a downward angle. Of course, ALWAYS use a safety harness when using a tree stand.

Learn to shoot your bow as a bowhunter. This is different than shooting at a range. Learn to judge or estimate distances accurately. The use of a rangefinder is recommended to ensure accurate shots. Before you hunt decide the maximum distance you will shoot. This means you must know your effective range. If you cannot put 5 out of 5 arrows in a pie plate at your maximum range, then reduce your maximum range!

Know when to draw and shoot. Draw when the animal is looking away or its head is behind an obstacle. Never shoot at a running animal! Make a bleating sound or a grunt to momentarily stop a walking animal so you have a standing shot. Always wait for a broadside or quartering away shot. Never shoot at an animal facing toward you or directly away from you. Learn about the anatomy of the animal you are hunting so you know the best place for a lethal shot. When shooting, pick a small spot to aim at.

Equipment

Today's bowhunter is faced with a bewildering array of tackle and equipment. Some of the items are essential. Some of them are very helpful. Others are merely gadgets or gimmicks designed to catch the eye of the bowhunter looking for every opportunity to improve chances for success.

Bows

The majority of modern bowhunters use compound bows of some design. These bows offer a mechanical advantage that reduces the draw force needed at full draw. That same mechanical advantage helps the archer extract more of the energy used in drawing the bow as acceleration for the arrow. The result is increased arrow speed and flatter trajectory. In spite of the mechanical advantages of the compound bow, many bowhunters prefer to use more traditional equipment. They use recurve bows or the traditional straight longbow. Most of them choose these tools for the history and tradition or aesthetic reasons, but they offer greater smoothness in the draw, better release characteristics and lighter weight as well. Longbows are usually self-bows, meaning they are one-piece bows; but take-down models are available for many recurve bows. This permits the archer to change limbs if desired or needed.

Selecting a Bow for Bowhunting

Many factors enter into the selection of a bowhunting bow. Adequate performance for the task at hand

is one of the most important, and personal preference rivals performance for the hunter. Using inadequate equipment violates ethical bowhunting principles. In most areas, it is also illegal.

Draw weight is one of the major considerations, regardless of the type of bow selected.

Experienced

bowhunters often advise using the heaviest equipment that can be handled effectively. Ability to handle the bow effectively is critical. The archer must be able to shoot it accurately and without discomfort or excessive movement. A bow that is too heavy for the shooter encourages poor shooting form and is likely to cause poor hits because of inaccurate shooting. Many beginning bowhunters tend to over-bow themselves, demanding equipment in the 60 to 80 pound range or even higher. For most applications, bows drawing 50 to 60 pounds are adequate.

Heavier bows tend to shoot faster, flatter trajectory arrows. This is even the case when they require heavier arrows to have adequate spine or stiffness. The heavier, faster arrow has greater momentum and achieves better penetration than a lighter, slower one. Cast is the ability of the bow to propel an arrow. The minimum performance criterion for a hunting bow should include adequate cast that allows complete penetration of the game animal being hunted using a razor sharp broadhead at the maximum range of shots taken. At that same distance the archer should be able to keep all shots in the animal's kill zone.

Since archers tend to develop an ability to handle heavier equipment rather quickly, adjustable draw weight is an advantage. An archer could start out with a bow set at about 45 pounds and increase the draw weight to 60 pounds as their strength and endurance increase. The same advantage can be attained by the ability to interchange limbs. A light set of limbs, perhaps 35-45 pounds, could be used for target shooting and summer practice; and a heavier set in the 55-65 pound class could be used for hunting. With a little practice, most archers can easily adjust to that level of change.

The materials used in constructing the limbs govern their potential performance. Solid limbs may be more durable, but laminated limbs are lighter for the same strength. That results in quicker recovery and greater arrow speed. Boron or graphite fibers are stiffer and lighter than glass, but they are also much more expensive.

Limb design also has an impact on performance. Recurved limbs and reflexed limbs may provide more cast than a comparable straight limb. Shorter limbs provide quicker recovery at the cost of smoothness in the draw, "stacking" (rapid increase in the drawing effort required) and finger pinch from the sharp angle between the drawing fingers and the limb tips. The mass of the wheels or cams and their hangers also affects limb speed and arrow speed.

The form and construction of the handle and riser section of the bow is another major consideration. The weight and length of the riser affects the stability and "feel" of the bow. Metal risers are very cold under cold hunting conditions. Wood risers tend to be better insulators but may be heavier, more bulky and less strong. Insulating grips or saddles for the shooting hand can reduce the icy feel of a metal riser, but they may alter the shape of the riser with impacts on shooting form. The riser may be equipped with an arrow shelf, rest, cushion plunger, adjustable arrow plate or overdraw. Any of these must be compatible with your shooting style. Overdraws permit the use of a shorter, lighter arrow for increased speed and flatter trajectory. While this makes errors in range estimation less critical, it reduces the mass of the arrow with potential impacts on penetration. (Remember, a broadhead kills by penetration ($\text{mass} \times \text{velocity}$), not kinetic energy ($\text{mass} \times \text{velocity}^2/2$). Use of the overdraw also demands greater precision in shooting form, since the pivot point for the bow and the pivot point for the arrow are not in the same plane.

The physical weight and size of the bow may be important considerations. A bow that is excessively heavy will be tiring to carry in the field, increasing the need for movement when game is sighted. It also will be more tiring to shoot until stamina is developed. The heavier bow will be more stable, however.

The accessories available for the bow and their ease of attachment may be considerations as well. Nearly every manufacturer has a mounting system that matches their equipment with their bows. Consider the stability of those mounts and the ease of using them. Notice whether they are quiet or noisy during the draw, shooting or in transport. Are the sights or other accessories of acceptable and useful design for you? All of these things and many more are part of selecting a hunting bow.

Arrows for Hunting

An old Indian is reported to have said, "Any bow, good bow. Arrow much work." Arrows must be straight, matched in mass and spine to the bow for best performance. Arrows flex around the riser of the bow in order to fly straight, even with bows cut to true centershot. This is known as the archer's paradox. Paradox is much more significant for finger shooters than for those using release aids, and it factors into the tuning process for the bow. The spine or stiffness of the arrow determines how much the arrow will flex during the release. An arrow that is too soft will tend to curve around the bow, striking to the bow-hand side of the intended point of impact. One that is too stiff will tend to fly to the string-hand side. In general, bowhunters should err on the stiff side rather than the soft side, since the mass of the broadhead and the length of the arrow both tend to "soften" the arrow's spine. Use a manufacturer's chart for a starting place, but experiment to see which arrows give the best performance in your bow as it is set up.

Shafts may be made of wood, fiberglass, graphite, aluminum or some combination of those materials. Each type of material has advantages and disadvantages for the bowhunter. Wood is the traditional material, but it is difficult to match completely and to keep straight. Each of the other materials is more easily matched in mass and stiffness. Aluminum (particularly premium grades) and graphite currently dominate hunting shafts. Some health concerns have been expressed with graphite shafts because tiny splinters of the material may become imbedded in the flesh around the wound. These thin, stiff fibers can penetrate the digestive tract, causing severe problems if they are swallowed. Shooters using graphite arrows are advised to cut out the area around the wound channel and discard the flesh where it cannot be eaten by pets or other animals.

Arrow mass is important. It contributes to conservation of momentum when the arrow is in flight. It contributes to consistency in the point of impact if variations in mass are allowed. It also dampens the shock of the bow being fired. The current AMO (Archery Manufacturer's Organization) recommendation for arrow mass is six (6) grains for every pound of peak draw weight. Shooting arrows weighing less than that standard is the equivalent of dry firing the bow and may result in bow failure.

Fletching - Fletching is used to stabilize the arrow. In general, bowhunters use two types of fletching

materials - feathers and vanes. Feathers are the traditional fletching material. Most commercial feather fletching comes from the flight feathers of turkeys, but feathers from other large birds, like geese or swans, could also be used. Feathers are softer and more air resistant than plastic vanes. They are essential for any bow that shoots off the arrow shelf. Since feathers create greater drag than do vanes, they are somewhat more forgiving of release variations; and they tend to dampen arrow movement more quickly. On the negative side, they also make more noise in flight, producing a hissing or whooshing sound. Because of their structure, they are affected more by wet weather than are plastic vanes.

Plastic vanes are generally constructed of a soft, resilient plastic that is highly resistant to weather and extremely consistent in performance. They require the use of an arrow rest for optimal performance.

They have less air resistance than feathers, resulting in less drag, higher arrow speed and less "forgiveness" compared to feathers. Vanes are quieter in flight than feathers, but the hiss or whoosh may be replaced by a high pitched whine from aluminum shafts. Their durability and resistance to weather make vanes a preferred type of fletching for many bowhunters.

A perfectly shot arrow from a perfectly set-up bow might require no fletching at all. Unfortunately most people are not perfect, particularly when they are excited and trying to make a good shot on a game animal. An adequate amount of fletching compensates, at least partially, for those errors in shooting form and bow tuning. Increased amounts of fletching result in decreased arrow speed, but speed is traded off for control and stability. Heavy arrows with heavy heads require larger amounts of fletching. The standard in hunting arrows is approximately 15 to 16 inches of vane or feather divided into three or four sections. Three-fletched arrows generally use three, five-inch feathers or vanes set at equally spaced (120°) locations around the shaft. Four-fletched arrows usually use four, four-inch feathers or vanes set at either equal 90° intervals or at 75° and 105° for greater cable clearance on compounds. With three-fletch, an indicator feather (cock feather, to old timers) should be facing away from the sight window, while four-fletch has no index vane to consider.

Either type of fletching may be applied in several ways. Straight fletch, where the fletching material is in alignment with the axis of the shaft offers the greatest speed-and least control. Off-set fletching is merely straight fletch aligned at a slight angle to the axis of the shaft. It offers slightly more control at a minor loss in arrow speed. Helical fletching places the fletching in a spiral relative to the long axis of the shaft. It offers the highest level of control and loss of speed among the three types. Most serious bowhunters use off-set or helical fletching to increase flight stability, preferring to trade some speed for better accuracy under variable conditions.

Other fletching styles may be used for specialized conditions. Arrows used for birds or small game may be fletched with full-length feathers wound around the shaft or with six, full height feathers. These fletching styles, known as flu-flus, control the flight of the arrow, slowing it to a halt relatively quickly and making recovery of the arrow easier.

Arrowheads- Bowhunters use a wide variety of hunting heads and several means of attachment for them. Many prefer to use screw-in points that may be changed quickly when desired. Using a lubricating material, like petroleum jelly, on the threads of these screw-in adapters is vitally important. It prevents the materials in the adapter and the point from reacting and corroding the parts together permanently. On the other hand, the heads should be checked for tightness before being used. Losing a broadhead in flight to a perfect shot can be a bit frustrating.

When selecting target or field points for practice or small game hunting, the wise archer matches the points with his or her broadhead for performance. Since the critical shooting takes place with the broadheads, tune the bow for them; then find a field or target point that shoots to the same point of impact. Many small game bowhunters use blunts constructed of rubber, metal or hard plastic.

Choosing a broadhead usually results in a great deal of opinion among bowhunters. They all agree on a few points:

1. The broadhead must be razor sharp.
Razor sharp edges cut blood vessels effectively. Dull blades do not.
2. The broadhead must be large enough to kill quickly.
The minimums are often stated in law, but cutting widths of between $\frac{7}{8}$ and $1\frac{1}{4}$ are most common.
3. The broadhead must fly true and in a predictable manner:
Everyone has a different opinion about which ones fly best, but vented blades seem to be more easily tuned than solid ones and the bow needs to be tuned with the broadheads just as they will be used in the field.
4. The broadhead must be durable and tough.
Fragile broadheads may come apart if they hit bone, losing their integrity. The broadhead should remain functional even if it hits bone on the way in.
5. The broadhead must not be barbed on the back side.

Ethical considerations demand that an arrow be easily removable so a non-vital hit animal can pull it and allow rapid healing to take place.

After these points are agreed upon, the debate begins in earnest. Some archers prefer broadheads with replaceable, pre-sharpened blades. Others prefer fixed blades that can be sharpened and honed to razor sharpness by the archer. Among those who sharpen their own, some prefer a filed edge, leaving a fine wire edge on the steel. Others use stones and a razor strop to put a highly polished edge on the steel. Jagged edges and "teeth" tend to clog with hair and fatty tissue, reducing the effectiveness of the head; so even though they look wicked and effective, they should not be used.

A few archers prefer a two-bladed design where only two cutting edges are provided. Some prefer as many as six cutting blades. Most archers are shooting broadheads with three, four or five cutting edges. These may be sharp to the tip of the head, dubbed off at the end to form a chisel point designed to slide off heavy bone, or conical at the tip. The so-called "punch point" heads have both supporters and detractors. Supporters usually comment on the quality of the blood trail. Detractors usually express concern about adequate penetration. The best advice is to try several types on hay bales, sand banks or sawdust piles before using them on game. Carefully observe their performance on game animals, and stick with one that works well for you and gives you confidence.

Hunting archers also find ample use for some specialty heads. Small game hunters and big game hunters looking for a tune-up arrow often use spring-loaded heads, like the judo head. The spring-loaded wires projecting from the head tend to make it stand up in cover, making it easier to retrieve. Bird hunters may shoot heads featuring wire loops or even a set of steel darts to increase the effective size of the arrow. Bowfishermen use some form of harpoon design to hold the fish on the arrowhead until it can be retrieved. Turkey or pheasant hunting archers often use some type of device to limit penetration and keep the arrow in the bird.

Quivers

Although bowhunting is usually a one-shot game, most archers carry more than one arrow. Some form of safe, secure and convenient arrow carrying system is needed. Several types of quivers are available.

Bow quivers are convenient to carry, and they place the arrows within easy reach without demanding too much movement. They add to the weight of the bow, but that added weight may tend to stabilize the bow during a shot. They have a relatively limited capacity. The exposed fletching may attract attention from some species or create a flash of color when the bow is moved. Bow quivers must completely cover the broadheads and keep them securely in position to protect them from damage.

Hip quivers share many characteristics with bow quivers. Their capacity is relatively small. The heads are well covered and well protected, but the exposed fletching can be a source of attention. They may be a bit noisy when moving through heavy cover, and their open design attracts leaves, twigs, other debris as well as water or snow. They are easy to use with minimum movement that is easily concealed. They are also light and comfortable to wear.

Back quivers come in several styles as well. Some designs hold each arrow individually with either the broadhead or the fletching covered by a hood or cowl. They are relatively cumbersome and may be very noisy when moving through thick cover. They do offer greater capacity and some shielding for the part of the arrow that is inside the cowl or hood. Motion required to remove an arrow can be concealed behind the back, but where cutting edges are exposed there is some risk of injury to the fingers. **Traditional back quivers** generally offer inadequate

protection for the broadheads, allowing them to dull each other or to be dulled by contact with the quiver material itself. They can be noisy, even when stuffed to reduce arrow rattle; and the motion required to remove an arrow is high and relatively obvious. Their greatest advantage is large capacity.

Bowhunting Clothing

Bowhunting is a close range affair. It demands that the hunter be able to get close to his or her prey or

that the animal be allowed to get close to the hunter. That requires the hunter to be quiet and concealed

in some fashion. Many camouflage clothing patterns exist for a wide variety of habitats and conditions. Its base color, mix of colors and pattern contribute to the utility of the garment. Camouflage exists in leaf patterns, striped patterns, bark patterns, desert patterns, white or snow patterns and brightly colored "safety" camouflage. In addition to the various patterns, camouflage clothing comes in a variety of color combinations. For animals that see color (most do so to some extent) an excellent pattern that differs sharply in color or intensity from the background still stands out. Very dark camouflage is often best in country dominated by evergreens. Green-on-green camouflage is excellent for late spring and early fall. Brown-on-brown camo may be the best choice for late fall through early spring. Think about the cover, then plan the clothing to blend with it while disrupting your outline.

Clothing should be roomy enough to allow freedom of movement and to permit the hunter to layer clothing for the variety of conditions that might be encountered on a hunt. At the same time, it must be controlled to keep the clothing from interfering with the string on a shot. Hunting style and local conditions will dictate the type and variety of clothing needed, but even hunting from a stand involves a combination of active and passive phases. Dressing solely for either phase is an excellent way to be miserable during others. Careful selection of clothing and layering, are two of the best ways to avoid over-heating and chilling. For those who do their hunting under cool or cold conditions, avoiding wind chill and hypothermia are critically important considerations.

The hat is also important in regulating body temperature. In cold environments a stocking cap may be a wise choice, but Jones-style hats with a relatively short bill are most commonly used. Folding down the side and rear portions of the brim provides some extra concealment and breaks the outline of the head. The short brim does not interfere with the string at full draw, as some other types of hats may.

Foul weather protection is another important concern. Being prepared for foul weather can add substantial amounts of hunting time. The archer must consider both their personal protective gear and ways of preparing their equipment for inclement weather. The key is to keep all of the equipment, including the body parts, in functioning condition under the existing conditions.

An additional clothing or gear consideration involves adequate cargo space for the additional gear being carried on the hunt. Pockets, a fanny pack, a day bag or some other type of cargo carrier may be used.

Bowsights. Bowhunters who shoot instinctively (without sights) can be very successful. They accept the limitations of this choice and limit their hunting range accordingly. Shooting instinctively requires a great deal of practice. Bowhunter who use sights have a wide variety of choices. Try many different types and stick with one. Avoid too many sight pins. Many shots have been missed because the bowhunter picked the wrong pin in the excitement of a quick shot and many decisions to be made in a short time. A properly sighted bow can use one sight pin for all shots under 35 yards.

Other Bowhunting Equipment and Accessories

Safety and Comfort – Every bowhunter should carry a basic set of safety equipment adapted to their hunting area. A basic first aid kit, particularly materials needed to handle minor cuts and scrapes, is essential. Blade injuries are among the most common circumstances requiring first aid. A simple cut on a shooting finger could be a hunt ender unless the bowhunter is prepared with an adhesive bandage to cover, protect and pad the cut. In some areas or for some persons, the kit may need to be expanded to include essential medications, an insect sting kit, a snakebite kit or similar materials. The camp or car kit should be more comprehensive.

In addition to the first aid supplies, the archer should be prepared with a basic survival kit suitable to the terrain, climate, weather and circumstances. At a minimum; the archer should carry emergency shelter (like a light mylar sheet), signaling equipment (shooting three arrows in the air does not usually bring help), a map of the area with a compass and knowledge of how to use them and a lighter or waterproof matches. Many archers include a headlamp or miniature flashlight with fresh batteries.

Several other items could be considered part of the safety equipment. A broadhead wrench is essential for handling sharp broadheads safely. Any tree stand hunter must use a safety belt or safety line. He or she also needs a hauling line to hoist or lower their equipment. Certainly water to keep hydrated is always a consideration.

Game recovery can be aided by carrying some type of trail marking material. Hunters should mark the spot from which the shot was taken, the spot where the animal was standing at the shot and the last place the animal was seen. A sparse blood trail can be a challenge unless the back trail is adequately marked to help predict the direction the animal has taken. Many marking materials are useful. Some archers prefer toilet paper because it breaks down quickly when it gets wet. That does not require retracing the route and removing the marker after the animal is recovered. Others prefer engineer's flagging tape in a bright color. Although it must be removed after the animal is recovered, the bright colors are easy to see. Roll about 10 to 15 yards of the material in a small cylinder and tape it down with masking tape. Two or three of these packages take up very little space in a pack or pocket, and one is usually plenty for most recovery tasks, even when the animal is leaving a sparse blood trail.

A large plastic bag is an excellent addition for transporting the liver, heart and/or kidneys. A fairly light block can help a lone bowhunter handle an elk or moose. A large can of black pepper or a spray bottle of pepper solution (e.g. Liquid Game Bag) can be a significant aid in fly control during warm weather. For personal safety, hunters may want to use field dressing gloves (kitchen gloves work just fine) when dressing animals that might carry brucellosis, tularemia or similar diseases.

Conclusion

Bowhunting is an exciting and demanding sport. It requires preparation, adequate equipment and knowledge of proper use. Study the sport. Talk to other bowhunters. Read about tools and techniques. Most of all make the tools and your personal selection of gear fit the task, terrain, climate, weather and other conditions that affect your circumstances.

Exhibit and Sharing Suggestions

1. Develop a bowhunting equipment checklist and share it with other members of your club or group.
2. Shoot a series of shots using a variety of arrows with different stiffness to determine the best size and spine for your bow. Share the results with other members of your club or group.
3. Assemble a first aid kit, survival kit or field dressing kit to carry in your day bag or pack. Share the contents with other members of your club and discuss the reasons you selected the components,

Hunting with a Camera- Wildlife Photography

Wildlife photography is not the same as other types of hunting, but it shares some characteristics with those other types of hunting. Many people enjoy photographing wildlife and outdoor activities. It allows them to "hunt" during closed seasons for game animals and provides a chance to seek non-game species throughout the year. It gives them a means of recording their outdoor experiences for later use, telling the story of the trip, capturing trophies in photos and making lasting reminders of special memories.

Photography differs from hunting in several ways. The game is captured at light speed and in straight lines, not with the comparative slowness of bullets, shot or arrows. Like bow hunting, photography is a close range sport. Often wildlife must be extremely close before a quality photograph can be taken, although, photographers should always respect the animal and keep as far of a distance as possible. Unlike the rest of hunting, the hunting photographer must worry about framing and composition of the photograph.

Good wildlife photographs are relatively rare jewels. They have a structure that require either great luck or plenty of planning and work to obtain. Since most of us are not overwhelmingly lucky, we must rely on understanding and practicing some principles of photography and knowledge of the animal and its habitat.

Inside the Digital Camera

An array of cameras is available to photographers today. Although some professionals and traditionalists still use film cameras, the advancements in digital cameras have been dramatic and now define the industry. The quality of the picture and the flexibility to vary light and speed settings make digital cameras the choice for most photographers. This chapter will concentrate on digital cameras.

The sensor in a digital camera is made of millions of tiny light-sensitive squares called photosites. In a photograph, those same squares are called pixels. Digital cameras are rated by how many pixels or photosites are on the sensor. For example, a 10 megapixel (MP) camera has 10 million photosites on the sensor. Today, mobile phones have higher megapixel cameras than the professional cameras from ten years ago. Common megapixel counts are between 10 and 16 for consumer and amateur cameras and all the way to 80MP for professional cameras costing \$40,000. It's important to know that not all megapixels are created equal. The quality of the photograph depends not only on how many pixels in the sensor but also the software in the camera and quality of lenses. A professional camera with 6MP can produce a better quality photo than an amateur camera with 12MP because the professional camera has a better computer processor.

Storage media and file types

Once photos are captured, they must be stored in the camera until the photographer is ready to transfer them to a computer. The photos are stored as files.

The files can be compressed without a significant drop in quality using JPEG (Joint Photo Experts Group). JPEG is designed to take image data and compresses it while only losing some information related to image quality. The more you compress, the smaller the file but the more information you lose. A file can be reduced by a factor of 10 and still get a very high quality image. Files can be saved without losing information by using TIFF (Tagged Image File Format) . This will keep all the original information, but the files will be much bigger.

There are several different memory cards used in digital cameras. Unfortunately they are incompatible and not interchangeable.

- The Compact Flash (CF) was the first memory card. It is larger than the others and available in capacities up to 2GB. CF cards tend to be cheaper than any of the other forms of solid state memory. CF cards contain their own disk controller, so that makes the camera electronics simpler.
- Secure Digital (SD) are very small and have a built in protection to prevent accidental erasure.
- Smart Media are thinner than CF cards.
- XD were developed and used by Fuji, Olympus and Toshiba. They are smaller than SD.

After your camera hunt you can transfer shots to your computer for editing, emailing, printing and archiving. Cameras connect to your PC or Mac via USB. The best way is to have your camera act as a "USB Mass Storage Device". Plug in the cable and your camera appears in Windows and Mac's as a removable drive from which you can simply copy the image files.

http://photo.net/photodb/photo?photo_id=1418353 Another option is to buy a USB memory card reader. These come with a number of different slots supporting all popular formats.

Lenses

There are two kinds of lenses: fixed or prime and zoom. Prime lenses have only one focal length and are of very high quality. Zoom lenses can change focal length. Lenses are commonly available in focal lengths from about 17 mm to over 800 mm. A 50 mm lens gives the appearance of a 1 power telescope, making an 800 mm lens approximately equivalent to a 4 power scope. Longer lenses carry much higher costs but they permit the photographer to fill the frame with his or her subject from a greater distance.

Most compact cameras have both optical zoom and digital zoom. Optical zoom works just like a zoom lens on a film camera. The lens changes focal length and magnification as it is zoomed. Image quality stays high throughout the zoom range. Digital zoom simply crops the image to a smaller size, and then enlarges the cropped portion to fill the frame again. Digital zoom results in a significant loss of quality and if you don't have it in your camera, you can do a similar job using almost any editing program.

http://photo.net/photodb/photo?photo_id=1412490 Zoom lenses for digital cameras can be of questionable quality and a fixed lens is the higher quality option. Fixed lenses are only offered on the lower resolution models. Those are usually cheaper and much higher quality than their zoom versions.

Because digital cameras have a 1.5 x smaller image area than a 35mm negative, they only need a short focal length lens to achieve the same magnification. A 35-70mm zoom lens will act the same as it did on a 35mm point and shoot. Although the 35mm equivalent is the same, you actually have a 7mm lens, so almost everything in the frame is in focus. If you want wide angle such as a 28mm, you will need a camera at the higher end of the scale. However, for some mid-range cameras you can get a wide angle adapter which is mounted in front of the lens. A 50mm lens mounted on a digital SLR would create the appearance of a 75mm lens. The lens is still a 50mm focal length, but the smaller sensor crops the edges creating the illusion of a longer lens. This can be a great benefit for wildlife photographers as a 300mm lens appears to magnify the subject like a 420mm lens.

The focal lengths of lenses are grouped into categories. Common categories are macro, wide angle, standard and telephoto.

Macro lenses are designed for very close focusing distances, taking larger than life photographs of smaller subjects. Insects and similar creatures are often best photographed with a macro lens. Many zoom lenses are capable of macro use as well as telephoto use.

Wide angle lenses are focal lengths from 8mm to 35mm and they produce an image that captures a wider field of view than the human eye. Standard lenses can be from 40mm to 70mm and the resulting image has a field of view that is similar to the human eye. Telephoto lenses magnify the scene and have a very narrow field of view. These can be from 85mm to 1,200mm.

Lenses contain an important mechanism, called aperture that helps control exposure. The aperture is an opening in the lens that allows light to pass through to the camera sensor. The aperture is created by several blades that can move to create a larger or smaller opening or aperture allowing more or less light to enter the camera. The term to describe the size of the aperture is called an F-stop. The sizes range from f22 to f1.8. The numbers are actually backwards. f22 is a very small opening or aperture and f1.8 is large. F22 allows only a little light to enter the camera and f1.8 allows a lot of light. F1.8 lets more light into the camera than f22. Not all lenses have all apertures. For example some lenses might only go from f4 to f22. Larger apertures, f2.8 and larger, are difficult to manufacture so these lenses tend to be more expensive.

Aperture can be used as a creative tool. An aperture like f22 will make the majority of a photo look very sharp. By comparison, f2.8 might only allow a very small area of focus in a photo. This is why the background behind an animal in a wildlife photo often looks out of focus and why landscape photos look very sharp all the way from the foreground to the background.

Sensitivity settings on digital cameras are the equivalent of ISO ratings on film. Just about every digital camera will have settings with a sensitivity equivalent to ISO 100 all the way to 6400. Quite a few digital cameras have an "auto" ISO setting, where the camera will pick the best ISO to allow for the brightest, sharpest photo.

Another mechanism in the camera that works hand in hand with the aperture in the lens to control exposure is the shutter. The shutter is like a curtain that opens and closes in a specified amount of time to control how long the light gets to expose the sensor or film. Shutter speeds are a description of time. Shutter speeds commonly range from 1 second to 1/8000 of a second. Cameras even have settings to allow the shutter to stay open as long as the photographer wants. This is useful when photographing low-light scenes like fireworks or cityscapes at night.

The aperture and shutter work together to control exposure. It's like a seesaw. If one goes up, the other must come down. They balance each other.

*Any easy way to think of it is the aperture determines how much light gets to come into the camera, and the shutter says how long the light gets to stay.

Exposure describes the brightness of the photo. If a photo is too bright it's called overexposed. If it's too dark it's called underexposed.

Modern cameras have auto-exposure capability and the aperture and shutter speed settings are set automatically by the camera to make (what the camera believes to be) the best exposure. Most cameras also have a fully manual exposure control allowing the photographer to determine the exposure. This can be tricky but also provide the photographer with complete control.

Light ... the Medium of Cameras

The good news is that today's cameras will take care of all the light management if we want them to. We select the situation setting on the camera and the internal electronics and sensors automatically determine and set the proper speeds and exposures. However, understanding what is going on will help us take better pictures. Also, certain situations will require us to make manual selections to optimize the picture or create an effect that is desirable.

Light is an enigmatic phenomenon. It moves as electro-magnetic waves, but it acts like particles or packages of energy. Variation in the wave lengths produces different colors as they are perceived by our eyes. Like our eyes, cameras are sensitive to specific wave lengths of light. Thus, photography is the management of light.

Sunlight carries the full spectrum of visible light. To us that light appears as white light. Sunlight is adequate for most photographs.

Sunlight can be direct, reflected or diffuse. Its intensity determines the amount of light affecting our picture. Thus, cameras have different exposure settings (combinations of shutter speed and lens aperture) for different light conditions. While bright, direct sun might require a quick shutter with an aperture like a pin hole (f16, for example) a photograph taken in deep forest shade under those conditions might need to have a much larger aperture (f2, for example) with a longer exposure. Generally full sun and a bright overcast permit the use of small apertures and fast speeds, while dull overcast, shadows or dawn and dusk situations require longer exposures and slower shutters. With the appropriate settings, good moonlight may be adequate for acceptable pictures, and we can take campfire shots if a long enough exposure time is used.

Artificial light is frequently needed to assist in getting the proper exposure or to give the photograph a better appearance. Photographic flood lights are outstanding light sources. They have excellent color balance and are easily adjusted for the purpose, but they are designed for studio use. Making use of them in the field requires a major logistical effort that most amateurs are not willing or able to make.

Some photographs wind up being taken indoors. Indoor lights usually do not have the color balance of sunlight, causing them to impart different colors to the exposed film. Incandescent lights shed a warm light that gives a yellowish or pale orange wash to the film. Fluorescent lights vary in wave length, but many of them have a cool light with a bluish cast that results in pictures that appear to be under exposed. Using a fill-in flash can eliminate most of the influence of ambient indoor light.

A wide variety of flash units are available to the photographer. Some cameras carry a built-in flash. The metering system on the camera may trigger it automatically when light levels are too low or the photographer may select it. Other cameras have a flash unit that is mounted on the camera. These may be dedicated flash units that form an integral part of the camera when attached or units that are linked to the shutter by cable. Remote flash units are also available, acting independently of the camera, but linked to it by cable to trigger the flash at the appropriate time. Even in outdoor contexts, the wildlife photographer will find ample use for a quality flash unit.

Light has color. You can see this late in the day when the light seems really warm and at noon when everything is very crisp and almost blue. Artificial lights have color too. Fluorescent light tends to look green in a photo and tungsten lights can look yellow. This can all be balanced in digital cameras with white balance. The camera measures the light in a scene, and then automatically adds the opposite color to what it sees to make the colors appear neutral or correct. On many cameras you may get better results if you manually set the white balance if you know what your light source is. Most digital cameras have settings for *sunlight*, *shade*, *electronic flash*, *fluorescent lighting* and *tungsten lighting*. Some have a *manual* or *custom* setting where you point the camera at a white card and let the camera figure out what setting to use to make it white.

Using Light

When using ambient light, the shutter speed and/or aperture setting are adjusted to permit access of the appropriate amount of light. That light can be managed in several ways. Subjects that are lit from the front or at an oblique angle will present a much different image than those that are back-lit. Reflected light may be used to create images that differ sharply from those in direct sun. Screens or other types of light diffusers may be used to reduce shadows and cast a more uniform light over the image being recorded. Waiting for a desired sun angle can add shadows for depth and contrast, which can increase the pattern and contrast in the image. Even moonlit scenes or wildlife can be recorded if the combination of aperture and shutter speed can be adjusted properly. Sometimes it is even desirable to shoot at slow shutter speeds in order to show movement on the image - e.g. shooting running water or wispy fog.

Seeing Through the Camera's Eye

Composition, the arrangement of elements in a photograph, is often the key to the impact and aesthetics of the photograph. There is a natural tendency to center the subject in the frame. Photos can be made more interesting by using composition techniques.

Photographers use several techniques to make sure their photos are interesting.

Rule of Thirds: Imagine the photo image area is divided into thirds along the horizontal and vertical axis. Many cameras even show these grid lines in the viewfinder. Professional photographers will compose the photo so the main subject lies along one of these thirds or at the intersection of them. For example, if you're photographing an elk, rather than placing its head right in the middle of the frame, place it to one side, either left or right. If you were photographing a landscape, try to place the horizon line on the upper or lower third of the frame. This technique leads the eye through the photograph.

Patterns and repetition: Photos can be very interesting if there are patterns or repetition of objects in the image. For example, the repetition of leaves on a tree or the patterns created in the bark of the trunk or sand on a beach.

Leading lines: Look for objects that will lead the viewer's eye through the images. For example, a stream in the foreground can lead the viewer's eye toward mountain in the distance.

Showing or freezing movement can also be a compositional tool. Movement may be simulated by slowing the shutter speed to create the illusion of motion in such features as wisps of fog or turbulent sections of streams. Timing can also stop a subject in a pose that shows action. Further, the use of candid shots of people and their trophies, dogs on point, or similar features provides a sense of drama and reality that cannot be provided as effectively with stilted poses.

Even slight changes in the camera position and perspective relative to the subject can make dramatic changes in the impact of a photograph. Experiment with shots where the camera is level with the subject or either below or above it. Consider shots from unusual angles to create special effects in the photograph. Even if your experiment does not work to your satisfaction, it may lead to a much more dramatic photograph of another subject in another place at a later time. Remember that "level with the subject" means that the camera is on that level, not that the line of sight is focused on the subject's level. Thus, photos of small animals and plants might best be taken from the prone position if that shot is desired.

Some spectacular shots can be taken by using reference points in the photographs to produce a series of shots that form a panoramic view. While these may take considerable effort to shoot, they can be very special sets of photographs. Other references may be included in a photograph as indicators of size. Traditions place coins, lens caps, pocket knives or similar indicators in the photograph. These objects tend to distract from the subject, although they may be very useful to

the scientist who is looking for specimen photos. A better solution to the need for scale in the photograph is to include common materials that give that scale in a relative fashion. Dead leaves, flowers or similar objects can give an excellent size perspective without drawing attention away from the subject.

Elements of the Picture

A photograph contains a primary subject and a background. In some instances secondary subjects may also be displayed. The primary subject should be the focal point of the photograph. The locations of other objects and subjects should provide a composition that complements or draws attention to the subject. Background should be selected for that purpose or deliberately rendered out of focus to eliminate clutter or confusion from the shot. Observe the work of a good illustrator. You will see that the important things are emphasized and those that are superfluous are eliminated. Although the reality of photography does not permit the selective elimination of elements without some sophisticated techniques, the photographer can use the simplicity of illustrations as a guide to taking photos that contain a clear message without visual or mental confusion. Frame the picture from several vantage points until you locate one or more that state the message best, then take those photographs. The set up time, when it is available, is well spent and yields much better results than trusting to luck for quality shots.

Focal length may be dictated by the equipment you have on hand. If a choice is available, consider the impact of different focal lengths of the nature of the picture. Normal lenses tend to give an image very much like the one recorded by the unaided eye. Close-up lenses enlarge the subject. Wide angle lenses broaden the view while tending to give some curvature to the visual field. They take excellent panoramas, but they may distort the view particularly toward the edges of the frame. Telephoto lenses have a tendency to flatten the field of view, distorting depth perception to some degree. Each of these types has a value and is best at some purposes. With zoom lenses, the photographer can tinker with focal length to get the best shot possible.

When your shot is fully set up, take a few moments to make a final check. Does the photograph tell the story you are trying to capture? Are the mechanics of camera operation set properly? The final check makes sure that you get what you have worked hard to obtain. If everything is right shoot the photograph. Wisdom leads most of us to shoot several more, bracketing the shot to make sure we have gotten the appropriate exposure and to try other angles and compositions that might prove useful. Getting the shot of a lifetime could mean taking an extra exposure or two when a rare opportunity is presented.

The importance of keeping a record of your efforts cannot be overstated. At a minimum your photographic journal should state the subject, location, time of day, conditions and type of equipment. These data are your key to learning and being able to repeat something that worked very well. Journals detail in permanent form those things that are all too easily forgotten.

Other Equipment

Any outdoor photographer will find many uses for some additional equipment. A strong, solid and sturdy tripod is an extremely valuable tool. It provides a steady platform for photographic work, even with very long lenses or long exposures. Some photographers prefer to use a gunstock mount, in which the camera is supported by the shoulder and both hands. Both the tripod and gunstock mount call for the use of a remote or cable release. That minimizes disturbance of the camera during the shot. Sunshades keep light flares off the lenses and prevent strange bright spots in the photograph. They also help to camouflage the lens, whose round shape resembles an eye - a threat to prey animals. Filters can also be useful, reducing glare, haze or other conditions that might alter the character of a shot.

Proper lens cleaning equipment is also important. Outdoor photography may expose the camera to harsh or dusty conditions. An air bulb with a soft brush can be an excellent dust remover. Many photographers carry a supply of "canned air," dry pressurized air that can be used to blow dust off lenses or camera parts. Nothing harsher than lens paper or lens cloth should ever touch the camera's lens, and shutter screens can be damaged easily if they are subjected to handling.

Photo processing

Once photos are transferred from the camera to a computer, they must be processed. This can be as simple as making them a good size for emailing or as complicated as preparing them for publication in a magazine.

Although it is beyond the scope of this chapter to give details on how to edit your pictures, here are some software options to help you process photos.

- **Adobe Photoshop Elements** has most of the features you will need and it is very user friendly.
- **Paint Shop Pro** is affordable, easy to use and comes highly recommended by a number of users.
- Apple Aperture and Adobe Lightroom are both software that create a 'digital darkroom' environment for photographers allowing them to quickly process photos.
- Google Picassa is a free software that has much of the functionality as the more expensive programs.

Before taking the actual picture, a camera needs to focus, work out exposure and do many other things to be ready to record the image. The time it takes from pressing the shutter release to taking the picture is called *shutter lag*. It is a problem in many digital cameras. This delay is different in all cameras and a long shutter lag might make you miss that trophy photo. You can minimize this by pre-focusing. When you press the shutter release half way, the camera will focus, set exposure and if needed charge the flash, indicating in the display or viewfinder when it is ready. Keep the shutter depressed half way until the best moment and then press it fully. The camera will then take the picture almost instantly.

Using Your Photographic Skills

Your photographic skills will find many avenues for expression in outdoor activities.

Photographing hunting, fishing or camping trips is one obvious set of uses. Telling the story of a trip includes the need for photographs that are often overlooked. Planning, preparation and travel are seldom recorded unless the photographer develops a shooting script that includes capturing those shots on film. The photographer also must be prepared and ready to shoot some scenic photographs, habitat shots or other background shots for the event. Memorable moments often come without warning. Being ready with the camera can produce shots that cannot be duplicated without massive effort. Action photographs are often difficult to obtain. The best advice is to shoot plenty of the ones you think you want. Great actions shots are possible, but they demand anticipation of the event, preparedness and just a little luck. One renowned wildlife photographer, whose collection includes more than 10,000 slides of Canada geese, stated that getting one publishable quality picture out of 40 shots was outstanding. Do not worry if a few of your shots miss their mark!

Trophy Hunting Photographs

Trophy photographs present some special problems and must break some clichés. Too many trophy shots are taken in a rush of excitement, resulting in a stilted pose by the hunter with a bloody and messy animal. Since many people could see your photograph, it is useful and in the

best interests of the sport to avoid ugly or obnoxious photographs. Consider the following steps to getting quality trophy shots.

1. Take the trophy photographs before field dressing the animal.
2. Reposition the animal if necessary to present a clean side or view, avoiding any evidence of the hit if possible. If that is not possible, consider doing a quick clean up job before the photographs are taken.
3. On large mammals, make sure the tongue is placed back in the mouth rather than dangling from the corner of jaw.
4. Shoot the trophy photograph in natural cover when possible. If not, pose the animal in an aesthetically pleasing situation. Avoid the bloody pickup tailgate shot or the meat pole shot.
5. Shoot some candid shots of the hunter and the trophy. Often these will be among the best and most useful of trophy shots.
6. Make sure the photographs reflect respect for the quarry.

Trophy shots are important mementos of hunts. Their quality may determine whether they can be publicly displayed or they will need to sit in an album only those who share the moment and the orientation can share.

Photographing Wildlife - Wildlife photography can be extremely challenging. Before heading into the wilderness, start by practicing on easier subjects. Plants, insects, semi-domestic urban or park animals, birds around feeders or nests, and zoological parks or zoos offer much easier photographic opportunities than do free-ranging birds or mammals.

Non-game species can be located around the home or local community. Backyards, local parks or open areas and local wetlands or ponds are good places to locate subjects for your photography efforts. Zoos offer the chance to record wildlife from other continents or other parts of our own. Nearby refuges and hunting areas can provide many opportunities for photographing non-game species as well.

In order to be successful at photographing free-ranging wildlife, an individual must develop some additional skills. Studying the subject(s) is critical. The photographer must be very familiar with its size, shape, color and color patterns, habitat use and any signs the animal leaves. He or she must develop acute powers of observation in order to see what is present, not merely look at it. Any unusual movement or sound, as well as calls must be part of a search image for the animal. The observer must become adept at seeing pieces of animals, too. Silhouettes, eyes, ears, legs and feet, tails, noses or other parts are almost always easier to find than whole animals; but where they are located, the remainder of the beast can usually be found.

Since photography is a short-range activity, getting close is important to success. In order to get close to free-ranging animals, the photographer can rely on luck or a combination of hard work and skill. The latter approach usually produces more shots. Individual animals usually can be patterned by studying their individual habits. Observation of their activity periods, feeding habits and locations, water sources and habitually used trails can provide potential locations and times for photographic opportunities. Once these long hours of observation have been completed, the photographer can elect a "hunting" technique to set up for the shot.

Some subjects can be stalked successfully. Stalking skills must be acquired and practiced for success with wary species. This requires making advantageous use of the cover and using clothing or other gear to disrupt the outline and/or help the photographer to blend into it. Camouflage can be very helpful, and even the hands and face should be covered. Some species are easily stalked, while others pose very rigorous challenges.

As in other types of hunting, it is often more effective to attempt to have the subject come to you. This may be as simple as locating an area habitually used by the animal of interest and positioning yourself to take advantage of the wind and sun angles to get a suitable shot. Natural

or artificial blinds are very helpful in concealing movements needed to prepare for the shot. These may be fixed blinds or easily transportable ones. Some portable blinds are specifically designed for photography, resembling camouflaged pop-tents. Establishing feeding or bait stations can draw wildlife to an area, as can the use of calls or lures. For gregarious or highly territorial animals, decoys can also be effective in getting them into camera range. Remember that wind direction is critically important with most mammals and that light direction is critical to the camera's lens. Plan your hiding spots accordingly.

Although wildlife photography is considered a non-consumptive activity, it is important to avoid excessive disturbance of animals or an area. Disturbance can alter habits or drive adult birds away from nest sites. It can induce starvation by disturbing animals during times of food stress or even by increasing the metabolic rate of an individual subjected to a flight or fight situation. Since many mammals reduce metabolism to conserve food stores during those time periods, disturbance can be a critical influence on their survival later in the winter. Disturbance around nest or den sites can lead to abandonment of the site, particularly early in the reproductive cycle.

Concentrating animals at sites like bait stations or feeders can attract more animals to a location than can be handled if the food source is withdrawn. Those sites should be located near appropriate escape cover and in areas where incoming predators can be detected easily to avoid increasing predation pressure on the concentrated prey base. Finally, caution must be exercised with large mammals attracted to baits. Predators or large ungulates could be dangerous at close range if a perceived threat or lingering odors of bait material are present.

Research has demonstrated that visiting bird nests tends to increase predation on those nests. Restoring the natural appearance of all vegetation around the nest in order to avoid having trails leading to them reduces the influence of nest visitation dramatically. The best strategy is to enter the area obliquely, detour to the nest site for the photography session, restore the appearance of all vegetation in the detour zone, and continue down the main trail in the original direction of travel. The better the restoration job, the less likely there will be an increase in predation.

Planning Photographic Trips

Photographic trips differ in very few ways from other types of trips for outdoor activities. The objectives of the trip create most of those differences. With the objectives or subjects in mind, the process starts by selecting an area. A time for the trip must then be selected to address accessibility to the area and the subject(s), activity or presence of the animals of interest, and minimum potential for human interference with the photographic effort.

Trip duration is another factor to be considered. Day trips are excellent for captive animals or animals that have already been patterned. These trips require relatively little cost and relatively low effort for success. Overnight or longer excursions offer a greater breadth of opportunity. There is more time for chance encounters or serendipitous events. Blinds may be set up or constructed. Attractants can be placed with some potential for success. Approaches to unpatterned, free-ranging animals can be attempted, and there is much more opportunity for sharing camaraderie around the campfire.

Transportation, meals and similar logistical considerations should be made carefully. Ignoring details can result in difficult circumstances in the field. Each person should be responsible for his or her personal equipment, which should be appropriate for the conditions and any contingencies that can be foreseen. Developing a checklist of gear is an excellent way to avoid complications. A similar checklist should be developed for personal or group photographic equipment. That list should contain everything from cameras and camera bags to the journal and cleaning equipment. Foul weather gear for both the person and the camera equipment is important.

Final arrangements should include the meeting time and place as well as a return time and pick-up point at the end of the trip. Emergency contact information should be left whenever possible, and an itinerary should be left with parents or other responsible persons. Once the trip is

completed, an excellent wrap-up session would be to review the results of the expedition, comparing photographs and selecting some for an exhibition. Develop a story line and select photos to support it while telling an interesting story of the trip.

SHARING AND EXHIBIT SUGGESTIONS

1. Construct a fair exhibit or album for display in a county or state fair or entry into your state's photography project activity.
2. Mount and frame selected photographs as gifts for friends and family members.
3. Using a variety of techniques, exposures and angles, shoot a common scene and construct a teaching aid that demonstrates the impacts of the differences on the quality of the photographs.
4. Visit a local camera shop or studio to learn more about techniques and equipment for outdoor of wildlife photography. Share your findings with your group.
5. Develop an illustrated talk or demonstration about photography or some facet of outdoor photography and deliver it in an appropriate setting.
6. **Study other photographers.** A great deal can be learned by studying the work of experienced photographers. Some notable wildlife photographers are Art Wolfe, Thomas Mangelson, Daniel Cox, and Frans Lanting. Try doing an internet search for these names and you will see their websites and can study how they approach wildlife and nature photography.

SECTION 3: Hunting Equipment

1. Use of Map and Compass for Hunting
2. GPS for Hunters
3. Choosing and Using Binoculars
4. Hunting Clothing
5. Cutting Tools for the Hunter

Using a Map and Compass

Knowing how to use both map and compass is fundamental skill for hunters who hunt in unknown country. This skill is important for the safety of the hunter. It allows them to find their way out of hunting areas, to relocate their camp or vehicle or to avoid hazards. It is important to the ethical behavior of the hunter, allowing them to identify boundaries between public and private land, to avoid accidental conflict with neighboring landowners or to relocate downed game for recovery and retrieval. It increases enjoyment by removing the fear of getting lost, planning effective hunting strategies, locating hot spots, locating trails or routes into hunting country, or locating other landmarks. In short, using a compass may be as important as knowing how to shoot for hunters who move off the beaten path.

Don't let the availability of Global Positioning Systems (GPS) make you think knowing how to use a map and compass are not important. You will be able to better use your GPS if you understand map and compass use. Besides, you can be sure the limitations of any electronic device will make your knowledge of map and compass use a major asset sometime during your hunting career!

INTRODUCTION

In it's Simplest Terms...

When people are first introduced to a compass, they are sometimes intimidated. They get caught up in the markings, the dials and the different colors. They think they are learning to use a very complex instrument.

All a compass really does is **"LET'S YOU KNOW WHERE NORTH IS"**. Yes, it is THAT simple!

The pointer (or "needle") indicates NORTH. If you put the compass down after noting the direction of north, you would have all the information you need to understand how a compass can be used.



Here are some other basics:

1. SOUTH is in the opposite direction of NORTH.
2. If you are facing NORTH, EAST is directly to your right.
3. If you are facing NORTH, WEST is directly to your left.
4. The direction half way between NORTH and EAST is referred to as NORTHEAST.
5. The direction half way between NORTH and WEST is referred to as NORTHWEST.
6. The direction half way between SOUTH and EAST is referred to as SOUTHEAST.

7. The direction half way between SOUTH and WEST is referred to as SOUTHWEST.

That is really all there is to using a compass. But the fun really begins when you take this knowledge and begin learning how to apply it. But remember, if using a compass ever seems too complicated, just come back to these simplest terms.

Getting in and out of the woods...

This is also very simple. You come **out** of the woods by going in the opposite direction you went when heading **in**. If you go into the woods heading NORTH, you come out by heading SOUTH. If you go into the woods heading SOUTHEAST you come out by heading NORTHWEST.

An important part of using the compass is to remember to take the readings. You must know which direction you are heading before you go into the woods. Likewise, as you are roaming the woods you must be aware of deviations you make from your original direction.

Luckily, we usually do not have to return to a precise spot. We usually just need to get back to the road. If we park on a road that is heading EAST and WEST, and we go into the woods heading NORTH, even if we wander around we will be able to hit our road by heading back to the SOUTH. Then we just need to determine whether we parked EAST or WEST of where we returned to the road.

UNDERSTANDING AND USING A COMPASS

To learn the full capabilities of compass use, you need to learn some **terms** and you need to understand just what you can do with a compass.

As we have said, the indicator side of the magnetic **needle** on a compass points to North. North is one of the **cardinal points** on the compass. The cardinal points, North, East, South and West, divide the compass into four equal quadrants, each having 90° of the 360° circle. Even a simple compass can orient the hunter to these cardinal points and give a direction to travel if they know which way to go.

Splitting each of the cardinal directions, that is northeast, southeast, southwest and northwest, are the **ordinal directions**.

Ideally, a compass used for land navigation should have markings that indicate **azimuths** or bearings in degrees. There are 360° on a compass, with both 0° and 360° indicating North. East is at 90°, South is at 180°, and West is at 270°. To find azimuths or bearings, the compass must be held level so the needle can rotate freely and far enough away from iron or steel objects or other magnets so they do not interfere with the behavior of the needle or dial.

An inexpensive orienteering compass is the best compass to start with. They have several features that make them valuable to a hunter who relies on map and compass. Each compass is built on a base plate. It holds the rest of the parts together, provides straight edges for aligning the compass with map grid lines or drawing a straight line, includes a direction of travel arrow and a small magnifier to help with map reading, and has a scale for measuring map distances. The magnetic needle is equipped with an indicator pointing to the North. It rides on a jeweled pivot point inside a compass housing which is often liquid filled to dampen the movement of the needle. The housing or turntable includes orienting lines and degree graduations with cardinal points indicated as well. These features make this type of compass very versatile and useful in the field.

Facing an Azimuth (Bearing)

An azimuth (often used interchangeably with bearing) is a compass direction, an angle of the compass relative to magnetic north. As outlined above, the angle increases around the circle clockwise. Facing an azimuth or bearing means determining the magnetic direction to a selected point, usually marked by some sort of landmark. In order to face a bearing, the person must hold the compass properly; level, away from metal masses, and with the direction of travel arrow pointing away from the body. Rotate the housing or bezel of the compass until the desired azimuth is on the direction of travel arrow. Next turn the entire body to bring the north end of the magnetic needle in line with the North index or line on the compass housing. Finally, line up the direction of travel arrow with a prominent object and walk toward it.

One of the greatest errors made by novices in using a compass is to walk along while looking at the compass and keeping it on the desired azimuth or bearing. This results in a very poor line of travel, since the azimuth is re-faced at every step. Locating a landmark and walking to it before locating another one on the selected bearing is far superior and results in a truer line of travel. It is a good idea to have each person take and face the bearing, locate a landmark on the line of travel, then put the compass away and walk to or toward the landmark. This is not only good compass technique; it is also a confidence builder for the young person.

Shooting an Azimuth

Shooting an azimuth or bearing means finding a direction to another point. Usually some type of landmark is used as the point being determined - a point, hilltop, bluff edge, stream mouth, highway intersection or similar objective. Holding the compass properly, the person should aim the direction of travel arrow at the landmark. Then they should rotate the compass housing or bezel until the north end of the magnetic needle is aligned with the orienting arrow and North indicator on the bezel, while keeping the direction of travel arrow on the desired landmark. The magnetic azimuth can be read directly off the housing where it intersects the direction of travel arrow.

MEASURING DISTANCE BY PACING

Plenty of distance measuring tools exist, from measuring tapes, surveyor's chains, or measuring wheels to laser reflectors. Most of these are inconvenient to use or carry when a hunter is in the field. Fortunately every hunter who has two legs can measure distances with something they always have with them - their pace. A pace is the distance covered by two steps. Each person has a normal pace length that fits their height, build and even temperament. In addition, the pace stays fairly stable in length once the person matures. Knowing how many of your paces it takes to go a certain distance will allow you to measure distance wherever you are.

USING A TOPOGRAPHIC MAP

Topographic maps are rich in information for anyone who knows how to read them. For the hunter who also knows how to read the preferences of game animals, topographic maps are sources of a treasure of information. The border of the map includes several important items. It tells the user the location of the map in the area, the quadrangle name and the scale of the map. Parenthetical information on each edge and at each corner cites bordering quadrangles. Latitude and longitude as well as Universal Transverse Mercator grid points are written on the borders as is the revision date and type, the scale of the map, road classifications, and any unusual marks used on it. Location in the state or province is included, and a declination diagram showing the deviations of magnetic north from map (celestial) north is printed at the bottom. The contour interval is also listed, since this may vary greatly with site characters and scale.

Topographic maps include other natural features of interest to the hunter. Bodies of water of all kinds are mapped. Lakes, ponds and even stock ponds are mapped, as are streams and rivers. On flowing water, contour lines or special markings indicate falls and rapids, and contour lines

point upstream, indicating the direction of flow. The nature of streams is also shown, with intermittent streams mapped in broken blue lines; Marshes, swamps and tidal areas are marked as well, sometimes including depth information.

Some maps include an indication of vegetation types, using green for forest cover. They also include local names of features, like Old Baldy for a mountain or Skunk Cabbage Creek for a tiny brook. Man-made features, like houses and roads are indicated, as are political boundaries, like county lines, townships and the borders of state or federal lands. Cities and towns are indicated. Highways and trails of all types are shown on the map as well, with indications of their type and service level. Schools, churches, homes and outbuildings that were present at the time the smaller scale maps were constructed are shown.

Landmarks can be located from the maps. These should be obvious, relatively permanent and stable features that can be used for cues in navigation. Junctions of roads or streams are excellent, as are peaks, sharp turns in valleys, bluffs, and heads of canyons or similar features.

Topographic maps are rich enough in information to permit many hunters to orient themselves and navigate within that area by using the map and landscape features alone. They also point out features that can become reference points as personal experience with an area is built. Problems, like sheer bluffs or deep swamps, can be avoided by reference to the map before setting out to explore the area. Once the area is learned with the aid of the map, it can be learned in person, allowing the person to orient to landmarks and use the area without the need to use additional tools. In spite of that, the ability to use both map and compass together is a valuable skill for outdoorsmen.

PUTTING THE MAP AND COMPASS TO USE

A person with a map and compass and the knowledge to use them is never really lost, even if they become temporarily confused. They possess the tools to locate themselves in the landscape and to plot a course to get them where they wish to be. Combining the structure and features of an area as well as the orientation of the structures and relative locations of features of interest that can be gained from the map with the direction finding ability of compass use frees the hunter from the boundaries of the familiar, the easy and the close-to-the-trail.

MORE ADVANCED INFORMATION

Basic land navigation involves learning to put map and compass together to plot locations or calculate courses to destinations. To be more precise, it is important to know that there is a difference between “true north” and the “magnetic north” which is indicated by the compass needle. This difference is called “compass **declination**”. Compass declination becomes important because magnetic azimuths differ from those that can be plotted on the maps for most locations in the world. Most areas will have either an east declination, where the magnetic north is east of map north, or a west declination, where magnetic north is west of map north. This may be of minimal significance in open areas or over short distances; but in dense cover, when long traverses are involved, or where declinations are large, correcting for these errors is critical.

Some compasses allow the user to correct the compass to the declination on the map, allowing the user to read map bearings directly from the magnetic scale. Most of us must learn to do a little mathematics. Correcting from compass azimuths to map involves adding the compass declination to the azimuth obtained with the compass for WEST declinations (where the compass points to the west of map North) and subtracting the declination from EAST declinations (where the compass points to the east of map North). This is used in finding your location from map landmarks or similar situations.

Correcting from map orientation to compass azimuths requires using the opposite action. For maps with a west declination, subtract the declination from the map bearing (obtained with a

protractor or compass rose) to get the proper compass azimuth for a travel direction. For east declinations, add the declination to the map bearing to get a compass azimuth. While this may seem a bit confusing, reference to the declination diagram on the map will remind you what to do and which way to go with the corrections.

Triangulation

Triangulation is a technique used to plot a location by determining back bearings from two or more landmarks to the location. The point at which the lines cross on the map is the location from which the azimuths were shot. When using multiple landmarks, the crossing points frequently do not align perfectly. The location is usually within the polygon that is described by their intersections.

This is both a fundamental tool and a very powerful one for the outdoorsman. It enables the hunter, to locate himself or herself in the area. That allows them to plot a course to reach any desired destination. It can locate a spot to which the hunter wishes to return - perhaps to get into a hot hunting area or to retrieve a big game animal that was too large to bring out alone or shot too late to allow returning to camp with it that night. Knowing the location of the kill or the hot spot on the map and the location of the camp or parking spot, the hunter can plot a compass course and distance to locate the spot again.

The only new skill involved here is the calculation of back bearings. A back bearing is exactly the opposite direction from the azimuth that is shot, that is, it is 180° greater or less than the azimuth. Since North is both 0° and 360° one may either add or subtract 180 to a South azimuth. If the azimuth is greater than 180° it is most convenient to subtract 180 from it to obtain a back bearing. If it is less than 180° adding 180 to it is the easiest way to get the back bearing.

For the hunter, knowing this set of skills frees him or her from the need to stick to what is known and close to the road. Knowing the fundamentals of land navigation, the hunter can hunt away from crowds, hunt with security in wild country that is beyond the reach of those who do not have the skills to reach it, to find their way home again with a sense of security, and to have more fun while hunting safely. The more these skills are practiced, the greater their use to the hunter becomes. Eventually, the map pocket in your day bag and the compass on the lanyard attached to your shirt pocket will be as important as your favorite firearm or bow to your hunting success and enjoyment.

Exhibit and Sharing Suggestions

1. Construct a three-dimensional model of a favorite hunting area, including physical features that are important landmarks. Display it at an appropriate event or use it as a teaching tool with other young people.
2. Show a parent or friend how to navigate with a map and compass.
3. Prepare and deliver an illustrated talk or demonstration on using map, compass or both for land navigation.
4. Use a map and compass to locate a potential hunting area.

Handheld GPS Units

Handheld GPS units are a common tool used by hunters and many other outdoor recreationalists. GPS devices allow users to mark specific points and trails and return to exactly those same locations. Hunters may use GPS units to mark the location of a vehicle or the path of a road or trail to decrease the chance of getting lost or accidentally trespassing on neighboring property. During scouting trips, the hunter could mark where game activity was observed, trails, water sources or other likely gathering areas for game. Hunters may also mark the location of downed game so it can be retrieved.

GPS Technology

GPS is an acronym for Global Positioning System. GPS technology is comprised of two parts: satellites that orbit earth and a receiver.

GPS satellites were originally launched in the 1970's by the US military. They have been available for public use since the late 1990's. There are 24 satellites in the system which orbit the earth twice a day and transmit their location in signals to earth.

GPS receivers receive and analyze signals from the GPS satellites. The satellite signal transmits precisely the location and time it was sent. The receiver then takes the information from the signal and uses it to calculate how long ago the signal was sent and therefore the location of the satellite. By using signals from several satellites, the receiver can calculate its exact position on earth. The receiver then displays the user's location as latitude and longitude coordinates or visually on a map. The receiver can also calculate measurements such as distance traveled, speed traveled and more.

To calculate a precise location, GPS receivers need to lock in on signals from three or more satellites. This allows them to calculate the location more precisely. When the receiver locks in on multiple satellites it can also calculate a rough elevation. The accuracy of GPS units can be increased with newer technology that provides an additional signal from other satellites or a ground-based location to 'truth' the signals being received from the GPS satellites. Wide Area Augmentation Systems (WAAS) and Differential GPS (DGPS) are two systems that improve the accuracy of GPS locations.

Accuracy of GPS locations is also dependent on the amount of interference from foliage, tall buildings or heavily overcast weather. Modern handheld GPS units can offer accuracies down to three feet in ideal conditions. Generally the accuracy is displayed with the location display.

GPS Uses

GPS is used in many ways you may already be familiar with. This chapter will focus on handheld GPS unit use for hunting, but there are many other uses for GPS technology such as navigation, cell phones, law enforcement, farming and recreation.

The GPS system was originally designed to help the military with navigation and precisely locating specific places. You are probably familiar with automobile drivers using GPS devices, but airplanes and ships also use GPS to navigate. GPS technology is available in most cell phones. Cell phones use GPS to interface with the internet for applications such as navigation or Facebook. Law enforcement can use the GPS location from a cell phone to locate where a person is calling 911 from. Law enforcement or emergency personnel may also use GPS to find stolen vehicles or to help locate automobile accidents. Farmers use GPS to help steer their equipment and to record information from their fields on maps so they can better manage their farm ground. GPS technology is used in a large variety of recreational activities such as hiking, snowmobiling, mountain biking, to name just a few. There are even games specifically designed for GPS use, such as geocaching. Anyone who needs to keep track of where he or she is, to find his or her way to a specified location, or know what direction and how fast he or she is going can utilize the benefits of GPS.

Handheld GPS Units

Handheld GPS devices are manufactured by several companies and come in a variety of models, from simple to very complex. Each of these units will share some similarities, which will be discussed here. However, each device has its own specifics which are best understood by carefully reading the user manual.



In general, using handheld GPS units for hunting will involve three screen views: the satellite screen, the map screen and the distance traveled calculations. The satellite screen displays the satellite locations and the quality of the signals being received from the satellites. The map screen allows users to see their position relative to roadways and landmarks. Distance and time traveled, as well as a variety of other useful calculations, are displayed on a calculations screen.

In general, when a user first turns a handheld GPS unit on, the satellite screen appears so users can see how many satellites are being locked in and the accuracy of the location. After the GPS user has ensured the GPS unit is adequately accurate for their uses, the map and calculations screens will be the most useful for hunters.



The map screen displays a user's location as well as some basic landmarks and major roadways. This screen can be zoomed in or out to change the scale of the map. Changing the scale will change the amount of detail displayed on the map as well. To improve the detail of the map screen to include more topographical information, more landmarks and roads, more advanced map software can be purchased.

When viewing the map screen, users can see locations and paths they saved previously. For many applications, saving a single location, known as a waypoint, will be enough to allow a user to navigate back to that location and visualize in reference to other waypoints and landmarks. Waypoints are displayed on the map screen as a name and marker. Users have the opportunity to name the point and determine the type of marker when they save it. By default most units name waypoints with sequential numbers. Most users prefer to name the waypoints as it makes it easier to distinguish them on the map.

GPS units can also save the path of a road or trail, often referred to as a track. Different GPS models have different methods and terms for this, so users will have to read their owners manual to determine how to do this on their unit. On the map screen, tracks will be displayed as dashed or solid lines. Saving tracks can generally be done either before or after it has been traveled with the unit turned on.

The names and locations of waypoints and tracks can be altered after they are saved. The latitude and longitude coordinates can also be viewed, which may be useful if you wish to share them with others.



The calculations screen displays distance and time traveled and speed as well as a variety of other calculations. On a handheld GPS unit these functions are all the result of calculations by the unit. It determines the change in position from a previous location to a current location and how long it took for that travel to occur. Tracks do not have to be saved to determine the distance or speed traveled. The calculations can be reset as necessary, so can be used to determine the distance or speed of a specific trip without recording it as a track.



To navigate to a waypoint or to follow a track, select the waypoint/track from the map screen or from a list. Some GPS models have compasses that can be followed to the location, or the user can track their progress toward the coordinate on the map screen. Note that the GPS unit must be moving in order to determine the direction of progress. The compass and movement on the map screen is dependent on the GPS unit performing continuous calculations on the starting point of travel and the current location.



Using Handheld GPS Units for Hunting

GPS units are useful in hunting situations from before a hunt ever begins to a safe and successful return home.

Scouting an location in advance of a hunting trip is critical, especially if a hunter is in an unfamiliar area. However, trying to remember where game activity is likely can be challenging, even when using a map. Hunters may choose to use their GPS units to mark prime hunting areas or locations of likely game concentration.

Tree stands or other blinds are useful in some hunting situations. However, it can be difficult to remember exactly where they are set up. Marking these on a GPS unit will help hunters return to the specific location where the stand or blind is.

Getting lost is often a fear of outdoor enthusiasts. Hunters may find it helpful to mark the location of their vehicle or camp, the course of a road they drove into an area on, specific trails they followed, or the location of critical landmarks and topographical features they crossed during their hunt.

GPS locations for property boundaries or areas where hunting is not permitted may be useful in helping hunters remain in the area where they have permission and the legal right to hunt. This may be done during a scouting trip or by entering saving coordinates provided by the landowner.

Using a GPS unit to mark the location of a downed animal will assist the hunter in returning to that location to retrieve it. Tracking wounded animals can be very disorienting. Marking locations along a path or simply recording a track as an animal is being followed will help the hunter return to a known road, his vehicle, or enlist assistance from his hunting party in tracking the animal.

Cautions When Using Handheld GPS Units

Regardless of the activity being pursued, handheld GPS units are not infallible. Without the purchase of expensive mapping software, they only show basic landmarks. This may not be a problem if a user wishes only to use them to show the location of a specific point or record a trail. However, it may be useful to the user to know where elevation changes, topographic features or even smaller waterways and roads are. Even with the more advanced software, GPS units only display the current location and saved waypoints and tracks. When navigating to a destination, users must use their knowledge and observation of the landscape, property lines or other interfering landmarks to proceed safely.

GPS units are electronic devices. Relying solely on them could be treacherous if the batteries run out or the unit breaks. It is not a good idea to use only a GPS unit as a hunter's sole navigation tool. Carrying a compass and a map of the area and being familiar with their use is critical as well. Hunters and all outdoor recreationalists should always be observant of their surroundings.

GPS units can be challenging to learn to use. It is a good idea to practice using your unit to save waypoints and tracks, as well as to retrieve and navigate to previously saved points before you are in a critical situation.

Sharing and Exhibit Suggestions

1. Give a demonstration to your group to show how a GPS works. Explain how it might be used in hunting situations.
2. Develop a practice exercise where distance and directional instructions will lead members of your group to a specific spot.
3. Draw a map or use a topographic map of a potential hunting area. Demonstrate to your group how you would use your GPS on a typical hunting trip.

Choosing and Using Binoculars

Most people who watch wildlife find some need for binoculars or other optical tools to help them see better. Binoculars or telescopes help us get a closer look without disturbing the animal being observed. They give us a bigger and possibly sharper look at the animal. For hunters, they help in evaluating potential trophies. They give us a better look at things that may be difficult to approach.

Picking binoculars can be complicated and confusing. Prices range from about \$20 to well over \$1000. They come in a many styles, powers, weights, and objective lens sizes. The way they are focused varies. The way they are built differs. Their design may use roof prisms and porro prisms. Spotting scopes vary in a similar way.

In order to pick one of these tools wisely, the hunter needs to decide what features are needed. What do the numbers mean? Will some of the less expensive brands or models will serve the hunters needs? A hunter needs to understand how to make a well-informed consumer decision about the binoculars and scope they decide to purchase.

Some Basic Questions

The basics of choosing good binoculars are very simple. Some of the choices involve personal preferences. Others may be dictated by money or the uses for the tool. Asking and answering a few questions can help the buyer make a better choice.

The first and most important question is, "what do I really need?" If the binoculars are to be used by a walking hunter, they may need to be fairly small and protected (armored) by shock absorbing material. If they were too large they would get in the way and they might make the user tired. Some hunters might need to see in poor light (brightness), with a very sharp image (good definition). Some might need to focus on both close and distant objects. Weight, size, and armoring may be important to a brush hunter. Another hunter might select a compromise among the features selected.

Another very important question is, "what will these binoculars need to do?" Will they be used in good light or under dimly lit conditions? Open country has more light available than do forests. Dawn and dusk use demands more brightness, as does use in forested areas. Binoculars for use in bright conditions can have much smaller objective lenses than those needed for dimly lit conditions. Larger lenses also make it easier to see colors in poor light or when the light is coming from behind the object. Usually the size of the objective lenses is a compromise between size and weight and the demands of the user.

The amount of magnification that is needed is an important question, too. Power demands for open country, watching species that are wary or difficult to approach, or serious evaluation of trophies are much greater than for forested country, easily approached species, or merely spotting game. It may seem that greater power is always a good idea, but increased power includes some other "costs." Most people cannot hold powerful binoculars steady enough to take advantage of their magnification. Usually, the upper limit is about 10X or 10 power. For most purposes, anything less than 6X is of very limited value; so 7X to 10X binoculars are usually an excellent choice. Usually, when higher magnification is needed (mountainous country, open prairies, coastal areas) a good spotting scope is a better choice than high powered binoculars.

The user must consider the importance of weight, bulk, and cost. Generally, increased power carries costs in size, weight, and cost within a given style of binocular. Lightness and small size may carry costs in power, brightness, field of view, or image quality.

Let's Look at Some Numbers

Binoculars almost always list some of their features as a label. Usually, the magnification and the diameter of the objective lens are listed as a two-number code, e.g. 7x35 (usually pronounced 7 by 35). The first number is the power or magnification of the binoculars. It tells the number of times the image is enlarged over that seen with the unaided eye. The second number tells the diameter of the objective lens in millimeters. Often the field of view will also be listed. It is usually expressed as a width (e.g. 285 feet) at some distance (e.g. 1000 yards). Zoom lenses (variable power lenses) usually list the extremes of their power range, e.g. 15-45X or 15x45. That holds true for variable power rifle scopes as well.

More power is not necessarily better. As power increases several other factors change. Size and weight (within any given style) increase. Relative brightness (the ability to provide adequate light to the eye or exit pupil size) decreases unless objective lens size goes up. Field of view decreases, making it somewhat more difficult to locate an object quickly. Susceptibility to mirage (heat waves) increases, too. Very few people can hold anything over about 10X still enough to take advantage of the increased magnification unless they use some type of support. That causes the resolving power (sharpness of the image) to decrease. For nearly everyone the resolving power of 12X (and higher) binoculars that are hand-held is no better than for 6X lenses. Tremors or movements are exaggerated by the magnification causing the loss of sharpness. That calls for a compromise to get the sharpest images and practice to improve skill in holding the glasses steady.

Binoculars in the 7X or 8X range are an excellent choice for general use. They have enough magnification for most purposes, and most people can learn to hold them steady with a little practice. If very high magnifications are needed, a spotting scope on a tripod or a window mount is a much better choice. Where the ranges are fairly short (e.g. hunting in woodland or brushy cover) 7X binoculars are a good choice. For long range use (e.g. plains or mountain hunting, watching shorebirds or raptors, marine use) 8-10X lenses may be worth the costs in weight, size, and the effort needed to master their use. For more open habitats or other situations where more power is needed, 8x40, 8.5x45, or 10x50 lenses will give similar performance in terms of brightness.

Smaller objective lenses can increase the ease of carrying the binoculars by decreasing their bulk. Roof prism binoculars are also much more compact. They usually cost more than the more traditional porro prism design, however. Smaller objective lenses (e.g. 7x25) will not be as bright under poorly lit conditions. They will also have a smaller field of view. Compensating for that by going to wide angle lenses causes some distortion at the edges of the field.

Comparison Shopping

In purchasing binoculars or spotting scopes, as in many other areas, the buyer usually gets what he or she pays for. Getting the best one can afford makes good sense, but even relatively inexpensive binoculars can give excellent performance and last a lifetime. Careful selection and checking for some critical features is the key to satisfaction.

First, the optical quality of the lenses must be adequate. The images seen through the two sides of the instrument should be nearly identical. Technically, that means the instrument is parfocal, the two sides are properly aligned. Check for it by looking at a distant object. Alternately cover each objective lens. The object should be in the same place in each visual field.

Second, the lenses should be fully coated to reduce light scattering. That results in more of the incoming light being directed to the observer's eyes. Usually the manufacturer will state "fully coated optics" or something similar in the literature with the binoculars. The coating appears as a slight amber, greenish, bluish, or violet cast to the lenses.

Since the purpose of having binoculars is to increase your resolving power, they should have clear, bright, sharp images. If they are hazy, blurred, or dull images after you have properly adjusted and focused the binoculars, find something else.

Third, consider the way the binoculars are focused. Nearly everyone has some optical difference between their eyes. At least one ocular lens (the ones closest to the eyes) should be adjustable. Having a way to secure that adjustment is a positive feature. Both individual and center focus binoculars are useable. Individual focus binoculars are considered less desirable, using adjustments on each ocular lens to focus the eyes. That may be inconvenient when rapid changes in focus are needed. When center focusing is used, the instrument is focused for both eyes simultaneously using a focusing lever, knob, or wheel once the difference between the eyes has been set. Whether you choose individual or center focus is mostly a matter of preference. Most people feel that some type of center focus is quicker than individual focus. For people with small hands, a thumb-operated lever is often easier to use and quicker than a knob or wheel.

Finally, people who wear corrective lenses may want to consider selecting binoculars with very shallow eye cups or with soft ones that can be turned down. That feature will greatly increase the apparent field of view while wearing glasses. Most manufacturers offer binoculars that are designed for the eyeglass wearer.

Setting Up Your Binoculars

Quality binoculars may be adjusted for the distance between the user's eyes. Adjust them by holding the instrument to your eyes and bending them together or apart until the images formed by the two sides fuse into one circular or slightly elliptical field. If there is a scale on the pivot point, note the location and record it in your field notes. That way you can reset it quickly each time you use your binoculars.

For users of center focus binoculars, the next step is to adjust for the difference in the eyes. With the adjustable side of the glasses covered by the palm of one hand and both eyes open, use the center focus to get the uncovered eye sharply focused on a distant object. An object with sharp lines and some detail, like a leafless tree or a power line tower, is a good choice. Once that has been done, cover the focused lens with the palm of the hand and move the adjustable eyepiece (DO NOT MOVE THE CENTER FOCUS) back and forth until the same object is just as sharply defined. Check yourself by closing the eyes alternately or covering the lenses alternately. Note and record the setting on the adjustable eyepiece. That way you can set the instrument tip quickly any time it is bumped or brushed out of adjustment. Only the center focus mechanism need be adjusted after the difference between the eyes is set.

Learning to Use Binoculars Effectively

Binoculars are best used with support from both hands. The index fingers and thumbs can be placed on the forehead and cheekbones, respectively, to act as a brace. The binoculars are supported mostly with the last three fingers and the palms of the hands. Using this two-handed, braced position provides an excellent foundation for viewing the enlarged image. Before the image can be viewed, though, it must be located.

Locating something through binoculars is very simple, but it requires practice. Simply bring the binoculars to your eyes while watching the subject you wish to view. Beginners have a tendency to look into the binoculars first and then bob their head around searching for the subject. They quickly learn how important it is to look at the subject and then move the binoculars to the eyes.

Practice on some stationary objects before trying to find things that are moving. With very little practice you will be able to locate an object quickly and with very little searching. Your center focus thumb or finger should be poised to do its job as quickly as the object comes into view. Focus back and forth through the object of interest until it is in the sharpest possible definition.

Care of Your Binoculars

Most reputable manufacturers supply instructions for the care and use of their equipment. Read them carefully. Use only lens paper or a specially designed cloth to clean the lenses. Try to protect the binoculars from extreme heat, e.g. exposed to the sun in a closed car. Protect them

from shock by keeping them in a protective case when not in use, being careful where you put them and avoiding actions that may cause them to strike other objects forcefully. Remember, they are precision optical instruments; and they need to be handled with care to keep them properly adjusted for years of service.

HUNTING CLOTHING

Hunters use a wide variety of clothing in their pursuits. Some of it is the same clothing worn for outdoor work. Some of it doubles in other outdoor recreation activities. Some of it is extremely specialized and designed for a specific hunting purpose.

Hunting poses a wide variety of conditions, and hunting clothing is designed to meet those conditions. It provides protection from heat, cold, moisture (from perspiration to driving rain or snow), offensive insects, briars, thorns or even snake bite. It helps to prevent cuts, bruises, scrapes, sprains and strains. While doing all of this, it makes the hunter obvious to others or hides him/her from their quarry. It also provides for carrying a variety of cargo, from basic survival gear, ammunition and field dressing equipment to field lunches, fluids and game or game parts. It does all these things while keeping the hunter comfortable and focused on the hunt.

Comfort means that the body is able to maintain its preferred temperature through changes in weather, activity and other factors. Maintaining body temperature is critical to humans. Metabolism, the body's furnace, produces heat as well as supplying nutrients to the distribution system. Our normal thermostat keeps the body core at a temperature around 98.6°F. All the enzymes that control body functions are adapted to operate best at that temperature. If the core temperature climbs too high (hyperthermia) or drops too low (hypothermia) the body ceases to function properly. Extreme changes, which may be as little as 8-10°F, can result in severe problems or death. The comfort zone is smaller than that, and clothing should be selected to maintain reasonable comfort. Beyond the effect on body function, being comfortable allows the hunter to focus attention on the task at hand, to remain still and unobserved, and/or shoot effectively.

One of the ways the body maintains its high working temperature is to warm the air immediately surrounding it. Cold temperatures, windy conditions, or moisture on the skin can strip that warmed layer away. Hot temperatures can result in the body needing to use evaporative cooling, to lower its temperature as heat loss to the air is prevented.

Under cold or wet conditions, the body tends to lose heat in several ways. Direct contact with cold objects, like boat seats, firearm barrels, bow handles, rocks or logs causes the body to lose heat by conduction. The warmer body simply transfers heat to the cooler one. Convection and radiation result in heat loss as warmth is transferred to cooler air. Air movement tends to increase that loss by stripping away the warm envelope of air the body generates. Of course, air movement aids in evaporative cooling when the hunter is too hot as well. Contact between the cooler air, and bare skin; particularly on the head, neck and hands tends to be the major sources of convective or radiative heat loss. Evaporation results in heat loss when body heat is used to convert liquid water into a gas. It works regardless of temperature. Thus, while it is critical for cooling in hot weather, exposed wet skin, can cause extreme heat loss under cold conditions.

Heat is constantly being lost from our bodies. The important thing is to regulate that heat loss for comfort and well-being. Proper selection of clothing is part of that regulation process. One of the primary factors in regulating heat loss is weather. Hunters are afield under a tremendous array of weather conditions - hot to bitter cold, dry to heavy precipitation, nearly calm to high winds. Clothing must be matched to those conditions.

A second factor affecting heat loss and its regulation is the hunting technique. A hunter who posts on a stand, waiting for game to come to him/her produces much less heat than a hunter who is still hunting or stalking game. Muscle use generates heat, so the active hunting method requires less insulation than the more sedentary one. The stand hunter, however, may have had to walk or

climb rather briskly for a mile or more to reach his/her selected stand site. That means their clothing requirements change radically walking to the stand site as opposed to hunting from it.

The type of terrain being hunted also affects clothing comfort. Hot desert conditions might call for light clothing, but tough pants and boots may be required to protect the legs and feet from thorns or spines. Rugged, broken terrain requires much more ankle support in the boots and lighter clothing (because of the effort involved in movement) than does open country that is relatively easy to cross. Climatic differences associated with different types of terrain from marsh and bayou to high deserts and mountain slopes also affect the clothing required. Wise hunters also enter the field prepared to cope with any sudden changes in weather that the area and season may create.

Ease of movement is important in hunting clothing. Hunting is usually an active sport where ease of movement is vital to the act of hunting itself. This usually supports the use of full-cut clothing that does not restrict either movement or blood flow. Clothing that feels fine in the store may bind or restrict movements when the hunter is in the act of shooting, so care should be taken to make sure that freedom of movement includes shooting positions.

Layering

Most hunters adhere to the principle of layering in their hunting clothing. Layers are added or deleted to adjust the level of protection and insulation to their needs. Some sources view the layering process as a set of three layers: a foundation layer, an insulating layer, and a protective layer.

Foundation Layer. The innermost layer of clothing, or foundation layer, serves two primary functions. It traps warmed air next to the body and wicks moisture away from the skin, or it acts as an absorbent layer to distribute moisture and allow greater areas of evaporative cooling. Fabric choices for this layer vary with the needs and purpose. Cotton is an outstanding choice for hot or mild weather. It is comfortable against the skin, non-irritating to almost everyone, and absorbent. In many fabrics, it allows air movement and encourages evaporative cooling. Under extreme cold conditions, however, cotton is a relatively poor choice. It can become damp during periods of high activity and dries slowly once it has become saturated with moisture. Wool is an excellent outdoorsman's outerwear and insulating layers, but it is less useful as a foundation garment. It has the ability to maintain its warmth even when it is wet, but it often becomes wet easily, and many people find it uncomfortable or irritating against the skin. Several synthetic fibers are better choices for the foundation layer during cold weather. These fibers tend to transfer moisture readily to the outer layers of clothing without becoming saturated with moisture themselves. They hold their shape and loft well in laundering, and they are generally comfortable against the skin. Many of them, like polypropylene, have most of the advantages of wool without the disadvantages and feel very comfortable to the wearer.

Insulating Layer. The bulk, weight and thermal qualities of the insulating layer vary with the conditions being met. Most insulation can be disregarded under hot or even mild conditions, but cool, cold or severe conditions may require several layers. The primary function of this layer is to increase the thickness and effectiveness of the warm air layer next to the skin. A wide variety of materials may be used to provide an insulating layer, and these materials vary in thermal qualities as well as weight, thickness, durability and retention of their actions when they become wet. The best materials for heat retention fall into two categories. Some of the newer materials have a high R value for their thickness and mass. These are used almost as films in clothing that is light, compact and warm. Most other materials depend upon their loft - the ability to trap large amounts of air within the material. Goose or duck down, Dacron fillers, and the various hollow filler fibers operate on this principle. These materials are light, but most of them require a fair amount of bulk to reach their best insulating qualities. Some of them crush easily for packing yet spring back to their original shape when removed from the pack. Down suffers from a loss of loft if it becomes wet and matted, while the newer hollow-fiber fillers do not. Many hunters who hunt areas where daily temperature extremes can vary widely will include a down or hollow-fiber filled jacket or vest

in their gear, using it early and late and storing it in a day bag during the heat of the day. Stand hunters will find a similar use, going light on the way to and from a stand and adding the extra insulating layer once they have reached a stand site.

The upper body and head are most important as areas of heat loss (up to 80 percent) and as areas that must be kept warm. The lower body, composed primarily of large muscle masses that heat themselves when used is less susceptible to cold. The body's core is found in the deep tissues of the upper body, so protection of the abdomen, chest, neck and head is essential.

Protective layer. Under warm or hot conditions, the protective layer may be the only one required aside from light underwear. As those conditions become more stressful for humans, the importance of this layer increases. The function of the protective layer varies with the type of conditions encountered. Wind, precipitation, cold or hot weather or combinations of those conditions dictate different types of outerwear for protection. In general, a hunter's outerwear should have several characteristics. It should be wind resistant unless wind penetration to the body (as in hot weather) is an important factor.

Wind chill has a pronounced effect on the apparent or realized loss of heat. Often, simply blocking the wind from the body is adequate to make the hunter comfortable. Where precipitation is a factor, outerwear should be moisture resistant to completely waterproof. Under rainy conditions, both the upper body and lower body should be protected to achieve the highest level of comfort. Clothes that permit perspiration to move away from the body while preventing precipitation from wetting it are ideal for those circumstances. Several selective films are available that achieve this dual purpose, with Goretex being the most commonly known.

The purposes for which the outerwear will be used should be carefully considered as well. If the garment is meant for a single purpose, it can be selected with that specific purpose in mind. If it is to serve multiple functions, it may need to be a compromise among competing factors. Some of the factors that need to be considered in buying hunting clothing include: cost, durability, utility, weight, quietness, effectiveness for the purpose, color and pattern, cargo carrying capacity and compatibility with other uses.

Clothing for Extremities

Since the head and hands are often exposed and their bare skin radiates much of the body's heat, particular attention is required in selecting head gear and hand wear. An almost bewildering array of styles and types of head gear is available. Hats and caps in a wide variety of styles and materials are commonly used, with many regional favorites. Felt crushers or even cowboy hats are commonly used in some areas. Others prefer various weights of caps designed around the common baseball cap style, either with or without ear warmers. In severely cold weather, many people prefer the trapper style hat, with its neck and ear warming flaps. Still others prefer some type of stocking cap or Balaclava with or without a face shield of some type. Ventilated caps or straw hats are much cooler during hot weather hunting sessions. Archers may prefer the short bill of a Jones style hat as well as the possibility of folding down the sides and back of the hat to conceal their ears and break up their head outline.

A hat or cap may be used in a layering process when the wind and temperature make conditions severe.

A coat with a hood can be used over the cap or hat to increase the heat-trapping capacity. In addition, face masks or frost shields can be used to further reduce the heat loss from the face or to increase the camouflaging of the face where conditions call for better concealment or more protection. Hats with built-in insect netting can be extremely helpful as a combination of camouflage and protection from insects like mosquitoes and black flies.

Gloves and mittens can be used to keep the hands warm, but they are used for a variety of other purposes as well. Light shooting gloves can be used to improve the grip on firearms, to cover and disguise the hands, or to prevent insults from thorns, briars and other objects. Heavier or

insulated gloves can be used to keep the hands warm and functional and to prevent chapping under cold weather conditions. Mittens are much warmer than gloves of like weight, but they tend to reduce dexterity or shooting speed. Field dressing gloves can be used to keep the hands clean and prevent contracting blood-borne diseases or allergic reactions to stomach contents. Waterfowlers will find trapper's gauntlets or other waterproof gloves (even kitchen gloves will help) very useful in picking up decoys when water and air temperatures are low. A light pair of cotton or wool gloves inside the gauntlets will keep them dry and keep the hands warm while the picking up process is finished. Wet hands rapidly lose dexterity and continual wetting and drying will produce hands that crack and chap. Under severe weather conditions, gloves may be layered inside mittens for additional protection. Handwarmers or chemical heat packs can be great benefits to the hunter when hands tend to get cold easily.

Footwear

Like other types of hunting clothing, footwear needs to be matched to the use and conditions. Hunters may use stalking moccasins or sneakers in some situations and insulated waders in others. Boots that perform just right on a dry upland hunt in early fall may be miserable on a rainy day hunt or one over boggy ground or in wet snow. Short rubber boots may be great for wet conditions or shallow water crossings, but they offer little support for the ankles and may cause the feet to sweat factories in warm, dry weather. Felt-lined packs are great for severe cold, but they are bulky and extremely hot under warmer conditions. Mountain boots with their tough Vibram soles and strong ankle support are essentially useless in a waterfowling marsh.

Weather combines with terrain and hunting style to dictate the best type of boot for the hunter. Style, sole or tread type, height, and other factors, like insulation or waterproofing, enter into the decision. Where one pair of boots must fit a variety of uses, preparing for either the most common conditions or those that are most demanding is often a good alternative. Even the type of hunting technique has an influence. Stand hunters need warmer boots as well as warmer clothing than do hunters using more active techniques. The upland bird hunter or still hunter needs boots that will keep his or her feet comfortable over many miles of country. That means that the boots must fit!

Feet are the real "all terrain vehicles" of the hunter, and proper fit is essential to taking care of your feet. Well fitted, well-broken-in boots prevent blisters and sore feet, two of the best fun-killing conditions a hunter can encounter. Wearing a new pair of boots enough to get them broken in before the season is essential. Wearing them on daily conditioning walks is a great way to get that process handled.

Boots are the protective layer for the feet, but socks make up the foundation and insulation layers. Socks cushion the feet with each step, aiding the shoe's sole in that process. They handle the perspiration from the feet, either absorbing or wicking it away to another layer. They also act as friction transfer devices if properly used. A relatively light cotton or acrylic sock worn under a heavier boot sock can cause any friction between the boot and the foot to be transferred to the interface between the socks, eliminating the abrasion of the skin and potential blisters.

Dry socks are important for both warmth and comfort. In fact, one of the most refreshing things a hunter can do for his/her feet in the middle of the day is to substitute a clean, dry pair of socks for those that have been collecting sweat all morning. The sensation rejuvenates both the feet and the spirits, and it keeps the feet healthy.

Materials for the Outdoorsman

The array of materials available in sporting clothing can be almost bewildering. Experience with various types, weights and weaves can help you to select fabric and cuts that fit your needs well. Both natural fibers and synthetic fibers are extremely useful to the hunter, with the appropriate choice depending upon a whole suite of conditions and use options. Talking about potential choices with experienced people can be an excellent source of information in making specific selections, but new materials and combinations are being developed all the time.

Cotton is one of the most common natural fibers use in hunting clothing. It can be very light and airy or it can be woven in a tight, tough pattern to make it stronger and more resistant to briars and thorns. Denim and twill weaves are among the more common types found in cotton clothing for the outdoors. Sometimes cotton pants are reinforced at the front of the legs with Cordura or canvas (a heavy cotton fabric) to make effective brush busters. Chamois cloth is cotton that is soft to the touch, warm and quiet. Cotton absorbs water readily unless it is treated with water repellent. It is comfortable against the skin and makes excellent mild or hot weather clothing.

Wool is a naturally quiet fiber. It retains its warmth even when wet, but it wets easily and becomes extremely heavy when wet. Wool clothing may be knitted (sweaters, socks) or woven (pants, coats, shirts). It comes in wide variety of weights that can be matched to the conditions. Its colors may tend to bleed when it becomes wet, but some wool clothing is used by almost every hunter in the country.

Wool may be obtained in very hard weaves, like whipcord, or in weaves that leave a napped finish. When the weave is harder, the fabric is more durable.

For many years, goose down was the premier insulating material. It remains one of the best today, even though some synthetic fibers and fillers rival or surpass it in thermal qualities. Down is an outstanding insulator when it is dry, but it tends to clump and lose its loft when it gets wet. Wet down needs to be refreshed with a down soap and tumbled dry before it can be restored to its full insulating value. The light weight and crushability of down make it an excellent choice for garments that may spend some of their time in a day bag or pack during each day's hunt. They add lots of insulation for very little weight. Both duck and goose down may be used in down garments.

Synthetic fibers are used in a wide variety of field clothing as well. These fibers are engineered for their qualities. Nylon is one of the oldest of the polymer fibers. It is available in a wide variety of weights, from extremely thin and airy material to 1000 denier Cordura. Ripstop nylon is used in many packs and windbreakers. Nylon or rayon, a related fiber, is used in sleeping bag linings and covers as well. Nylon is light for its strength, but it is noisy. That makes it a poor choice for big game hunting, although Cordura is an excellent pack material or facing for upland bird pants. It is also used in conjunction with water barrier films in making boots.

Orlon is a water wicking material that is often knitted into socks and sweaters. It is soft, resilient and warm to the touch. It is also durable and machine washable, making it a good choice for field wear.

Polypropylene is a plastic fiber. It is water repellent, making it a good wicking material. When spun and woven or knitted into fabric, it is used in making underwear, glove liners, socks and similar clothing. It is an outstanding choice for cold weather undergarments. PolyArmour, Polartec and Nylour are trade names of other popular fabrics.

A whole host of hollow polymer fibers are available as insulation. Early ones were nearly equivalent to down as a crushable insulator. The more recent ones improve on down's performance by retaining their insulating qualities even when they are wet. They are also machine washable and are easily dried.

Several new fibers, fabrics or blends have come on the market under a wide variety of names. Thermax, Worsterlon and pack cloth are among some of the brand names used in garments made of these fibers. All of them combine some characteristics of wools and synthetics for excellent field performance.

Thinsulate is an insulation layer that is used in many boots and outdoor garments. It has high insulation value for its weight and thickness, providing warmth without bulk. Gore-Tex and other

water barrier films are popular with many outdoorsmen because they will permit moisture to move out from the body in a vapor or gaseous state, but they will not allow liquid water to pass through their pores. These materials also have excellent wind stopping power, making them a great barrier or protective layer under wet, windy conditions.

Camouflage and High Visibility Clothing

High visibility clothing, like blaze orange fabric, is a legal requirement in many states and provinces. It allows hunters to be seen by other hunters, keeps them in touch with their hunting partners, and may save some lives. It is available in many weights and finishes, and it has little impact on hunting success rates where upland birds or big game animals are hunted with firearms. It is seldom used in hunting waterfowl or turkeys, and it sees little use in bowhunting because of the need to get very close to game or its obvious visibility to birds. Color-blind mammals see it only as a bright white, but humans see it extremely well. Wise hunters use it to be seen, even if the law does not require it. Some states permit the use of alternative high visibility clothing, like fluorescent chartreuse.

Camouflage clothing is designed for concealment. It aids the hunter in avoiding detection by game animals. It may also avoid giving the appearance of a game animal in some hunting situations, like spring turkey hunting. Camouflage acts by breaking up the outline of the hunter – disruptive camouflage, or by allowing the hunter to blend into the background - cryptic camouflage, or both. Disruptive patterns often place sharply contrasting blocks of color next to each other, disassembling the hunter's image into separate blocks. High contrast is often needed to accomplish this task, and disruptive patterns are found in most military camouflage and the traditional "woodland" camouflage. Cryptic patterns are designed to make the hunter blend with the background. Increasingly large assortments of patterns are available which represent bark, leaf, brush, rock or other backgrounds. Some waterfowling camouflage even imitates the vertical structure of green on green or tan on tan found in marshland plants. White or black on white camouflage works extremely well under snowy conditions or when the hunter is "hiding" in a snow goose spread.

Blaze camouflage is a combination of blocks of color, designed to give the appearance of woodland camouflage to animals that do not see the red end of visible light well. It offers hunters the chance to be seen by others without the risk of being as obvious to color-blind big game animals.

Relatively recent information shows that some game animals see with a different visual spectrum than do humans. They may be able to detect wavelengths in either the infrared or the ultraviolet range. Since many of today's fabrics and detergents have color enhancers that fall in the ultraviolet range for reflectance, companies have developed products that act as UV "killers," reducing the ultraviolet reflectance of camouflage clothing.

Regardless of the type or pattern of camouflage clothing used, effectiveness is the responsibility of the hunter. Movement will reveal your presence almost immediately to any wary game animal. Noise, either human noises or the noise of fabric being scraped can also act as a warning to game animals. A sky lined hunter has a distinctive predatory shape, and un-camouflaged parts of the body like the face, hands or eyes can act like beacons in attracting the attention of the animal being hunted.

Summary

Hunting clothing and footwear must be matched to the weather, climate, terrain, hunting technique and personal preferences of the hunter. Clothing is not magical. It does not make or break the hunt, but using the proper types of clothing can make it much more pleasant. New developments in clothing for hunters are being made all the time, and wise hunters try to stay abreast of new developments that can make their time afield more pleasant.

Sharing and Exhibit Suggestions

1. Develop an exhibit showing various types of fabric that are used in hunting clothing and outline the pros and cons of each type. Share that with your group or another appropriate group of people.
2. Develop an illustrated talk on selecting an item of hunting clothing, showing the reasoning process that was used to make the selection.
3. Research and outline the development of some type of fabric used in making hunting clothing. Discuss the impact of that fabric on the hunting world and share your results in an appropriate forum.

CUTTING TOOLS

Hunters find many uses for a wide variety of cutting tools. Saws, axes and knives are as much a part of hunting and its related activities as are archery tackle and firearms. These tools are designed for different purposes. Saws are usually used across the grain in wood for either coarse or fine cutting jobs. They are also useful in quartering game or cutting bones. Axes are usually used with or diagonally across the grain in wood. As hardened tools, they should not be used on very hard materials, although some may use an ax or hatchet to aid in the quartering process. The greatest value of axes and hatchets in the hunting camp will be in the preparation and splitting of firewood. Knives are extremely versatile cutting tools. They may do moderately coarse work, like cutting brush for a blind, or do fine cutting like field dressing a game animal or helping to lift a splinter or thorn from the skin. They are used in food preparation, cutting cordage and leather, and many other operations around the camp or in the field.

All of these tools come in a variety of shapes and sizes. The user must know how to select a tool for the job and how to use it properly. Proper use includes knowing how to keep the tool sharp and how to care for it to keep it in good working order.

Saws for Hunters

Sportsmen use a variety of saws. Bow saws are commonly used in preparation of fire wood, although some camps may have access to chain saws for that purpose. Many hunters find a meat saw valuable for splitting or quartering a carcass or for removing the lower leg bones or the head. Some manufacturers provide a take-down saw with interchangeable wood and bone blades. Many sportsmen also carry a cable or wire survival saw as part of their emergency equipment. Saws are fairly simple tools, consisting of a blade and (usually) a frame of some sort to support that blade and provide a means of controlling the saw.

Axes and Hatchets for Hunters

Axes and hatchets are versatile heavy cutting tools. They are composed of a head and a handle, usually held together by wooden or steel wedges. The head is composed of a blade with a toe at the far end of the blade and a heel at the end closest to the handle, an eye through which the handle passes and a poll, in single bladed axes. The handle is slightly curved to straight, depending upon the style of the tool.

These tools come in several lengths. Felling or splitting axes have moderately heavy heads and full length handles. Cruiser's axes have a somewhat lighter head and a handle approximately three-quarters the length of the full-sized ax. These features make it a bit more portable for the backpacking hunter, although it does not have the same force for cutting or splitting wood. Hatchets are designed with much shorter handles, usually 18 inches or less in length. They are intended for one handed use on relatively light chores; but they are relatively light and easily carried. Most of them have a pounding surface and a cutting surface on the head, making them a light wood splitting tool and a hammer.

These tools also differ in head design. Single bit axes have a pounding surface to increase their versatility as tools, and many woodsmen prefer them to double-bit axes. They may have fairly straight edges and a relatively flat cutting surface or sharply flared edges to the head with a curved cutting surface. While some clear advantages are attributed to each type, the choice of style is largely one of personal preference. Double bit axes offer the advantage of sharpening the two edges for different purposes, e.g. felling trees and splitting firewood. They lack a safe pounding surface, however, and they require a bit more caution during use.

Knives for Hunters

Every hunter needs at least one knife, and one is seldom enough. Knives find hundreds of uses in camp and in the field. They come in a bewildering array of sizes, shapes and quality. Thus,

the hunter needs to know something about how to select, care for and use a knife in order to get the quality needed.

A knife is a simple instrument. It consists of a blade and a handle. The blade has a back, which is usually unsharpened and heavier than the cutting edge. The blade has a point. Together with the general shape of the blade and the sharpened edge, the shape of the point defines the blade type and its purpose. Some knives have a blood groove which is a concave area in the blade. The base of the blade usually features an unsharpened area, often in the shape of the original blade blank, known as the choll. Extending behind the choll into the handle is a tang. The tang includes a means of attaching a handle in sheath knives and an extension to hold the pivot pin and/or locking device in folding knives.

The knife handle may include a guard at the base of the hilt, another name for the handle. Folding knives are usually supported in the area of the pivot pin by bolsters, layers of metal to protect the knife handle from damage. Folding knives also have springs or some other locking device to aid in keeping the knife closed or open as the user desires. Most pocket knives have only a spring, while lock-back knives include a rigid locking device for greater security. Lock-back knives also have a release of some type that disengages the locking device. All folding knives have a pivot pin that allows the knife to be opened or closed while keeping all the parts together. Most of the handle is exactly that, a handle or grip. In folding knives, the grip encloses the blade when the knife is closed. As in fixed blade knives, the grip surface may be made of many materials, metal, bone, horn, antler, plastics, wood, leather or combinations of those materials. Handles may be shaped to the hand or left in more or less round, oval or rectangular shapes. In fixed blade knives, the handles are often attached to the tang on the blade by one or more rivets. Alternatively, a cap or pommel on the handle may be pressed or screwed into place to secure the handle.

Belt knives are the workhorse knives of the hunter. They are usually heavier than pocket knives, with thicker, more massive blades. They may be of traditional design with a fixed blade, a large lock-blade folding knife or a non-traditional style, like the Wyoming knife. They are usually worn on the belt and carried in a sheath of leather, nylon or some similar product. The sheath keeps the knife securely in place and protects the blade from damage. It also protects the person carrying the knife from injury. Thus, the sheath should be heavy enough to resist cutting and puncture and equipped with some means of keeping the blade away from metal or other dulling surfaces while preventing it from penetrating the sheath and cutting the person carrying it. While belt knives that look like short swords are available from many manufacturers, there is little need for a knife with a blade longer than about three to four inches. The shorter blades are easier to handle, more convenient to carry and completely adequate to almost any task that might be encountered by a hunter after even the biggest of big game.

Pocket knives are often multiple use knives. They may have a single blade or several different blades designed for different jobs. Some single or double blade knives are as massive as large lock-blade knives, but most pocket knives are designed to fit easily in a pants pocket. Pocket knives for the hunter usually have two or three blades. Two blade designs may include a long clip or Turkish clip blade with a long spey blade or skinning blade. Trapper or muskrat knives frequently have this design combination. Stockman's knives usually include a clip blade with a spey blade and a sheepfoot blade. This variety of blades serves multiple uses from general cutting to light field dressing quite well. Others may include other blade shapes that you prefer. Camp or camping knives may have one or more cutting blades, usually a spear or pen blade in combination with an array of utility blades or tools. "Boy Scout" and "Swiss Army" knives fall into this category of useful knives. The larger models of these "pocket knives" are normally carried in sheaths because they are too bulky to be carried comfortably. When they are needed, these portable tool boxes earn their keep, but they are not a true substitute for the traditional pocket knife or the hunting knife.

Utility knives normally stay in camp or at home. These are the knives used in the preparation of food or preparing the game animal for eating or storage. In camp, the hunter will find plenty of use for paring knives - usually the same use they find at home. Slicing knives can be extremely useful in preparing food in camp and in slicing meat that is cut and wrapped in camp. (Be sure to check state laws before doing this!) Specialized skinning knives usually have a broad sweep of curved blade to make the skinning task easier. Where the skinning task is handled in camp, these knives will save lots of work with a more general blade shape. Boning knives are also very useful for the hunter who prepares big game for storage or consumption in camp or for the backpacking hunter who would rather not carry out the bones. Specialized boning knives with a swept back blade or short fillet knives are excellent for boning out a big game carcass. Short (four to six inch) Swedish style fillet knives work very well as boning knives in addition to being good for cleaning fish during the off season.

Blade Shape and Function

Knife blades come in a wide variety of shapes. Usually those shapes have evolved for two reasons. The function of the blade often dictates its shape, with generations of users modifying blade shape trying to find one that works effectively for the jobs they are trying to do. The second major shaping influence is aesthetics. The appearance of the blade is important to the buyer. While these two influences may be compatible, the first is far more important in using the knife. Looking good in the store or when showing a knife to a friend is much less important to the knife's function.

Several types of blade designs have endured the test of time to become popular with hunters. A wide variety of clip blades are used in folding and fixed blade knives. Clip blades are tapered from both the back and the cutting edge of the blade with variable amounts of sweep to the edge and a fairly sharp point. Saber clip blades are angled downward from the back and swept upward from the edge to a fairly acute point. The long clip blade has a more gradual taper from the back and a longer and shallower sweep from the edge. The point is much more acute and slender. Fishing knives frequently use this design. The Turkish clip blade has a long, but almost imperceptible taper to the top, turning upward slightly at the point. The relatively thin blade is swept upward to meet the tip in a very thin and sharp point. This blade style is often paired with a long spey blade in folding hunters or trapper knives. Clip blades have an excellent general purpose design with a point that is very good at puncturing tough skin to start a field dressing or skinning process.

Spey blades have a fairly obtuse tip with plenty of upswept edge. Usually the back of the blade is relatively straight until it tapers downward to the tip rather abruptly at the end of the blade. Spey blades are often the "for flesh only" blades on stockman knives, and they are frequently coupled with a thin Turkish clip blade in trapper or folding hunter styles. The maize blade is essentially a "swollen" spey blade with much more curved cutting surface. Many skinning blades use a spey design, sometimes on a curved blade.

Sheepfoot and coping blades have a straight, flat cutting edge with the back of the blade curved downward to support the edge to its tip. They are used to cut into a surface while avoiding damage to anything behind the cutting edge. They are useful for cutting cordage, slicing leather or making sharply defined cuts in wood. Many three-blade pocket knives combine this blade style with a spey blade and a clip blade for broad utility.

Spear and pen blades are curved nearly equally from the back and the edge. The major difference between them is their size. Spear blades tend to be both longer and wider than pen blades. While they are good general use blades, they are not as effective as more specialized blade designs at either making initial incisions or skinning.

Drop point knives resemble a broad Turkish clip blade with more sweep to the cutting edge. These blades are excellent field dressing and skinning tools, and many hunters prefer them to other blade designs for general use. The back of the blade is slightly curved or angled toward an

up-swept cutting edge, producing a fairly sharp point with a wide curve of cutting surface for skinning or caping work.

The Green River skinning blade is an old design used by fur trappers who specialized in beaver. Beaver hides adhere strongly and must be removed with a wedge or a good skinning knife. Cuts or nicks reduce their fur value, so a broadly curved and angled knife was developed to permit the trapper to skin the animal effectively and with minimum pelt damage. Several specialized skinning blades are available today on this same basic design. The shape of these blades requires that they be fixed blade knives.

Boning or fillet knives have a relatively narrow blade with either a relatively straight back or one that is angled upward from the tang. Their general shape varies from a narrow drop-point design to an elongated and curved Turkish clip design. Some of them have a rounded and extremely sharp point which is used for much of the incision work. These knife blades are usually relatively thin and flexible. They are excellent, versatile blades for final preparation of a big game carcass for packaging and storage.

Some specialty knives have other tools. Bird knives often include: a long, smooth and narrow hook, known as a gut hook, which is an aid in field dressing small game birds. These knives may have a blade that functions as a choke tube wrench as well. Big game knives may include a folding saw blade that aids in cutting through the sternum or the pelvis during field dressing.

No blade design or knife does everything well. Most hunters find a need for a multiple-blade pocket knife with blades of their choice, a general purpose belt knife that meets their preferences and the tasks they expect it to perform, and a set of specialized knives of their choice back in camp or where the carcass will be handled.

Carefully chosen, maintained and used, good knives are life-long investments. Consider your selection carefully. First, think about the primary use of the knife and the suitability of the blade(s) for the use(s). Consider your personal preferences in blade types or shapes for various chores. Choose a knife from an established manufacturer or maker with a reputation for durability and ruggedness. Select blades with the steel quality and edge-holding ability you prefer. Softer steels will sharpen more easily, but they will require more frequent sharpening. Stainless steels do not tarnish as much, but high carbon steels are harder and able to take on a finer edge. Finally consider how the knife looks and feels to you. Does it feel balanced in the hand? Can you maneuver the blade effectively? Does it carry some pride of ownership?

Sharpening Cutting Tools

Dull cutting tools are dangerous! Keeping your knives, axes and saws sharp is a factor in both safety and the effectiveness of the tool. Although saw sharpening is a more advanced activity and is often best left to a professional with the proper equipment, anyone can learn to sharpen knives and axes effectively.

The temptation when faced with a sharpening job is to head for the shop and an electric grinder. Please avoid that temptation. Grinders can heat the metal in the tools, drawing their temper and leaving them with an edge that is easily dulled. Specialized grinding tools may be used if they have both a means of keeping the tool cool and a way to maintain the proper angle during the sharpening process.

A flat mill bastard file, whet stones of various types and grades, kits or devices designed to keep angles true, sharpening steels and or ceramic (crock) sticks all have a place in sharpening cutting tools. Whet stones, either manufactured or natural, are usually made of carborundum, a hard aluminum oxide similar to ruby, emerald and similar stones. These stones come in a variety of grades. Coarse or soft stones (sometimes called Ouachita stones) are used for rapid removal of material. Using progressively harder or finer stones (hard Arkansas to black Arkansas stones) reduces the amount of material removed from the edge and leaves a progressively smoother edge which cuts more smoothly. A variety of kits or tools are available to assist you in keeping

the angles of the edges uniform while sharpening. Unless you are experienced and skilled, try to maintain the manufacturer's angles on the tools being sharpened. Steels or crock sticks can be used to refresh an edge during use or to further smooth the edge after treatment on the stones. A heavy leather strop can be used to further polish the edge of the blade on knives to make it sharper and smoother. Some people are satisfied with the edge produced by a scraper-type sharpener, usually carbide or tool steel cutters in a device designed to produce a sharp edge when the blade is drawn through it. Seldom will these devices yield the quality of results attainable with good stones and other sharpening tools, but they are fast.

Sharpening an Ax

Although axes can be sharpened without a vise or other means of holding and securing it, the task is much harder under those conditions. Using a good bench vise is preferred, but the ax head can be held firmly against a convenient surface like a bench or stump, too. Following the angle ground into the edge by the manufacturer or one that you have determined suits your use better, draw file the edge equally on both sides of the blade. This is accomplished by placing uniform pressure on the tip and the handle of the file and pushing the file forward as it is pushed from the heel to toe or toe to heel of the blade. Make the strokes smooth and let them cover the length of the blade's edge while keeping the pressure even and the angle the same. If there are nicks in the blade, work the entire blade until they are removed.

Once the edge is sharp, polish the bevels using one or more whet stones. Use either a circular motion or a draw-filing motion, but make sure the blade is covered evenly. Maintain the angles used with the file and try to use a lighter but consistent pressure on the stone. Round stones work best in a circular motion, while rectangular ones will last longer if a draw filing type of motion is used.

Once the edge has been sharpened, protect both the edge and yourself from damage by placing it in a sheath or scabbard. A sheath of heavy leather or a padded fabric sheath will keep the edge from getting nicked or blunted and people from getting cut while the ax is not in use. Take a few moments to check the handle to make sure it is tight before putting the ax away or stowing it in your hunting gear. Apply a light coat of linseed oil to the handle occasionally to keep the wood in good shape. If the head is loose, replace the wedges or add steel wedges at an angle to the wooden one to tighten it. Soaking the head in water will effect a temporary cure for a loose ax head by causing the wood to swell. This should be considered a temporary or emergency cure. The leather sheath can be treated with saddle soap, Neet's foot oil or leather restorer to keep it flexible and in good condition. Use oils sparingly, since they tend to soften the leather and may reduce the protective nature of the sheath.

Sharpening a Knife

Knives can be sharpened either at home or in the field if the proper tools and a comfortable place to work are available. Once the tools have been assembled, select the desired angle. The angle at which the edge is sharpened determines its sharpness and its durability. Sharpness increases as the angle gets shallower, but durability of the edge decreases at the same time. Most of us select angles that give us the optimum compromise between the two for any given job, sometimes using different angles on the various blades of a pocket knife.

For relatively coarse work where a tough edge is required, many people prefer an angle of about 25° to 30°. An angle of about 15° to 20° yields a much sharper, yet durable edge that is excellent for field dressing, skinning and bailing as long as the blade is not used to cut through too much bone. Even the small bones in the rib cage of small game or scraping on the wing or leg bones of game birds will dull knives sharpened at these angles. Very shallow 5° to 10° sharpening angles are excellent for fillet or boning knives or for the "for flesh only" blade of a pocket knife. Many wood workers try to keep an edge of about 5° on their wood carving knives, touching up the edge frequently. Beginners should stick with the angles used by the manufacturer of their knife until they have experimented enough to find the edges that work best for them. Many hunters prefer to

use an extremely sharp edge, even though it does need frequent touch-ups with the stone or crock sticks. The key is matching the edge selected to the job being done.

Once the desired angle has been determined, dress the edge equally on both sides to the desired angle.

On dull knives or those where you are changing the angle, begin with a coarse or soft stone. Keep using it until the edge has been cut to the desired angle and it is quite sharp. Repeat the process with medium and fine (hard) stones, keeping the pressure and the angles constant. A few strokes on either side of the blade should be sufficient if the coarse stone has done its work. Following the manufacturer's recommendations, moisten the stones with cutting oil, kerosene or water while they are in use. This keeps them from filling with metal filings and losing their effectiveness. The stones can be used with either a circular motion or a slicing one. The circular motion passes the blade through a series of overlapping circular patterns from poll to tip or tip to poll. This approach tends to take off material quickly, but it also tends to hollow the center of a stone and it may result in uneven sharpening of the edge. Some people will find it difficult to maintain the selected angle as well.

The slicing motion resembles an attempt to slice a very thin layer off the surface of the stone using the entire length of the knife blade. It tends to use more of the stone, wearing its surface more evenly. Most people find it easier to maintain their selected angle with this technique, even though it may require a bit more time to finish the sharpening task. For best results, the blade should be turned from one side to the other after each stroke and the strokes should get lighter with the harder stones.

Keeping a consistent angle as a knife is sharpened is the key to effective sharpening.

Many of the true-angle kits use a series of guide slots with a protected stone mounted on a rod. The manufacturers recommend that these devices be used by pushing the stone into the edge using overlapping strokes from the poll to the tip and back again. Usually three complete laps of the blade on each side will be adequate to refresh the edge. Regardless of the tool used or the style of sharpening motion, keep your flesh out of the way of the blade!

Once the edge has been hone to its desired angle, polish it with very light strokes on alternating sides using a set of steel or crock sticks. Be sure to maintain the proper angles while doing this. If desired, a heavy leather strop can be used to polish the edge even further. Draw the edge over the strop from the back of the blade to the edge, alternating strokes on opposite sides of the blade. This results in an extremely smooth, razor-sharp edge that will cut very cleanly.

There are many ways to test the edge on a knife. No matter which one is chosen, some caution must be taken to avoid getting cut in the process. Traditional methods of testing an edge include slicing paper, shaving hair, feeling the edge with a finger nail or feeling the edge with the ball of your thumb. The first three methods dull the edge slightly and require that it be stropped again to refresh it. The last three methods run some risk of a cut. Try them to see which ones suit you the best, but **BE CAREFUL** not to cut yourself in the process. When using your thumb to test sharpness, come across the edge carefully and at right angles to the blade. Do not run your thumb or finger along the blade!

Once the edge is sharpened to your satisfaction, protect it from corrosion. A light coat of oil or petroleum jelly helps if the blade is to be stored for some time, and having it clean and dry before storing it is very important. Using the blade for the purpose your selected and avoiding abuse of the edge will also keep it sharp longer. Sheaths can be cared for in the same fashion as those used for axes.

Using Cutting Tools Safely

Well sharpened tools will cut the materials they were designed for very well and with a minimum of effort. While they are less likely to slip or be deflected than a dull tool, they are also capable of wounding the user if they are not used with care. Every user of a saw, ax or knife needs to use

some common sense and responsibility in keeping the tool and the area around it under control. Fatigue and excitement are frequent contributors to injury. Try to use extra caution when you are excited or tired and you need to use a cutting tool. Keeping the work area clear and keeping body parts out of the way of sharp edges avoids most accidents. With knives the most frequent injuries are to the hands and fingers. Occasionally missing the sheath, using a damaged or inadequate sheath or putting away an open pocket knife causes a cut to a leg or the rump. Axes often involve injuries to the feet or legs from deflected blows or injuries to the head from flying objects (usually improperly placed wood) or by getting the axe head caught in obstructions. Any of these can sure foul-up a hunting trip.

Common hazards include deflected tools, damaged or loose tools, dull tools, cluttered work areas, careless people, flying pieces of wood from improper cutting (make sure the area being cut is supported) or cutting tensioned wood. All of these can be avoided. Safety glasses should be used when using an ax or saw, and gloves are a good idea for hand protection. Finally wise hunters use protective gloves while field dressing game to prevent blood-borne diseases from reaching any scratches or cuts on the hands.

Cutting tools are part of every hunter's life. Learning to choose, use and sharpen them safely and effectively is part of the basic training of a hunter.

Exhibit and Sharing Suggestions

1. By using the techniques you have learned, sharpen the knives and axes at your home. Be sure to warn others in the house that the knives have been sharpened!
2. Create a poster or other exhibit showing proper sharpening techniques for cutting tools.
3. Create a chart or poster showing sharpening angles for various tools and the advantages or disadvantages of various angles for the user.
4. Give a method demonstration or illustrated talk on sharpening a knife or ax.
5. Show another group of people how to sharpen and use a cutting, tool properly.
6. Select a knife, ax or saw for your use as a hunter. Share your reasons for that selection with a friend, family member or other adult.

SECTION 4: Getting Ready for the Hunt

1. Planning the Hunt
2. The Hunting Camp
3. Firearm Safety for the Hunter
4. Survival in the Outdoors

PLANNING THE HUNT

Introduction

For many hunters, hunting is a year-round process. As soon as one season ends, preparation for the next one begins. While opening day is the big one, often there are many things to do well before the opening day arrives. As hunting season approaches, hunters anticipate the opening day with a great deal of eagerness. Their attention turns to thinking about the upcoming hunt - a new rifle, shotgun or bow, reloading special ammunition, getting the camping gear in order, or maybe a trip to buy a new pair of boots. The experienced hunter realizes that it is important to make definite preparations for the hunt.

Personal Hunt Checklist

Many hunters like to use a personal checklist to make sure that they do not forget something that is essential or very helpful in their hunting trip. Many factors must be considered in hunt planning. The first of them is the type of hunt to be made. Is it a day hunt or for several days? Is it a big game, upland birds or waterfowl hunt? Will you camp, stay in a motel or use an available cabin or other shelter? Will you use a firearm (cartridge or black powder) or bow? Are you on your own or are the services of a guide or outfitter being used? What sorts of conditions are likely to be encountered? These and many other questions result in lists with a great deal of variability among hunters and hunt types.

Categories for a personal check list might include some of the following items.

1. Hunting arms and ammunition - list all items that must be included
2. Clothing
3. Sleeping
4. Toilet articles
5. Field equipment
6. Game processing equipment
7. Camping gear
8. Food
9. Game regulations
10. Other - miscellaneous

A wise hunter will pay attention to each of these categories, attempting to have the best preparation and equipment for the type and length of hunt that is to be taken. The mechanics of the hunt are also important, since some types of hunt access may limit the weight or bulk of equipment that can be taken into the hunting area. For backpack hunters, weight may be such an important factor that very limited equipment is used. While a heavier item may be better at a specific task, the light weight of another item may make it more desirable for the hunter. At other times, vehicular access makes convenience the most important factor. What is being hunted, where it is being hunted, how the area will be accessed, the type of weather and climatic conditions to be encountered, and much more enter into the planning process.

Hunting Regulations

Every hunter must take the initiative to know game laws and regulations in the area where he or she is hunting. The laws must be studied and understood before the hunt, particularly when hunting in an unfamiliar state. Some states require species applications and only those hunters "drawn" are issued a permit to hunt. Other states require special species stamps, such as a state waterfowl stamp, or conservation stamps that must be affixed to the hunting license.

Most states now require proof of hunter education training before licenses are issued to youth and/or adults. Others may require the International Bowhunter Education Program as a prerequisite to obtaining an archery hunting license. Provision for these courses should be made well in advance of hunting season, allowing plenty of time to locate and complete a course. Since most of the people who offer these courses are hunters and volunteers, locating a course once

the hunting seasons begin can be an extreme challenge, and the night before you leave for a planned trip is not the time to find that the course takes three-days!

The Hunt Plan

If more than one person is involved, a cooperatively developed hunting plan should be developed. This allows each hunter to assume responsibility for some of the hunt logistics. Decisions can be made that will reduce excessive duplication, insure adequate equipment for the hunt, and make the preparation process simpler for everyone involved. Examples of items that might be considered are listed below.

1. Who will secure and pack the various camp gear needs?
2. Who has a meat saw?
3. What kind of transportation is needed and who will provide it?
4. How will expenses be shared?
5. Have landowner contacts been completed? Who is responsible for them?
6. How long will the trip take, and when do we leave and return?
7. Where and how can you be reached in an emergency, and has a hunt plan been provided for responsible people at home?
8. Will you call home during the hunt or be out of touch for the duration?
9. Are adequate maps of the hunting area available, and who is obtaining them?
10. Have all details of the hunting lease been finalized and confirmed?
11. Are the directions to the hunting area clear and understood?

After The Hunt

Except for storytelling, there is a normal let down after a hunt. Most hunters must return to work and other tasks left at the beginning of the hunt. The hunt is not over, however, until all the equipment and game are properly cleaned, maintained and stored. Equipment should be checked to see that it is in sound order. Cast iron or sheet steel utensils should be cleaned, coated with light cooking oil and stored. Firearms or archery equipment should be cleaned and stored. Tents should be dried, cleaned, folded and stored out of reach of nest-building mice. Stoves, lanterns and other equipment should be checked, cleaned and put away for the next trip. Taking time to clean equipment adds to its life and effectiveness, gets it ready for the next outing, and saves time prior to the next trip.

Proper care and storage of game includes making it as table ready as possible before it is preserved or used. A little time spent at the end of the hunt makes the probability of a delicious meal much greater and prevents frustrations when preparing game for a meal. Proper storage also provides a higher quality product for the table.

Summary

Hunting is like many other things people do. It requires some planning and preparation. Attention to planning, whether it is for an afternoon squirrel hunt or a 30 day safari, makes the hunt more enjoyable and goes a long way toward making it a success. Learning from each hunt improves the planning and preparation process.

Exhibit and Sharing Suggestions

1. Develop a hunter's checklist for your favorite type and length of hunt. Share your checklist with your group.
2. Develop an illustrated talk or demonstration on hunt planning and present it at an appropriate event or activity.
3. Begin planning for a prolonged hunt a year or more from now. Assemble the equipment and information needed, and generate both a set of checklists and a hunt plan to support the trip.

HUNTING CAMP

Camping is part of many hunting trips. Sometimes it will involve staying at an established camp, where everything but the food and personal gear are in place in a rustic, but home-like atmosphere. At other times it may involve spending an extended period of time in a wilderness setting, where the hunter is limited to the gear he or she brought into the camp.

Camping offers several advantages to the hunter. It permits extended hunting trips with more time devoted to hunting and learning the area. It allows the hunter to stay in or close to game country, where they can spend less time traveling to and from hunting sites and more time actually hunting in those sites. Camping allows persons who enjoy the camp experience to expand the enjoyment of their hunting experience and to share it with a few like-minded people. It allows the hunter to "get away from it all" and re-create his or her spirit in the atmosphere of enjoyment. The hunting camper camps as a means to another end, but may find that the camp is as important, or more important, than the hunt itself.

The hunting camp may involve some challenges and needs that differ from other types of camps. Planning the site of the camp involves getting as close as possible to the action without disturbing or interfering with the normal behavior of the game animals. For sensitive wilderness species that may mean a few thousand feet of elevation or a mile or more from the hunting area. Other species may be impacted almost negligibly by the presence of a quiet camp. Hunting campers have needs in the area of meat and trophy preservation that are seldom encountered by other kinds of campers, and they must be concerned with some additional safety factors. Strict control of firearms or archery equipment is vital. Since most hunting takes place in the cooler parts of the year, the hunting camper is often concerned with heaters and the control of fires as well.

Types of Camps

Many types of camp situations are used by hunters. Those may range from an emergency over-night camp carried in a day bag to a permanent base camp or a self-contained recreational vehicle driven into the hunting area and used as a base. Backpack camps are carried in by the hunter or group of hunters. All camping gear and hunting equipment comes to camp on foot, so total weight is an important consideration. An emergency over-night camp could be considered a special case of the backpack camp. It might include no more than a "space blanket", fire starting materials and a little food and water. Spike camps are often camps established for a day or two deeper in the hunting territory from a base camp. Typically a spike camp may include a small tent, sleeping bag, minimal cooking gear and food for several days. Some "backpack camps" are reinforced by gear carried to the camp site by an outfitter and left for the use of those who carry in their hunting and sleeping gear and their food.

Horses are used in many areas to establish hunting camps. On full service guided hunts, the basic camping gear and food will be provided by the outfitter; and the hunter will provide personal gear, hunting equipment and sleeping gear. Drop camps may rely on the hunter's equipment completely or provide the basic shelter, heat and light of a base camp, with the remainder being supplied by the hunters. In this situation, horses provide the transportation to the camp and back from the camp at the end of the pre-arranged length of stay. Other hunters may organize their own horse packing trips into remote areas to hunt undisturbed country. Horse packed camps usually allow for more gear and comfort than do backpack camps.

Camp sites that are accessible to vehicles permit greater flexibility and a greater variety of gear. Some such sites are provided with a cabin or a tent platform. Others may be equipped with a trailer, either permanent or drawn in for the season. Still others will use self-contained vehicles or camping trailers as their base. Pickup campers may be adequate for a few days stay. Tents are the most common shelters in vehicular camps. Boat or canoe accessed camps may be similar to vehicular camps. House boats or cruisers may be used as base camps, while smaller boats or canoes may act as transport.

Locating Good Camp Sites

Several things enter into determining a good camp site. Access to the type of transportation being used is a major one. A second major item is proximity to the hunting location. The camp should be near enough to be convenient without disturbing or interfering with the game being hunted. Thus a waterfowler might locate a camp on a bit of high ground within a few hundred yards of a hunting area, while an elk hunter may need to keep the camp site a mile or more away from prime hunting areas to avoid disturbing the animals.

Site features are also vitally important. The ideal camp site is level, at least where the tent, cooking and eating areas are to be placed. It should be as free as possible from surface clutter, like rocks, protruding roots, stumps and similar obstacles. These can pose a hazard to movements in the dark and even small ones can become a pain in the back if they find their way through a sleeping pad during the night. The area should also be well drained and out of any potential flash-flood areas. Ditching of tents should only be used as a last resort for prevention of wetness inside the tent. The area should be large enough to locate the gear comfortably and without giving a sense of crowding or creating any hazards. Access to any on-site needs should enter into the decision on camp location. Access to a water supply reduces the need for transporting water to the site. Availability of fuel wood for camp fires, heat or cooking is a consideration in many camps. If pack animals are being used, adequate forage must be available for the stock. The site must be located so that wastes and waste water will not contaminate local waters with adequate disposal areas or arrangements to remove all wastes and trash from the area. In big game country, a site to hang game animals can be a very important feature.

Other site features are also important. Elevation is important, both as an impact on other factors and because of its effect on the hunters. Note that it takes about 3-5 days for a person to become acclimated to elevation and that even then, the elevation places a burden on the heart and lungs. The camp site should be outside flood or avalanche areas. It should be located some distance from game trails used by bears or other potential problem animals for the camp.

The availability of sun and shade should be considered. A sunny site is much more pleasant during the day, except where temperatures are high; but shady sites are better for hanging game or periods of high daytime temperatures. Wind protection is important to keep the cooling effects of the wind under control and to prevent collapse of tents or upsetting camp equipment. On the other hand, some air movement is an important factor in keeping insect pests under control in areas where flying insects are a factor.

The site should be chosen to permit a reasonable amount of privacy. This adds to the wilderness quality of the experience, even when other people are in the area. It grants some measure of security to equipment left in camp, even though camping hunters tend to show a high level of respect for the property of other campers. Finally, it affords a level of personal privacy that is helpful when bathing or taking care of other personal chores.

Finally, the camp site should be located where the surroundings look good to the camp residents. If the site pleases the aesthetic senses, it will promote a general sense of well-being and pleasure.

Camping Ethics

Ethics refers to accepted codes of conduct associated with right or wrong behavior. Many ethical codes have been printed, but the truth is that ethical decisions are personal as well as societal. Camping ethics have evolved toward minimum impacts on sites. No camper can leave an area without impact or evidence of human activity, but most sites can be left very close to the condition in which we found them or even in better condition. Proper disposal or removal of wastes, trash, or other items that were carried into or produced in the camp is a major part of minimum impact. Where burying garbage used to be considered appropriate, current standards call for it to be burned or carried out of the camping area for disposal.

Cleaning up the site and renewing its appearance are the camper's responsibility. Where existing established camp sites exist, using established fire rings and tent sites is helpful. Policing the site to remove trash or garbage left by others is part of the camper's responsibility, as is leaving the site ready for the next person. When a remote campsite is established where no others exist, the site should be restored as much as possible to its original state. Ash and burned materials from campfires can be buried with soil and sod replaced over the site, creating fertilizer rather than fire scar. Keeping site disturbance to a minimum reduces the effort required to restore the site to its original condition.

The camping hunter has a wide variety of responsibilities. He or she is responsible for the site and wildlife using that site. Responsibilities to other people are varied. They include other hunters or campers that might use the area, other kinds of recreationists (anglers, backpackers, nature observers), and all other human users of the area. Resource managers, users of natural resources (cattle or sheep grazers, loggers, or others), and landowners are all concerned with the quality of the sites used by camping hunters. Positive experiences with the hunting public lead to positive images of hunting, particularly where some of us clean up the messes left by those who are not worthy of the name hunter.

Although ethics go far beyond legal requirements, those requirements form a minimum standard for society. Some sites have very specific regulations which must be followed, like not cutting any living vegetation, no open fires, restricted use of vehicles or securing a permit before camping. The hunting camper must be aware of these regulations and follow them carefully.

Camping Equipment

The camping hunter may come in a self-contained version of home, stay in a well-stocked cabin, or carry a minimum of gear in on his or her back. Several categories of equipment are important. Shelter (and heat), sleeping gear, food and water, cooking gear, sanitation equipment, light, a variety of tools, and some creature comforts are part of the list to be considered in establishing a camp.

Shelter and Heat - Most self-contained recreational vehicles come equipped with both shelter and heat (or cooling), as well as the remainder of the gear needed. Pickup campers, trailers or pop up campers may be similarly equipped. House boats are simply water-borne RVs, while cabins are really homes away from home.

Tents are the major type of shelter used by hunting campers. Tarps or "space blankets" can be used to form body bags or simple lean-to shelters. They are excellent for emergency use or for use as a shelter under mild conditions. They may be rigged in several ways to make them useful to the camper or the over-night bivouac resident. Generally, backpacking tents are of limited use to the hunting camper. They are light in weight, compact, and easily carried; but they lack space for adequate gear for an extended stay. Some backpacking hunters use them as a "spike camp," but they are not used heavily by the long-term hunter.

Dome or umbrella tents offer many sizes and shapes with more space for people and equipment. They may have either external or internal frames. Some pop into place. All of them have more bulk and weight than the backpacker tents. Most camping hunters are willing to sacrifice the convenience of the smaller tent for the extra space and comfort of the larger ones. Cabin and wall tents offer greater height and more freedom of movement for the campers. They are frequently larger (up to military style "squad" tents) and often provide for additional heating options.

Heat Sources - Cold country outfitters frequently use a sheet iron stove or shepherd's stove as a combination heating and cooking stove. These wood-fired stoves require a chimney and asbestos ring in the tent to prevent setting the canvas aflame. Smaller tents are best heated with a catalytic heater. Several types are available, and the risk of fire or toxic fumes is minimal with

them. The use of cook stoves or lanterns to heat tents is dangerous because of fire hazards and the possible buildup of carbon monoxide fumes inside the tent. By adequately ventilating the tent to prevent carbon monoxide poisoning defeats the heating effect of the stove or lantern. Another alternative, particularly with open shelters or tent styles is the use of a reflector fire. Reflector fires can provide adequate warmth, but they do require maintenance during the night.

Keeping Unwanted Guests at Bay - Many hunting campers encounter some unexpected "guests" in camp. Some of them add to the experience, like jays who scrounge scraps or the chipmunk that decides your group is a great source of peanuts. Others are a nuisance or can create problems. Insects can be managed by selecting a breezy site with adequate air movement to discourage them. Adequate screening on the tent windows and doors is also effective, at least while inside the tent. Citronella candles or similar insect deterrents can be used to inhibit the critters around the dining and cooking areas.

Rodents can invade food supplies if they are accessible. The solution is to keep food in closed containers. Pack rats and deer mice can invade tents if they find tempting objects available and easy access. Sanitation, keeping attractive foods in sealed containers, and using a floored tent or a tarp covering the bottom flaps on wall tent should be adequate to keep most of them on the outside.

Bears and raccoons can be a serious problem in some areas. In bear country, NO food should be stored in tents. Food containers should be hung out of reach in trees. Suspend food from a tree 100 yards from camp at least 10 feet off the ground and 4 feet away from the trunk of the tree. Do not put anything that smells of food inside anything that you do not want to see torn open. Bears are powerful animals that can show great determination in getting at desired goodies. Raccoons are much smaller and less powerful, but they seem to have the capacity to open anything short of a strong combination lock! Exercise care to keep the area clean and to avoid raids by passing bandits.

Many problems with critters can be avoided by careful site selection and scrupulous sanitation. Most of the remaining ones can be cured by using some type of barrier to restrict their access. Problems are easier to prevent than they are to cure.

Sleeping Gear

Some types of camps are set up so sleeping arrangements are just like they are at home, with comfortable beds and appropriate linens for the season and temperature. Recreational vehicles usually have bunks or cots that can be used for sleeping, even if they fold away for other activities. Many hunters in other camps find canvas cots to be the most comfortable sleeping platforms, but some prefer the lighter and more easily transported sleeping pads of closed-cell foam. In cold weather, using a pad or a folded blanket on a cot will increase the comfort for the sleeper, since it provides a layer of insulation between the bag and the air.

Blankets may be adequate for mild weather, and several may be pinned together to make a sleeping bag of sorts. Blankets tend to be somewhat heavy for the amount of insulation they provide, so most camping hunters prefer to use sleeping bags. Sleeping bags are available in a variety of shapes, weights and filler types. Mummy bags are the warmest for their weight and bulk, but they may be a bit too restricting for tall or large people. Tapered, semi-mummy bags are a compromise that approach the rectangular bags in shape and freedom but increase the level of sleeping comfort per pound of filler. Rectangular bags are often the most acceptable to big or tall hunters or those who tend to be active sleepers.

Sleeping bags are filled with a wide array of natural and synthetic materials. Down has been considered the best filler for many years. It has excellent insulating qualities, very low weight, and superior loft. That allows the user to crush the bag into a small package, yet have it spring back into shape and heat retaining efficiency once it is spread on the pad or cot. Many synthetic fibers have been developed with characteristics that mimic down's desirable qualities without the

tendency to become matted when they get wet. Thus, several of the synthetics will perform on a par with the best down and behave well if they get wet and must be dried in the field. "Chicken feathers" or cotton batting found in the least expensive bags is not acceptable for cold conditions. Check the comfort rating of the material against the conditions you expect to face when buying a bag.

Food and Water

An adequate water supply is one of the most important elements of a safe and comfortable camp. Water is one item that is in constant use. We drink it, cook with it, wash dishes in it, bathe in it and perhaps wash clothes in it. Water can come from several sources. It may be carried in containers from home or some other approved and tested water source. It may be available on the site from a well, spring or surface waters. All surface waters and any source that is questionable should be purified before using it. Many surface waters contain a variety of organisms that can cause disease or temporary disability. Viruses, bacteria and intestinal parasites can bring a dream hunt to a quick and bitter end. Almost all of them, including *Giardia*, a parasite that is common in many places and causes severe intestinal problems can be eliminated by proper water purification. Iodine, halazone, several commercially available bio-filters and boiling can all produce safe, potable water.

A safe, quality food supply is important to enjoyment of a hunting experience. The type of transportation used and the amount of refrigeration necessary often dictate the type of food supply used in camp. Backpackers may be restricted almost entirely to freeze dried fare, primarily so they can save the weight of carrying the water in standard foods. Most RV users can enjoy home style cooking, particularly if self-contained units include refrigeration and stoves with ovens. Any boat or vehicular access camp should be able to support a varied diet of quality foods even if the only cooking heat is a camp stove or campfire coals.

Food safety is as important in the field as it is at home. Hot foods should be kept hot, and cold foods cold until they are used. Normally a hunting camp does not have a problem with keeping the hot foods hot until they are consumed. Meal times are often similar to a shark feeding frenzy. If the camp is in cold weather, keeping things cold may be less of a problem than keeping them from freezing solid. Under warm weather conditions, the ice chest may be the only way to keep fresh foods fresh and safe to eat. Keeping dishes, cooking pots and utensils clean is also vital to food safety. Food residues and soap both represent possible problems for the camper's stomach.

Most hunting situations call for a high level of physical activity. In cold weather that is compounded by using considerable fuel to keep warm. In hot weather, keeping the fluid level up to par is a challenge. Fueling the active hunter calls for a balanced diet of quality foods with a strong complex carbohydrate component. Hearty, well-prepared and palatable meals add to the quality of the hunting camp experience.

Food preparation should be practiced at home, rather than waiting until the party is in the wilds. Anyone with the ability to read and follow a recipe can cook super meals for hunting camp fare. Grilling, baking, boiling, broiling and frying foods are fine; and most backyard chefs feel comfortable with these techniques. Some truly exceptional camp foods can be prepared using a Dutch oven or reflector oven, if their weight and bulk are not too much for the situation.

Camp Kitchens -Camp kitchens could look just like home in some situations. In most cases, however, the camp kitchen needs to be set up for multiple use and efficiency. Some of the simplest cooking sets are nested pots and pans with plastic plates and silverware inside the smallest pan. These are completely suitable for two or three hunters. As party size increases or the capability of the cook increases, cooking gear can get a little more complex. A stout camp grill provides both a cooking surface for grilled or broiled foods and a support for other pots and pans when campfires double as cooking fires. A Dutch oven or reflector oven adds tremendous versatility to the cooking options by allowing baking. As these materials are collected, a kitchen

box might be constructed to hold the pots and pans, cooking utensils, hot pads or welders gloves, pot lifter, and a supply of condiments and spices that do not need refrigeration. These seasonings, incidentally, add tremendously to the enjoyment of food, particularly when coupled with a hearty appetite.

Cold Storage - Although some camps might be equipped with electricity and electrical appliances like a small refrigerator, most of them depend upon other means of keeping food cold. Ice chests perform that task for the vast majority of camps. Using block ice and keeping the chest as full as possible causes the cold to last longer. In cold climates, snow or ambient cold air might be enough or even too much cold for some items. In the latter case, the ice chest may provide a tempered environment where the fresh foods will be kept from freezing. Where cold water streams are present, bone-chilling water can be used as a refrigerator if the foods are anchored in sealed containers.

Cooking Techniques - This was discussed briefly above, but a wide variety of methods are available to the camping hunter. Backpackers may restrict their cooking to boiling water to rehydrate and warm freeze-dried meals. Traditionalists might elect to do most of their cooking over coals, where the use of wood fires is permitted. That can include any method of cooking up to and including baking almost anything desired in a Dutch oven or reflector oven. Burying the Dutch oven meal in coals and soil, is the equivalent of the modern slow cooker. It is excellent for beans, pot roasts and similar meals that benefit from a sustained heat. In other words, while the source of heat and the size of the oven may differ, you can do almost anything in the field that you could do at home. Remember to add cooking time to anything that is boiled when meals are being prepared at altitude. As elevation increases, the boiling point of water decreases, requiring longer cooking times to reach the same doneness.

Eating and Cooking Amenities - A table and stools or folding chairs add greatly to the enjoyment of meals and bull sessions, and they make processing meat much easier. Sturdy folding tables or tables that can be taken apart and reassembled easily are easy to pack and welcome conveniences. Seats can be folding chairs, camp stools, packing boxes or even buckets with lids. Having a seat other than the ground or a convenient log, stump or rock adds comfort to the camping experience. Boxes and buckets can serve double duty as storage containers and seats, but the back support of folding chairs is welcome to a tired hunter.

Sanitation

Sanitation covers an array of considerations from bodily wastes and cleanliness to preventing gastric problems because of food or cooking utensil contamination. Most camp sanitation is just common sense and doing the things your mother taught you to do many years ago.

Body Wastes - Bodily functions continue in camp as well as at home. Care is required to keep wastes away from the immediate camp area and to prevent them from contaminating water supplies, even if those water supplies are not being used by the camp. Camp toilets are used by some hunters. They are equipped with sealable plastic bags that permit the wastes to be carried out for disposal at an appropriate site. Others dig a latrine and provide it with a seat and other conveniences. At a minimum, wastes should be deposited in a slit trench or "cat hole" and covered with several inches of soil. That allows the wastes to be recycled by the local plants without allowing it to be carried into waters by run-off. Make sure that any latrine or trench is situated so it will not allow wastes to be leached into springs or water supplies.

Cleanliness - Basic cleanliness is important to health, a sense of well-being and hunting success. It can also contribute to the longevity of camping equipment, like sleeping bags and to prevention of skin irritations. Short hunting trips may not require extensive bathing. A simple washing of hands, face and feet may be all that is needed to make the hunter feel good. Washing the hands is part of basic sanitation and food safety. Washing the face makes the individual feel more alert. Washing the feet refreshes them and helps to prevent fungal infections or foul odors that can alert game to an approaching hunter.

Many hunters like to go beyond the absolute essentials, taking a sponge bath to keep bacterial activity on their skin to a minimum. Others go even further using some type of shower arrangement to bathe as the opportunity presents itself. When hunting in warm, dusty conditions, a hunter may feel like a new person with a shower every three or four days. In cold conditions, they may go much longer without feeling too offensive. Sunshowers, containers with a perforated bottom or other arrangements provide an adequate water supply, and a couple of tarps can make a private shower stall with either a couple of boards or a plastic sheet as a floor. Persons prone to skin irritations or fungal infections will find they are much more comfortable if they keep clean. Reducing the bacterial population and activity on the skin reduces body odors. This not only makes the tent more pleasant, it also enhances hunting success by reducing warning odors detectable by game animals.

Dish Washing - Thorough cleaning of all dishes and cooking utensils prevents contamination with either soap or bacteria. While a meal is being eaten, water can be heating to take care of the dishes. A hot wash with dish soap, followed by a rinse with hot water to get rid of any soap residues and a second rinsing with a mild hypochlorite bleach solution will clean and disinfect the dishes. Putting them away in an insect and rodent proof place will keep them clean until they are used the next time.

Clothing -Most hunters take enough clothing along to permit using clean clothes for the entire trip. If washing some clothes becomes a necessity, a heavy plastic bag or a sealable plastic bucket can be used as a "washing machine." Simply place the clothing, a small amount of laundry soap, and some water in the container. Shake or kneed the container to force water through the clothes. Wring them out or scrub areas that are soiled more deeply, and then rinse them in clean water. These clothes may be hung on tent guy lines or on a cord between trees to dry for later use.

Light

Since most hunting camps involve spending the daylight hours in the field and many require starting before daylight and hunting until dark, some type of additional light is important to many camp functions. Some well-equipped camps may have an electrical generator that allows them to use electric lights when desired. Most of them will use some combination of gas, propane, kerosene or battery powered lights along with the soft light of a campfire. Lanterns are designed to produce relatively bright light, and they are useful around food preparation and eating area, as well as for temporary use inside tents for dressing and getting gear assembled. Most other applications are best served with easily portable flashlights and headlamps

Flashlights and head lamps come in a wide variety of sizes and types and sizes. Headlamps have the advantage of leaving both hands free while focusing light on the area where the eyes need it. Headlamps may be found that operate on a variety of battery power packs, from two to four AA cells to 9-volt packs or rechargeable gel battery packs. Some hunters prefer a carbide miner's head lamp. Hand held flashlights come in sizes from AAA to multiple D cells as well as hand lanterns. Some of the latter are useful as lanterns as well - 6 to 9 volt powered fluorescent lights with variable intensity. Any time lights that use batteries are in use, the wise hunter will include a supply of the appropriate batteries and spare bulbs along with the lamp or lantern.

Candle lanterns can also be used effectively for modest lighting needs. The lanterns are designed to enhance the candle light while providing some measure of protection from the wind and containment for the flame. Their light is softer and more yellow than the light from gas lanterns or krypton bulbs. These brighter light sources are outstanding for tasks like following up a wounded animal (where legal) after dark.

Cutting Tools

Every camp needs some cutting tools. Knives, axes and hatchets, and a variety of saws can all be useful to the camping hunter. Axes and hatchets are designed to work diagonally across the grain or with the grain of wood. They are useful for cutting poles, clearing tent sites, chopping firewood, or splitting wood into billets to increase its burning rate. A hatchet or cruiser ax can be useful in quartering carcasses of larger game animals if a meat/bone saw is not available, and if a single bit design is selected, the reverse side of the head can serve as a light sledge or hammer for driving tent pegs and similar chores.

Saws are designed to cut across the grain of wood or to cut through bond and muscle to work up a carcass. Several useful types are available for the camper. Bow saws or Swedish saws are light, sturdy wood saws with fast cutting blades. They do an excellent job on firewood preparation. Several take down saws are on the market, most of them with several blades for different tasks. A wood blade mimics a small bow saw and does similar work on fuel wood, while a bone saw is outstanding for the handling of big game carcasses. Many of these are light and compact enough to be included in the contents of a day bag by big game hunters. Chain saws are heavy, noisy and require both a mixed fuel and bar oil. The user should wear eye and ear protection, as well as cutting gloves and chaps. On the other hand, no other saw will compare to its effectiveness in producing large quantities of fuel wood quickly. Choose the task, and then choose the saw to get it done effectively. Wire or cable saws are included in many survival kits. Redundancy is a good idea for any vital tool on a wilderness trip.

Knives are designed for light duty cutting. A sharp belt knife can do most of the tasks required in camp, but specialty knives can be far superior if adequate space is available to pack them. A belt knife designed for skinning is an excellent choice for basic game handling and for slicing food in camp. A small paring knife may be useful to the camp cook (a 4 inch fillet knife serves this purpose well.) Filleting knives serve very well for boning out big game. Most hunters will carry a pocket knife, and many carry a multi-purpose tool or knife for light duty chores of many kinds.

Knives and other cutting tools are only as good as their sharpness allows, and use dulls blades. Sharpening equipment is essential to keep tools at peak utility. At a minimum, a fine mill bastard file and a set of sharpening stones should be included in the camp kitchen box. Crock sticks or a good steel, as well as a true-angle honing guide and some cutting oil are also very useful in the sharpening department.

Earth Moving Tools - Many digging chores are part of camping in most settings. A good shovel is adequate in most situations, but some soils and sites require more vigorous treatment. Standard short or long handled shovels are best if space permits. Folding (army-style) shovels are useful for many things, although they are much less pleasant to use for big chores. A pick or mattock is helpful if the soils are very heavy, hard or stony.

Maintenance Tools - A simple set of basic maintenance tools can be extremely useful, particularly to hunting campers who are in remote areas. An assortment of screwdrivers, wrenches and pliers, along with a claw hammer will find plenty of uses. Be sure to include both Phillips and flat screwdrivers. If other types of screw heads are present with your equipment, make sure the appropriate drivers or hex wrenches are in the kit. Both adjustable and box wrenches will be helpful, particularly in setting up or taking down gas appliances, tables or other mechanical gear. A wide variety of pliers can be useful from fine needle nose pliers to heavy locking pliers. Be sure that at least one pair includes a wire cutting edge.

To compliment the maintenance kit, add an assortment of fasteners - nails, screws, bolts and washers, and perhaps a few pop rivets. Be sure to include spare parts for any equipment, like a lantern generator, o-rings for hoses or similar items. A spool of annealed wire will be useful for many things, as will a supply of light rope. Duct tape and electrical tape are both extremely versatile and useful as well.

Gun or bow maintenance equipment is vitally important to the hunter who cannot simply drive to the nearest gunsmith or pro shop for help. At a minimum, the hunter should carry a well-stocked cleaning kit. Spare bow parts, like rests or cushion plungers, and an arrow repair kit are critical. On remote trips, a spare firearm or at least a spare scope and mounting screws may be a trip saver. Both soft and hard cases for firearms and bows will be useful in camp, in the vehicle and in transit to and from camp.

Enjoying It

Enjoying a stay in a hunting camp depends upon a number of factors. One of the most important factors is the relationships with the people sharing the camp. Looking for things that need to be done, and trying to do more than your share, makes the work lighter for everyone. Divide up the chores so people are not saddled with something they dislike and they get to do things they enjoy will help make the camp a happy one. An organized camp helps, also. Keeping things in order so they are easy to locate when they are needed and people can move around easily and freely helps significantly. Anticipating the needs that the group might have and being prepared for them in advance reduces friction and frustration. Planning ahead for the entire trip and having contingency plans is another way to increase enjoyment and satisfaction. Having a well-stocked repair kit is one of the ways to ease problems and increase satisfaction. A well-stocked first aid kit is vitally important. It must go well beyond band-aids and iodine to anticipate common problems. Having fresh medications for minor aches and pains, stomach upset, indigestion and skin irritations can make a bad situation much better. Be sure to include anti-biotic ointment, a spare supply of any prescription drugs as well as a mirror, a fine pair of forceps and a magnifying glass. Each person should also carry minimal survival gear.

Remember the reason for going to the hunting camp in the first place. Take the time to enjoy the experience, and keep things in perspective. Leave all the pressures behind, including the pressure to succeed and the pressure to get out and hunt hard. Do things as you feel like doing them and at the pace that is comfortable for you. Avoid getting into camp with people who clash with your personality, ethics and hunting desires. This will allow you to enjoy the total experience, enjoying the solitude or companionship and taking the time to rebuild your spirit. The hunting camp can do that if you are prepared and you let it.

Exhibit and Sharing Suggestions

1. Hold an outdoor or camp cooking demonstration and invite your parents or leaders to sample the items you have prepared.
2. Demonstrate or prepare an illustrated talk on how to build several types of campfires, explaining their uses and the reasons for their structure.
3. Develop a food list or lists for hunting camps of various lengths and numbers of people. Make them realistic for a group that you might be with in camp.
4. Design and build a wooden food or kitchen box. Finish it and stock it with the equipment needed for your camp kitchen or use it in your next camping trip.
5. Demonstrate or give an illustrated talk on how to protect camp food in bear country.
6. Demonstrate several ways to construct a shelter from a tarp, sheet of plastic or piece of canvas, using Forester, lean-to or A-shaped designs. Discuss their pros and cons.
7. Make a checklist for your next hunting camp outing.

FIREARM SAFETY FOR THE HUNTER

Introduction

Hunting is not a dangerous sport. Hunting is safer than driving a car, taking a bath, playing tennis, attending a college sporting event or going to a concert. Hunter education programs have had extremely positive influences on hunting safety, reducing shooting accidents to 3 to 4 accidents (not deaths) per million participant days.

Hunter safety however, is the most important aspect of hunting. Safety must always be a primary concern because hunters: use potentially dangerous tools, traverse areas with uncertain footing, are often far away from emergency assistance, are often alone and are involved in a sport that is attractive because of all the uncertainties that make it hunting.

Firearm Safety

Muzzle control is the most critical element of firearms safety in the field or on the range. When a firearm is in your hands, it is your absolute responsibility to control where that muzzle points at all times. Your attention must be sharp at all times and in all situations. The foundation for that focused attention lies in self-control, and certainty that the firearm is pointed in a safe direction at all times.

"Safe direction" is defined by the circumstances, and it is primarily a case of exercising common sense.

Safety means that nothing would be injured if the firearm discharged unexpectedly and sent a round down range.

Shooting a firearm or a bow involves mental and physical action on the part of the shooter coupled with some chemical and physical actions that take place quickly. When a shooter presses the trigger on a loaded firearm a series of actions take place that propels the projectile through the barrel. The barrel acts as a launching tube, and it starts the projectile(s) toward the precise spot at which the muzzle was pointing at the time the gun was fired. Driven by rapidly expanding gases, the projectile accelerates down the bore and exits through the muzzle before striking the target (what ever was in front of the muzzle at the time of firing). Shot holes or bullet holes leave evidence of where the muzzle was pointed. No mental action can alter that impact site once the sear has been released and the projectile sent on its way.

Hunters must be concerned about handling firearms at home, on the range, and in the field. Most hunters must transport their firearms to the hunting area by some type of vehicle. States differ significantly in their requirements for transporting firearms. Very few permit the transportation of loaded firearms in motor vehicles; and even where it is permitted, the practice is unsafe and unwise. Some states require that unloaded firearms be in a case for transport. Others do not. Be sure to cover all aspect of firearms transportation law as it applies to your states and neighboring ones.

Transporting firearms. Safety is the primary concern when transporting firearms. Most laws are written to protect people from accidents or foolishness during transport. But, the reasons for care in transportation go far beyond safety. Proper transportation protects the firearm and its sights. It maintains the value of the arm as well as its proper functioning. Sturdy, secure, padded cases are ideal for transporting firearms over any distance. Soft, padded cases are good for keeping dust and debris off the firearm as well.

Before any firearm is placed in a case for transport, the user should check it once more to make sure that it is empty in chamber and magazine and that the barrel is free from obstructions. That may have been done several times in the past, even moments before; but learning to take a moment to make sure is sound practice that could save a life. Any time a firearm is handled; this same process should be repeated.

Carrying a firearm. Field firearm handling consists of carrying and using the firearm in the field. Hunters carry firearms in many different ways, and most of those techniques are acceptable under some conditions. Most methods involve at least two points of contact between the firearm and the hunter. A variety of two-handed carries give great security to the firearm. Most shooters carry their firearm diagonally across the torso with the dominant-side hand on the pistol grip and a finger guarding the trigger guard and the off-side hand on the forearm. Normally the muzzle is pointed upward and outward from the body. When using a cradle carry, the muzzle may come down to point almost horizontally to the non-dominant side. Most shooters use the cradle carry when sighting game is not assumed to be imminent. The dominant side hand still grasps the grip area of the firearm with the index finger covering the trigger guard; but the non-dominant hand may grasp the dominant wrist, allowing the forearm to rest on the crook of that arm.

The port-arms carry may be either one- or two-handed. It is primarily a shotgunner's position, used when flushing game is expected at any moment. In the one-handed version, the butt of the gun rests on the shooter's dominant side hip with the dominant side hand grasping the grip and the index finger guarding the trigger. The two-handed approach is similar to the two-handed carry described above, but it moves the muzzle forward toward the anticipated line of flight.

Rifles or shotguns are often carried on slings when walking to or from a hunting area or covering long distances during a hunt. The vast majority of hunters carry the muzzle up keeping it in a safe direction. A muzzle-down sling carry requires extra caution to keep the muzzle pointed away from the hunter and his or her companions. Carrying a handgun in a holster is the equivalent of using a sling carry with a long gun.

Where conditions permit, a firearm may be carried in a trail carry - muzzle forward and nearly horizontal with the hand grasping it near the receiver. It could also be carried on one shoulder either nearly vertically or nearly horizontally with the hand grasping the butt or the grip for control. These carries can be used with many variations, but all of them are determined by simple rules: muzzle control, secure handling, and keeping "safe direction" in mind constantly.

Firearm handling at obstacles. Handling firearms when obstacles or rough terrain are encountered must also be learned. Perhaps the most commonly encountered obstacle is a fence. Regardless of whether a single person is involved or a party of hunters negotiate the obstacle together, all firearms should be open and empty when a fence crossing is attempted. The lone hunter can pass the firearm through the fence, either setting flat on the ground or leaning it against a post at least one fence post away from where the crossing is being made. When hunting with dogs, be particularly aware of their presence and movements. Crawl through or under the fence, retrieve your firearm, and check it thoroughly for obstructions before loading. Where several people are crossing a fence together, safe (open and empty) firearms can be passed from one individual to another. The entire party can load once everyone has been able to cross the obstacle.

Safety dictates that fences be crossed carefully with solid attention to proper firearms handling. Ethics dictate that fences be crossed carefully to avoid damage to the fences. Most often it is better to crawl under or through a fence than to climb it. Climb fences only when you can do so without damaging them, and be sure to report any fence damage you encounter or cause along the way.

Elevated blinds present frequent opportunities for safety violations. The temptation to climb into the blind with a loaded firearm strapped on one's back is strong. Resist it! The safe approach is to attach a hauling line to an empty firearm, lean the firearm against the back side of the tree or an open part of the blind, and climb into the stand. Use the hauling line to pull the firearm into the stand after you are securely established in the blind. Remember to check the bore for obstructions before loading. When descending from the tree, reverse the process. Lower the

empty firearm to the ground, then climb down to retrieve it. Ground blinds that require some contortion to enter them should be treated similarly, loading only after getting situated.

Boats or off-road vehicles are treated like motor vehicles in most states. Only safe (open and empty) firearms or cased, safe firearms should be passed into or from them. Be sure to pass them carefully and to stow them where they will stay dry and out of harm's way. Load the arms only when ready to hunt (e.g. the boat is anchored and the decoys are placed or movement is stopped as you call for that bull moose). Unload all guns prior to heading to port or removing them from the boat.

Loading or unloading guns sometimes presents potential safety problems. Often a group of people is close together, near vehicles, roads, buildings or other possible danger areas. Firearms must be pointed in a safe direction while being loaded, and one of the easiest ways to accomplish that is to have hunters stand with their backs toward each other and firearms pointed away. As always, check for obstructions prior to loading and put the safety in the "ON" position once the arm is loaded.

Guns should be unloaded to traverse obstacles or dangerous terrain, like logs, slippery banks, steep slopes or similar challenges. They should also be unloaded when a group of hunters stops to talk, discuss strategy or pause to eat. Finally, they should be unloaded at the end of the day or at the conclusion of hunting a given area. Check them again before casing them.

Safe zones or zones of fire. Adhering to safe zones of fire prevents accidents. In the excitement of shooting at game, it is possible for a hunter to swing too close to other hunters in many situations. Knowing the limits of one's safe zone of fire is critical. In a single file group of hunters, only the lead person has a safe zone of fire in "the direction of travel." The others may have a narrow zone of fire to the sides if location of their partners permits.

Many types of hunting involve groups of hunters working covers in line-abreast patterns. Upland game, small game or waterfowl hunters may be in this situation as they attempt to flush game or as they wait in a blind. Each hunter must know where his or her companions are and which areas permit safe shots as well as those areas that are off limits to shooting. Take the time to discuss each person's zone of fire to make sure that nobody makes an error. Even big game hunters who are still hunting in groups or conducting a drive are likely to find themselves in this situation. Drive hunts require very pointed definition of safe zones of fire, since drivers are moving toward a line of standers with game likely to be flushed between them.

Anchored or staked boats can be treated like blinds - close quarters, well-defined zones of fire and agreed-upon shots. Drifting or hand powered boats are a completely different story. Only the person in the shooting position (usually the bow) should have a loaded firearm.

Certainty of target identification. The final element of firearm safety in the field involves target identification and shot selection. Since the mental control stops and chemistry and physics take over when the trigger is pressed, complete and absolute identification of any potential target is essential. The safety of any shot must be carefully assessed prior to taking any shot, and that safety assessment must include every point between the muzzle and the spot where the projectile will stop. Following this rule provides safety for people, property, livestock and non-game animals. It also increases our capability of making clean kills on legal game.

Knowing that something is not another hunter is not enough. Although a state may require hunters to wear blaze orange, it is not required of kids who could be playing in the fields, hikers, loggers, farmers, ranchers or others who might be sharing the site. "Mistaken for game" accidents should never happen!

Colors. Wise hunters elect to use protective colors to help other hunters see them. Blaze orange clothing makes the hunter easily visible to other hunters. Seeing more easily allows responsible

hunters to avoid shots in that direction. Studies have shown that deer, elk and other color-blind ungulates see blaze orange as a bright white. If hunters keep this in mind, wearing blaze orange will not increase their chances of being spotted by most game animals.

However, some hunting situations do not lend themselves to wearing blaze orange. In some cases certain colors can be dangerous. Turkey hunters, for example, should never wear or use items in white, blue, yellow, orange or red because these colors may say "gobbler" to excited hunters. The wave of a handkerchief or a glimpse of a sock top above the boot could cause a careless hunter to shoot without waiting for full identification. Records show that the safest turkey hunters are those in full camouflage.

Firearm Checking and Storage

A wise hunter includes equipment checks in his or her routine. In the field, every firearm should be checked thoroughly before it is loaded. The bore should be checked to make sure that it is free from obstructions or excessive oil. The ammunition should be checked to make sure that it is the proper ammunition for the firearm being used and that no other ammo is mixed in with it.

Once the firearm is loaded and the safety is applied, the hunter should make frequent checks of the safety to make sure it is still in the "safe" position. The arm should be opened and thoroughly checked after any fall, particularly to make sure that the bore is not obstructed. After traversing heavy cover, particularly under snowy conditions, or during periods of heavy rain or snow, periodic checks of the bore should also be conducted. After taking any shot that does not sound or behave as expected, the bore should be checked for the presences of a lodged bullet, wad or base wad; and the chamber should be checked if a case does not appear to be intact.

The position of the safety should be determined under all these conditions as well. Even though the safety is a mechanical device that can fail, a wise hunter makes sure that it is properly applied and in working order. Shooters must understand that some safety devices will allow the firearm to discharge if they are not completely in the "safe" position.

Any time firearms are exchanged, they should be passed from person to person with a standard protocol. The firearm should be empty with the action open. The person passing the arm should protect the trigger and trigger guard with one hand and hold the forearm with the other. The person receiving the arm should grasp it at the grip and on the forearm before saying "thank you" as an indication of his or her having control of the arm. The person passing the firearm should respond with a "you're welcome" to signify that their control of the arm is about to be released. Once the arm is ready to be used again, it should be checked in both bore and chamber, reloaded and have the safety applied.

Careful inspection of firearms in the field, store or home prevents many mishaps with firearms. The term "accident" should not be used when the situation was caused by failure to observe safety standards or proper firearms maintenance. Damage to guns and shooters comes from many preventable sources. Bore obstructions of all kinds - cleaning patches, wads, or event oil or grease can result in burst barrels. Poor storage conditions, like access to the arms by dirt dauber wasps, can result in both pitting and obstructions. Bores may be obstructed by using mixed ammunition, improper ammunition, lack of a powder charge, improper bullet seating, or cartridge failure. Mud and snow are among the more common obstructions, and they must be completely removed before the firearm is fired. Even a tiny amount of material near the forcing cone of a shotgun choke can result in a split barrel.

Mechanical damage can also result in problems. A safety that does not do its job or that allows a released sear to be blocked until the safety is moved to the "fire" position is dangerous and should be repaired by a competent gunsmith or the manufacturer. A broken firing pin can lodge forward, resulting in "slam firing" in semi-autos or pump guns or even in bolt actions where vigorous operation of the bolt takes place. Faulty sears, usually those that have become worn or have been "adjusted" by an amateur, can allow the second barrel of a double to fire on recoil or

allow other guns to fire after a slight impact. Broken or bent interrupters in some actions can cause the firearm either to fail to function at all or to go fully automatic. Both situations call for immediate service by a gunsmith. Improper headspace, either too much or too little, can create pressure problems, damaged ammunition and potential damage to the arm or the user. Even damage to the stock can cause problems. Although minor cracks may not be critical, serious ones could result in the firearm coming apart during firing. Even cracked butt plates could result in a pinch during firing. The moral of the story is to keep firearms in good repair and working order.

One of the keys to keeping arms functional is proper cleaning. Assuming that the arm came in from the field relatively clean and dry, allow it to warm to room temperature (if necessary) in the case. When it is removed from the case, immediately check it to be sure it is safe. Carefully swab the bore, from the breech end if possible, with a quality solvent and a brass or nylon brush or patch on a cleaning jag. When the patches are coming through clean, run several clean, dry patches through to remove the solvent residues. Finally, use a patch lightly oiled with a quality gun oil to lay down a protective coating on the bore.

Make sure that all metal parts are clean and dry, and then wipe down all metal parts with a lightly oiled cloth or a cloth treated with an anti-corrosion compound. Apply a small drop of oil to all moving parts. Remember that too much oil is worse for the gun than not enough, so keep the lubricant to a minimum. If the firearm is to be used in sub-zero weather, consider stripping all oil from bolts and other working parts with a solvent. Dry graphite can be used to lube moving parts under these conditions.

Stocks do not need the same treatment. In fact, gun oils that seep into stock wood, tends to damage that wood. Minimize stock contact with oils and solvents. Scrapes and scratches can be touched up with a tiny amount of stock finish or boiled linseed oil, rubbed with the hand until it seems to have disappeared into the wood.

Storage is a matter of personal choice, but some standards should be recognized. In general, gun cases are not intended for long-term storage. Moisture, body salts, or other contaminants that are trapped in the case can cause contact damage to the firearm that will go undetected until the next time the case is, opened. Usually, long-term storage should involve a cool, dry place where the firearm is safe from damage and unauthorized access. Vaults, safes, locked cabinets or locked rooms are all excellent choices. Many authorities claim that horizontal storage is better than vertical storage for the prevention of oil seepage into stocks or actions.

Guns and ammunition normally should be stored in separate locations, both with controlled access. The standard cool, dry location that was stated for guns is also excellent for ammunition. Excessive heat or moisture can damage ammunition by breaking down the powder or contaminating it with waxes or other compounds. Exposure to temperature extremes can result in condensation problems as well.

Of course all firearms should be cleaned properly before storage, and all ammunition should be placed in properly labeled containers so it can be used appropriately after some time has elapsed. Both storage areas should be checked periodically to make sure the arms and ammunition are in good condition.

Exhibit and Sharing Suggestions

1. Collect examples of firearms or parts damaged by various means. Develop an exhibit that can be used to stress the importance of proper firearms handling and care that can be used by instructors in this program or others, and offer them its use.
2. Prepare a demonstration of proper firearms cleaning (shotgun, rifle, muzzleloader, etc.) and present it at an appropriate event.
3. Collect information on perception of color by other animals and prepare an illustrated talk on the value of various colors to hunters, both for being seen and for avoiding detection by the animals they hunt.

4. Develop a home storage plan for your firearms and ammunition. Execute the plan in cooperation with you parent or guardian.

SURVIVAL IN THE OUTDOORS

Although most careful hunters never face a serious survival situation, anyone that goes afield is wise to be prepared to cope with those situations. Survival situations arise from getting lost, an injury, lack of preparation, boating or wading accidents, unexpected weather changes or a variety of other reasons. Prior planning and preparation are very helpful in avoiding problems, and prudence adds an additional level of prevention. Successfully coping with these situations depends upon self control, knowledge of survival skills and practice in applying survival skills. One of these factors without the others is not adequate. Maintaining a positive attitude and self control is greatly enhanced by the confidence that comes from knowledge mixed with practice.

Recognizing reality in a survival situation starts the coping process. Just knowing that most survival situations last less than two nights can be a calming influence. Start by recognizing the situation and realizing that your best option if you are lost, hurt or stranded is simply to stay put. Staying put simplifies things, making it easier to cope with the prevailing conditions and easier to be found if you are lost. It also conserves your energy reserves and other resources. Having practiced survival skills provides reassurance that you can manage and helps you to remain calm.

Most hunter survival situations result from getting lost. Once the decision is made to stay put, the other matters affecting survival can be addressed. Any injuries should be handled first. Basic knowledge of first aid (and a personal first aid kit) will make this easier. In cool or cold weather, a fire can provide reassurance and comfort, even if it is not essential for warmth. In cold weather, providing for a night's worth of fuel before darkness sets in is a good precaution against hypothermia. Every hunter needs to understand the dangers of hypothermia and the use of proper clothing, emergency blankets, shelter, hot food or drinks, and activity as means to prevent losing heat from the body core.

Factors Affecting Survival

Attitude and Mental State - The attitude and mental state of the person in a survival situation have a profound impact on the outcome of that event. Panic is among the most dangerous mental states, but fear of any kind tends to erode the individual's ability to cope. It can lead to depression and a sense of hopelessness -- an extremely dangerous situation for even healthy, well-prepared people. Loneliness and boredom also have negative impacts on survival.

A positive mental state, on the other hand, promote survival, even when conditions are severe. A person's sense that they are doing something to cope with the situation at hand and that those efforts will have a positive impact provides a positive impact on its own. Shelter, a bright fire, and adequate food and water all increase that sense of a successful outcome from a survival situation. Strong personal relationships contribute to the will to survive as well, and focusing on those relationships can quell fears and increase desire to cope. Finally, determination, persistence and perseverance are powerful, positive influences on survival under any conditions, often turning a potential disaster into an adventure.

Shelter - Shelter is important in most survival situations because it moderates temperature extremes. While most hunters are conscious of the dangers of hypothermia, many do not know the dangers of dehydration and hyperthermia. Over-exposure to heat and sun can result in dehydration as well as dangerous increases in body temperature. Heat exhaustion is the milder form of heat-induced problems. Its symptoms include profuse sweating with a hot, wet, flushed skin. It may result in relatively minor weakness and disorientation in its milder forms, but it may also cause a loss of consciousness. Rehydration and shelter from the heat usually bring a quick return to normal. Heat stroke, on the other hand is much more serious. Usually the victim loses consciousness. The skin is hot and dry. Heat stroke is a life-threatening situation that requires cooling, rehydration and immediate medical attention. Obviously, taking advantage of shelter from

the sun and keeping oneself hydrated is important in preventing these two heat-induced problems.

Hypothermia is on the other end of the heat spectrum. It occurs when the body's core temperature begins to drop. Cool or cold temperatures, particularly when they are accompanied by dampness and wind, strip away the envelope of warm air around the body and cause it to give up heat from the core to warm that air. Immersion in cool or cold water quickly reduces body temperature, and may become life threatening in a very short time. The effects of hypothermia range from misery and loss of dexterity in the mildest forms to life threatening situations in the more serious ones. Hypothermia shows a number of symptoms, some of which are mimicked by other problems. Nausea, slurred speech, confusion or disorientation, and a sense of physical weakness may be present. Uncontrollable shivering is a serious danger sign. Cessation of that uncontrollable shivering is even more serious. A person in this condition needs help to recover, since without that help they may become lethargic, yield to the cold, and "freeze to death" even in warm to cool temperatures. Treatment involves shelter from the cold and wind, removal of cold, wet clothing, provision of fire or another source of heat, and adding adequate dry clothing. In serious situations, the person may need to have shared body heat from a donor.

Prevention is far easier than curing hypothermia, particularly for persons who find themselves in survival situations alone. Dressing for the weather is one of the best prevention and survival strategies. Using layered clothing and clothing that retains its insulating properties even when wet is also wise. Carrying some form of shelter that can help to break the wind is also important. Providing for fire or other heat sources also contributes to maintaining the body temperature and preventing hypothermia. Finally, eating properly and having adequate food and water are helpful.

Water - Thirst and dehydration are serious problems in some survival situations. Water is a critical need for humans, regardless of the weather or temperature. Dehydration saps energy and it may result in a feeling of malaise or depression. Some people experience headaches or other pain, and many feel a sense of physical weakness when exposed to modest dehydration. Dehydration reduces blood flow, inhibits evaporative cooling, and may lead to heat stroke. Water loss takes place constantly. In cold temperatures, particularly at higher elevations, considerable amounts of water are lost through simple breathing. In hot weather or during periods of intense physical exertion, both sweating and respiration contribute to water loss. The key to preventing dehydration problems is to rehydrate before the body presses the need by showing thirst. Water or other fluid replenishers (water is about the best) should be used frequently. Wise hunters include water and water purifiers in their gear.

In a survival situation, water is far more likely to be a need than is food. Surface water can be used, but using it without some purification can cause other problems. A filter capable of removing pathogens and parasite cysts can be carried relatively easily in a day bag or fanny pack. Boiling is a good purification method, as is the use of iodine or other water purification tablets. Water can be extracted from the soil using a solar still. Ice or snow can be melted to provide water, but one should be careful about becoming chilled if the frozen article is melted in the mouth. The outside bends of streambeds, even intermittent streams beds, can have water available below the surface. Digging can locate a water source, even in dry climates. Finally, some plants store adequate water to aid a person in surviving. Knowing these plants can be an asset, particularly in desert survival.

The body requires about two to three quarts of water each day to function normally. It adjusts water loss to some degree when moderately dehydrated, so people have survived several days without water when shade was available and they were inactive. Survival gear should contain the needed materials to build a solar still in dry climates, a pan or foil to melt snow or boil surface water where it is available, and other gear as appropriate to the area. It does the hunter no good if it is in camp or in the vehicle when the survival situation presents itself.

A solar still is simply a 4x4 foot hole covered tightly by a large piece of plastic. A small stone placed in the center of the plastic forms a depression that will allow water to drip into a container placed in the soil directly under it. Many solar still makers like to use a piece of plastic tubing to connect their water container to the surface so they do not need to disturb the still while getting a drink. Placing vegetation in the bottom of the still will speed up evaporation. Practice making a solar still will generate confidence if the need for one arises.

Pain or Injury - Pain or injury can be a complicating factor in survival situations. It may inhibit rest or movement, making it more difficult to stay alert or to find needed materials. Chronic pain can be a negative influence on the mental attitude of the person, leading to depression or a sense of hopelessness. Stabilizing injuries and treating them to minimize discomfort contributes to positive attitudes and better survival. Where several persons are in a survival situation, care should be taken to avoid shock in any injured person, and both encouragement and support should be provided constantly.

Hunger - While hunger is seldom a serious consideration in a survival situation, it contributes to a sense of discomfort and may increase the incidence of fear and depression. Prolonged hunger can reduce vitality and vigor. Hunters are usually equipped with the means to harvest some food from the wild, but shooting an elk or a moose for a one-day stay in the field is seldom advisable. A small amount of high energy food can be a great morale builder, and it should be part of the hunter's day bag or fanny pack cargo. Use of wild plants requires knowledge of the edible and poisonous plants in the area, and hunters must learn them before the need to use them might arise. It might be wise to learn to recognize and prepare some of the local plants prior to needing them in a survival situation. Starvation is unlikely in short to moderate survival situations. In fact, a day or so without eating might do some of us some good.

Fatigue - Physical fatigue or exhaustion can be a serious factor in survival, because it impacts the mental attitude, decision making ability and dexterity. It seems to reduce both energy and strength, and that may contribute to fear. Mental fatigue, the simple stress of coping with the survival situation, can also be exhausting. Rest is the cure for both of these factors. A modest amount of comfort, a cheery fire as a morale builder, and shelter from the wind and elements can help a person obtain needed rest and refreshment.

Adequate rest and the resulting active mind defeat the sense of boredom and loneliness by keeping the person busy. Building rescue signals, making shelters, collecting firewood, preparing water or anything else that keeps a mind occupied will help.

Preparing for Survival

The best survival technique is to prevent oneself from getting into a survival situation. This requires a hunter to think through situations, exercise some common sense and caution, and to plan well before taking to the field. Preparation for support and quick location can minimize the time spent in a survival situation. Start by telling someone where you are going and for how long. Prepare an itinerary and leave it where it can be found by a friend or family member. Once at the planned location, leave a note on the automobile or in camp indicating the direction you are planning to take, including any landmarks or preferred spots. Plan to hunt with one or more partners, sharing plans, arranging emergency signals, and setting rendezvous times and locations. Carry some basic emergency signaling tools, like a whistle, flashlight, signal mirror, pocket flare kit and fire starting materials.

Be prepared to take to the fields, forests, marshes and mountain tops. Get into reasonable physical condition to go hunting. Start with aerobic conditioning. Add some endurance training and a little strength training. Eat and drink properly, fueling the body for exercise. Carry emergency rations and water as needed. Plan and prepare for the weather by selecting proper clothing that can be layered and adapted to the conditions that might be encountered on a hunt.

Be prepared for foul weather with at least modest foul weather gear that will let you cope with serious weather changes. Carry a map, compass and/or GPS receiver and know how to use them, practicing enough to make sure you can use them with confidence. Use them as needed and trust them! Carry a basic first aid kit that is adapted to your needs and local conditions. Include any personal medications that you must take on a regular basis or in emergency situations. Anticipate your needs by trying a shake-down trip to determine what is required and what is simply extra weight.

Build, maintain and carry a personal survival kit. Basic contents might include some means of making a shelter, a cutting tool, fires starters, water purification tablets or filters, and signaling devices appropriate to the area being hunted. Keep the kit small enough to make it easy to carry, and make a habit of keeping it with you in the field. Practice using basic survival skills and techniques before they are needed. Practice builds skills and confidence in one's ability to use them effectively when use is required. Sometimes being prepared makes the difference between discomfort and misery. At other times, it can be the difference between life and death.

Basic Survival Techniques

Fire Building - The ability to build a fire successfully under a wide variety of conditions is one of the most fundamental and important of all survival skills. Fires provide warmth, signals for rescuers, comfort and security, and something to keep you busy. Fire also provides the means of purifying water or cooking a meal.

Practice building fires in wet conditions, in snow, in low fuel situations and with different materials. Know where to find dry materials and how to safely start a fire with a variety of aids such as smokeless powder, fuels, starter sticks, wax, bird's nests, pine knot chips, frizzle sticks and various other materials. Always have matches in a waterproof container with you. Other fire starting devices such as cigarette lighters, flint and steel or magnesium sticks are nice to know how to use, but the reliability of matches in a waterproof container is hard to beat. Other aids for starting fires such as candle stubs, paper, cloth, gas and starter cubes are nice if you have them but in many survival situations you are lucky to have just your matches.

A good fire needs fuel, air and an ignition source. Fuel can be divided into tinder, kindling, and fuel wood. Tinder is composed of fine, dry materials that burn hot enough to ignite the kindling material. Knowledge of regionally available tinder sources can be very helpful. Items like the outer bark curls of birch, tiny pine or hemlock twigs, or even pack rat nests can be very useful as tinder. Fine, dry grass wadded into balls can work effectively as can abandoned bird nests or shavings from dry, light woods. Kindling increases in size progressively, starting with toothpick to match stick sized materials and progressing up to items that are about the thickness of a person's thumb. Often dry kindling can be found under the shelter of dense woods in the form of smaller dead branches still attached to the tree. Larger branches, small dead saplings, split logs, or whole logs can be used as fuel. Long pieces of wood can be ignited in the center of a fire and pushed into it as they burn. Logs can be used as both fuel and a reflector to bounce heat into a shelter. Split, dry wood lights more quickly, but round wood burns longer. Some wood burns well when it is green, but most wood burns much better when it has dried.

Hunters should know how to build a tepee fire and a reflector fire. Fires should be located carefully and the area around the fire should be cleared down to mineral soil. Sheltering the fire from the wind and the elements makes it easier to maintain and conserves fuel. Using a rock ledge or logs for a heat reflector can increase its efficiency.

Shelter Building - Many natural shelters can be helpful, either as they stand or with a little construction work. Deadfalls can provide a basic framework for a lean-to with little extra effort required, and existing vegetation can be used to construct a brush or grass-covered lean-to. Caves or rock overhangs can be excellent shelters as well. Shelters can also be made of man-made materials that are light, weatherproof and easily carried. Mylar or heavy polyethylene sheeting can be used effectively, and a mylar emergency blanket makes a good, small shelter

that reflects heat inward as well. In snow country, snow or ice caves or shelters can be excavated or constructed of blocks. These should be vented, but they can increase the ambient temperature significantly. When it is below zero outside, a 32°F environment inside the insulating layer of snow or ice can seem warm.

Rescue Signals - Numerous signals and signaling devices can be helpful. The traditional three shots in the air can be helpful under some conditions, but in other circumstances they are a waste of time. Fired after hunting hours are over and it is too dark to shoot safely at game, this signal can be effective for hunters who are relatively close to other hunters, camp or a vehicle. Whistles can also be effective under these conditions, and they are also useful during the day, at least over short ranges. Fire makes an excellent signal at night, particularly in relatively open country. Smoke is similarly effective during the day. A signal mirror can be used to reflect a bright flash of light toward airborne searchers or distant searchers that can be seen. Pocket sized aerial flares can be useful night or day, but their use should be confined to times and situations where they are likely to be seen by searchers. Although a variety of ground to air signals are available, the basics include an X stamped into the snow and lined with branches to make it obvious, strips of cloth in the same pattern, or other obvious markers to indicate one's position. These should be placed where aerial searchers are able to spot them easily. Similarly obvious arrows with a point in the direction of travel can be used if you have figured out your route to camp or vehicle and have started in that direction.

Water - Finding water has been discussed above. Surface water, either temporary or permanent, can be used if adequate precautions are taken against pathogens and parasites. Ice and snow are good sources if they are melted first. Underground water is often present in dry stream beds, with the outside bends being the best places to look. Soil water can be extracted using a solar still, although some areas do not yield significant amounts of water because of the soil type and structure. Water in plants may be both palatable and abundant, but it must be used with some caution because of materials that may be in some plant tissues.

Food - Food is not a critical concern in most survival situations since most people can survive several weeks without any food at all. It is helpful to morale and energy, however. High energy foods should be part of the survival gear, particularly for wilderness hunters. Gorp, high energy bars, or similar foods with a balance of nutrients are excellent choices. Plant identification is vital if one is going to use wild plant foods, and both poisonous and edible plants must be identified carefully before eating them. Wildlife and fish can be used for food, and a bit of salt or pepper helps their flavor. A line with some hooks and lures or flies can produce good meals in survival situations.

Summary

Avoiding survival situations is the best way to cope with them, but prior preparation helps significantly when a survival situation arises. A calm, positive attitude is one of the greatest assets in these types of situations, and developing survival skills before they are needed aids in maintaining that mental condition. The vast majority of survival situations last less than 72 hours, with most of them becoming adventures rather than life-threatening situations.

Sharing and Exhibit Suggestions

1. Build a first aid kit and share its contents with a family member, club member or other interested person.
2. Build a personal survival kit that can be carried easily in a back pack or fanny pack. Share its contents with your group. Encourage them to build their own. Lead your group in a session where each one builds a personal survival kit.
3. Take a field trip to a hunting area and survey the area for likely shelter, water sources, foods and other items that might be important in a survival situation. Report your findings to others in the group or to your hunting partners.

4. Study edible and poisonous plants that occur in your area. Prepare a list of identification characteristics and share them with your group.
5. Take a Red Cross First Aid Course.
6. Prepare a poster or exhibit showing survival techniques, emergency signals or other survival related items. Share that with your club or a family member.
7. Interview a game warden or rescue squad member to see if they have participated in locating lost hunters or other outdoor recreationists. Ask them to offer advice on outdoor survival.
8. Under adult supervision, practice building fires in increasingly difficult situations. Of course adhere to all safety considerations.

SECTION 5: HUNTING SKILLS AND TECHNIQUES

1. Recovering Game
2. Field Care and Processing of Game
3. Hunting from Stands and Blinds
4. Stalking Game Animals
5. Hunting with Dogs

Recovering Game

Even the best of hunters will sometimes wound an animal that does not go down in the open or while it is still in sight. Each hunter is responsible for verifying that game has either been hit or missed cleanly and for making every effort to retrieve any game that has been hit. Legally, hunters are normally required to avoid wanton waste and to make every reasonable effort to retrieve game animals. Ethically, hunters are expected to search for wounded animals until they are sure that recovery is impossible or the animal has been retrieved. Although there is no real waste in nature, ethical hunters attempt to eliminate the "waste" of game animals by recovering every animal they hit and adding it to their daily or seasonal bag limit. This prevents suffering on the part of the animal and provides useful meat and other products for the hunter. It also promotes the image of hunters as responsible and caring individuals. Having the knowledge and skills to successfully recover game is a prerequisite to ethical hunting. Both an art and a science, game retrieval abilities grow with experience.

Retrieving Game Without Dogs

Well-trained dogs are extremely valuable in the recovery of upland birds, waterfowl and small game mammals, but many hunters must take to the field without canine help. Adequate guns and loads coupled with accurate shooting will minimize wounding. Hunters without dogs must rely on **visual marking of the fall location**. In heavy cover or during the excitement of a covey rise or a multiple bird flush, it is easy to fail to make a good visual mark on the fall location. Wise hunters will concentrate on a single animal, making sure the location it went down is well marked visually.

Visual marking involves watching the bird fall to the ground or at least as long as possible to get a projected spot. The hunter should pick a landmark like an obvious piece of vegetation or some other structure. If hunting with a partner, the shooter should remain where they shot and send the partner to the fall location. If hunting alone, the hunter should mark the spot from where the shot was taken and proceed directly to the fall location landmark without looking away from it. Some hunters use a heavy washer with bright streamers attached as a marker they can throw at the fall location of a downed bird. Hunters can drop a cap, handkerchief, scarf or some other easily located object at the spot they took the shot from. Then they go to the fall location and mark it. A circular search pattern should be used around the mark. The hunter should look for blood, feathers or fur to indicate the spot where the hit or fall took place. They should also look and listen for movement while searching dense cover for the animal.

Rapid response is critical to successfully retrieving downed small game. This takes advantage of shock and temporary disorientation on the part of the game animal and reduces the potential for the hunter to become confused about the fall location. This is critical with pheasants, quail, grouse or prairie chickens that tend to run and hide in heavy cover if they are not killed immediately. Species that are prone to running and are hardy, like pheasants, should be shot again if they show signs of life after an initial hit. **Be certain, however, that the shot is safe and pursuing hunters or dogs are not in the line of fire!** Birds that are hit in the air sacs (their "lungs ") may tower or fly straight up before collapsing. Some species may simply continue to fly or glide until they hit an obstacle or the ground.

Signs of the animal may be sparse - feathers or fur, tiny specks of blood, or trails in soft soil or mud. They will tend to stick to trails or other narrow openings if they continue to run, but they may seek a hiding place immediately. Search all potential hiding places carefully. Even birds may seek cover in holes, burrows, brush piles or similar places. They may skulk into dense grass clumps, briar patches, ferns, depressions or dense brush. They may even hide under a downed limb or along the edge of a stone wall. Less hardy species usually go to cover quickly and depend upon their coloration to hide them. They can be extremely difficult to locate unless the hunter has the help of a canine assistant or is extremely persistent.

Turkeys are extremely hardy birds. Head shots are strongly recommended to ensure clean, quick kills. Even then the hunter should get to the bird quickly after it is shot and anchor it in place to be sure it does not escape. A freshly downed turkey may explode into wing flapping and spurring actions when touched. As a result, many turkey hunters tend to step on the neck rather than picking the bird up by the feet. If you elect to hold one by its feet, watch for the spurs and try to avoid taking a beating from the wings. If a turkey flies off after being shot try to visually follow the bird as far as possible. If it goes down, proceed to the spot as quickly as possible. If the turkey runs away from a hit, trailing can be very difficult. They tend to leave little if any blood trail and may drop only a few loose feathers to mark their direction of travel. If a turkey is wounded and runs out of sight it is usually best to leave the animal alone for about 30 minutes before beginning to search in the direction the bird was headed when last seen.

Retrieving Game with Dogs

Well-trained dogs are extremely useful in retrieving small game, upland birds and waterfowl. Small game and upland bird hunters use a variety of breeds with differing hunting methods to bring game to the bag. Hounds are ground trailing dogs, often used in hunting small game mammals and some types of upland birds. While they may or may not retrieve downed game, they are adept at locating downed game and trailing wounded animals. Trained pointing or flushing dogs will locate game, then aid in recovering downed game after the shot. Pointing breeds may "point dead" even if they do not retrieve, and most of them can be trained to be very good retrievers. Flushing breeds, like springer spaniels, and the "continental" breeds, like shorthairs, vislas and weimeraners, are even used in retrieving waterfowl under mild conditions. Retrievers are specialists in retrieving downed game. They can be trained as flushing dogs or even as pointers; but their strength is in retrieving under all kinds of conditions. Since all these dogs work by scent as well as sight, wind direction and scenting conditions are important in their ability to locate game and bring it back to the hunter.

Where their use is legal, blood trailing dogs can be used to recover big game animals. Well-trained animals, often working on leads or leashes, can be used to follow up hits that would be impossible for most trackers to follow on their own. Often this results in recovering wounded animals that might otherwise have been lost.

Trailing Wounded Game

When a game animal goes down in sight of the hunter, recovery is usually quite easy if the hunter exercises caution and care. Before moving to the animal, the hunter should remain poised for a follow up shot for a few minutes. If the animal stays down, it should be approached cautiously, generally from the back while the hunter looks for signs of life. The hunter should be prepared to shoot the animal again if it gets up or shows other signs of recovery. The basic rule of thumb is to use another shot if there is any doubt about the animal staying put. Often the follow up shot results in having a very short and quick recovery when failure to use it can result in a long trail or even a lost animal.

If the game animal goes out of sight before going down, the demands on the hunter trying to retrieve the animal are much greater. Recovering big game requires knowledge and persistence; but when conducted properly, most big game that is mortally wounded can be recovered effectively. Hunters with well developed skills in locating and retrieving wounded game are an asset to any hunting group, and these skills are one of the marks of an accomplished hunter. Real experience and plenty of practice are the best ways to develop these skills. Simulations have proven themselves to be effective teaching tools to accelerate the learning process or to review techniques, compressing years of field experience into a relatively short period of time.

Marking the Spots - When a hit is made, the hunter needs to mark **three** spots visually so they can be found and marked physically with surveyor's tape or some other visible mark. The hunter's location when the shot was taken should be marked with a noticeable object. The hunter should mark the exact spot where the game animal was standing when the shot was fired. Also mark the spot where the animal was last seen as it left the area. These latter two marks must be set

visually before the hunter moves. The first spot helps to relocate the others if necessary. The site of the animal at the shot allows the hunter to assess the hit (or miss) and to locate the appropriate trail. The line from where the hunter stood to where the animal stood points to where the arrow might be found and/or where blood and hair might be found to give clues as to where the animal was hit. The location and direction of the last observation give both a possible direction of travel for the animal and a likely spot to begin trailing the animal if the initial blood trail is sparse.

The hunter should observe the game animal as carefully and for as long as possible after the hit. The animal's behavior at the hit and as it leaves the area give important clues to the hit location and severity. Immediately after the hit, the hunter should make every effort to keep disturbance of the area to a minimum. Until well after the wounded animal is out of sight, remain quiet and motionless. Listen for sounds that might indicate the animal's direction of travel. Breaking limbs and hoof beats can help you track the animal by ear. Listen for sounds of falling or crashing into obstacles which indicate a weakened animal. Scan open areas in the direction the animal disappeared. Often a faint glimpse through the trees can add valuable information on the hit and the direction of travel. Avoid all unnecessary noise (like calling to a hunting partner or whoops of excitement) and movement. The animal may have moved into the nearest cover and bedded down. If left undisturbed, it may be found right there. If disturbed, it may move to another location, making recovery both longer and more challenging.

Note the time that the hit was made. This will help to determine how long to wait before starting to trail the animal after examining the evidence at the hit site or the beginning of the trail.

The hunter also must avoid disturbing the site of the hit or the trail, since this might eliminate sign that is important to recovering the animal. Start with a careful examination of the area where the animal was standing when it was hit. Examine the area where animal was standing when the shot was fired. Look for hair, blood, stomach contents, tissue or anything else that might provide a clue as to where the animal was hit. On most deer-like animals hair on the back is very dark, getting lighter as it goes lower. Hair color and texture gives important information on the hit location. The color of the blood is also a vital clue. Bright frothy or foamy blood usually indicates a lung hit, while bright crimson blood indicates a heart or major artery hit. Dark red blood may indicate a hit in a major vein, a major muscle mass or the liver. Dark blood mixed with bits of pulpy vegetation or material looking like ground twigs indicates an abdominal hit or paunch shot. Heavy blood trails at or very near the hit site usually indicate a short trailing job. Bowhunters should locate the arrow if it passed through the animal or fell out. Even broken pieces of the arrow can give the hunter important information on the nature of the hit.

How Long to Wait

Determining how long to wait after a shot to begin trailing is often a challenging decision. It is easy to set recommendations for various types of hits under ideal conditions, and using them generally increases the recovery of wounded animals. But the hunter must consider overriding conditions first. Heavy rain or snow, or the threat of heavy rain or snow, can force the hunter to take the trail earlier in order to avoid losing it to wet conditions or getting it covered. Time to darkness, particularly if the hunter is a long distance from camp may be an important consideration. Heavy hunting pressure or a shot from the direction the animal was going might dictate an immediate follow up to prevent losing the animal or a discussion of who should tag or possess it. The personal circumstances of the hunter also influence the decision making process. Lack of a flashlight or lantern, the necessity to leave the area immediately after the conclusion of the hunt, work or school commitments, and many other factors can enter into the decision to follow an animal more quickly than one would normally like.

There are some recommendations on how long to wait if possible. Gut-shot animals, usually indicated by food particles found in dark blood, ideally should be given a wait of about 8 hours. Even though the wound is fatal and sometimes quickly so, an animal that is pushed too soon may be able to cover a considerable distance. If forced to follow up an animal with an abdominal wound quickly, a wait of about one hour is just about the minimum elapsed time to allow the

animal to stiffen and weaken. Firearms hunters may follow up more quickly, but they risk the necessity of a running shot if the animal is jumped from its bed.

Light blood trails (about a drop every 3 feet) with either bright or dark blood often indicate a muscle wound with a bow, or a grazing wound with a firearm. Conventional wisdom is split on muscle hits. The majority favors following the animal right away and pushing it hard. A strong minority suggests a wait of at least an hour to permit the animal to stiffen. Light muscle wounds with a bow usually heal quickly with no permanent damage to the animal.

Hits that penetrate the chest cavity, particularly with complete penetration of both sides of the chest, may produce either light or heavy blood trails. Light blood trails require a wait of about 30 minutes to an hour before beginning to trail the animal under ideal conditions. Profuse bleeding usually allows the animal to be followed up with a minimal wait of about 15 to 30 minutes. These trails often include hand-sized drops of blood or steady streams or sprays of blood on one or both sides of the trail.

Game Recovery Equipment

Good trackers have a minimal amount of equipment to aid them in following a trail. Most carry some sort of trail marking materials, like toilet tissue or surveyor's tape. Toilet tissue is an excellent choice. It can be torn into small pieces and hung on twigs to mark a trail. Since it breaks down easily once it gets wet and it biodegrades quickly, it need not be recovered unless excessive amounts have been used. Surveyor's tape is also an excellent choice as a trail marker. A small, tight roll is usually adequate for most recoveries, and it fits easily in a pocket or backpack. It has high visibility in a variety of colors, and it can be used as a flag to mark a spot for returning later. Since it breaks down slowly, it must be recovered and removed after the tracking process is completed. Spot markers can be as simple as a cap, hat or other article of clothing. Or simply use a small piece of toilet paper or engineer's tape on a prominent twig or other object where it can be seen easily.

A good compass and map are important when tracking. The map can help in areas where the terrain is unfamiliar. A GPS is very useful in marking where tracking begins and to recreate the trail if necessary.

For night trailing, a good source of light is critically important. Propane or white gas lanterns are excellent for this purpose. They throw a broad field of bright, uniform light that reveals blood well. They can be hung from a convenient limb to provide a flood light for field dressing an animal in the dark. Battery operated headlamps with krypton or halogen bulbs produce an intense light that is excellent for night tracking. The LED lights provide a long-lasting and bright light and the multiple bulb models eliminate the "gray" spots that make it difficult to spot small specks of blood. Even large flashlights or small, high-intensity flashlights can be used effectively for trailing at night, but they are much less useful than the lanterns or headlamps. Any time a hunter is following up a wounded animal legally after shooting hours, it is a courtesy to the local conservation officer or game warden to notify them, if possible, of your location and activity. It can save them a lot of effort and time that could be devoted to other duties at that time of year.

Following Blood Trails

Following a blood trail involves a few basics. Most experienced trackers refer to "bringing the ground up to the eyes." They remain upright as much as possible, but do not hesitate to stoop, squat or get on their hands and knees to check for sign. While their movements are kept to a minimum (almost stalking), they keep their eyes extremely active, probing the trail for the slightest hint of blood or other sign, watching vegetation and other obstructions for blood, and looking ahead and to both sides of the trail for moving, bedded or downed animals. They track from the side of the trail to avoid stepping on it, and they use enough markers to maintain contact with the trail when it gets sparse. When trails are in dense cover or sparse, they will look at twigs or even the underside of leaves for evidence of blood. Tracking requires intense concentration and fine-tuned awareness of the environment. Sounds, from hoof beats or the breaking of brush to

scolding of jays or other birds and small mammals, like squirrels, are important clues in recovering game. Even scent plays a role since many game animals have a distinctive odor, at least to those who have trained their sense of smell to be aware of it.

Since tracking is often challenging under tough conditions, using a team approach is frequently a good idea. Although several trackers make a bit more noise than one, the advantage of extra eyes and ears is usually worth the risk of moving an injured animal. Usually the best approach is to have one tracker stay on the trail, keeping slightly to one side of it to avoid disturbing sign while the other(s) stalks further to the side. The distance away from the trail depends upon the cover and conditions, but it may range from a few yards to as much as 50 or 60 yards to the side. These flankers should watch primarily for the animal but also watch for blood as they keep pace with the tracker. Often they can help when the trail takes a sudden change of direction or locate an animal that turned off the trail to bed or as it went down.

Faint or intermittent trails should be marked periodically with a suitable material (toilet paper or tape) to establish a line of travel. One person can stand where the last drop of blood was located until the others locate another one, then move up to mark that one. Where several potential routes are clearly evident, each one can be checked by a tracker to determine the route taken. If no clear line of flight is evident, carefully searching in concentric circles around the last bit of sign give good coverage and usually results in picking up the trail or locating the downed animal. Even sparse, intermittent blood trails can result in a quick recovery. This happens most frequently with small caliber, high velocity firearms that fail to exit or with high chest hits with a bow and arrow. Both of these may result in quick kills that leave very little evidence of the hit.

Good trackers observe all sorts of signs to assist in tracking wounded animals. Sign like disturbed leaves, rolled rocks, or tracks can be important; but they also can be misleading. Unless the animal has distinctive tracks or shows evidence of a wound in its gait, the wounded animal's trail can be easily confused with other animal's in the absence of blood. Sometimes even good blood trails can be lost when other signs are followed without using blood to confirm that the right animal is being followed. Remember to look for blood at wound level on trees, leaves, twigs or other cover. Often a high hit will result in large quantities of blood being retained in the hair. An animal leaving a very sparse blood trail may literally paint boles of trees or other cover when it brushes against them. Remember, too, that blood can be very bright crimson for fresh blood that has been exposed to the air to nearly black for dried splashes on hard surfaces. Blood on porous surfaces like rotten wood or exposed soil may leave very little evidence on the surface, so the tracker must be extremely observant to see it. Drops left by moving animals will often have a "tail" or a splash mark. This generally indicates the line the animal was traveling when the drop fell. Practice is the best teacher in spotting and interpreting blood trails.

Common sense is a sound aid to trackers. Wounded animals that are still able to control brain function will usually follow the easiest path. They will usually go around brush piles, tangles of briars or similar cover unless they are going to use it as a hiding place. On the other hand, once an animal is beginning to show signs of oxygen deprivation or circulatory system failure it may run headlong into trees or other obstacles and continue in the direction of their deflection from the obstacle. The best blood trailers are persistent, use their experience and common sense, and do not hesitate to get on their hands and knees if necessary to search for sign.

Tracking Devices

There are many tracking aids on the market. Some are more useful than others. There are lights and fine powders that make blood easier to spot. There are heat sensing devices that detect the body heat of downed game. These devices may have some use in searching for downed game while the carcasses are still warm enough to be hotter than their surroundings.

Some bowhunters use "tracking string" an aid in game recovery. Game tracking devices that leave a trail of fine string can be attached to the bow or slipped into the arrow shaft. If the arrow stays in the animal, these tracking aids can lay a trail of string from the hit site or the bow to the

downed game animal. These devices are heavily used by bear hunters, where wounds may seal with fat or other tissue and by hunters who are unsure of their game recovery abilities. At short ranges they do not impact arrow performance excessively, although they do add weight to the shaft.

Game Behavior as a Recovery Aid

Studying the behavior of game animals can be a great aid to the hunter in assessing hits and recovering downed game animals. While every animal tends to react as an individual and some may show absolutely no response to a vital hit, some common responses are known to experienced hunters. White-tailed deer, for example, often react to a chest hit by bolting with their tails clamped down tightly to their rumps. A liver or abdominal hit often results in the animal humping its back at the hit before either bolting or walking away "acting sick." Seeing animals that are normally extremely nimble bouncing off obvious obstacles or crashing through seemingly impenetrable cover usually indicates a mortal wound with massive blood loss. Generally, animals resist going uphill as they weaken. Thus, they tend to head down slopes or in the easiest direction. Wounded big game animals usually follow a direct line while avoiding windfalls, rock piles at other obstacles. Wounded animals may pause to check their backtrack before changing directions or lying down, and they most often lie down where they can watch their backtrack or smell approaching hunters. Normally a wounded animal seeks the shelter of dense cover or places where they can remain hidden when they lie down. They may seek water as well, even lying down in shallow water.

Summary

Being proficient at recovering downed game is both a legal requirement and an ethical responsibility for hunters. Making every reasonable effort requires both preparation and practice. Common sense and persistence are vital components of consistently effective game recovery with either small game or big game animals. Game recovery requires the development of observation and tracking skills. Practice using artificial blood trails is an effective means of developing and honing these skills, which combine art and science. Trained dogs are extremely helpful in the recovery of upland game birds, waterfowl and small game animals. Where they are legal, trained blood trailing dogs can be used to assist in recovering big game as well. The skills of game recovery add to the enjoyment of hunting as well as enhancing hunter image and increasing the proportion of game animals that are brought to the bag for use by the hunter. Regardless of the techniques used, hunters need to work to perfect and maintain their tracking and game recovery skills.

Exhibit and Sharing Suggestions

1. Prepare hair samples from local big game animals that can be used as references in determining hit locations. Seal the samples in small plastic bags or clear envelopes and label each sample, showing its location.
2. Contact a local hunter education or International Bowhunter Education Program instructor and volunteer to lead a blood trailing exercise for a class. Prepare several hit sites and ask participants to interpret the hits, then have them follow a moderately difficult blood trail to recover an "animal" placed at the end of it.
3. Prepare one or more blood trails that can be used as practice in game recovery. Lead a small group of interested hunters, friends or other interested persons through a blood trailing exercise.
4. Volunteer to assist your leader in working with a group of participants in laying blood trails or assisting trackers in following a trail.
5. Select a breed of dog that would be compatible with the types of hunting you prefer.
6. Arrange for a demonstration by owners of hounds, blood trailing big game dogs, pointers, flushing dogs or retrievers. Try to include actual field experience on planted birds if possible. Have the handler discuss gun dogs, training methods and selection of a good hunting dog.
7. Develop a game recovery kit that you can carry in the field, including markers and or tracking aids.

Share the contents with friends or other club members and encourage them to make their own kits.

Field Care and Processing of Game

The Importance of Field Dressing

Table quality of wild game depends upon how it was harvested and the care it receives immediately after harvest. One of the most important factors in quality is how quickly the animal is field dressed. Off-flavors can result from contamination by stomach contents, decomposition and leakage of crop contents, or bacterial action. Heat retained by the carcass is a major factor in promoting both enzymatic breakdown of tissues and bacterial spoilage. Removing the viscera and opening the carcass to the cooling effects of circulating air or artificially cooling it reduces the effects of heat and promotes higher meat quality.

Bacterial and enzymatic action causes flesh to break down, and spoilage can occur even when no visible clues exist. This happens especially fast in spring or early fall hunting, where temperatures are warm to hot. It is generally a greater factor with small mammals than with birds; but even birds are subject to spoilage if they are held at high temperatures or the flesh becomes contaminated with stomach contents. A rule of thumb is to get the meat cooled down to 40 degrees as soon as possible and keep it cool. This sometimes involves taking the meat to a cold storage facility if you do not have cooling capabilities in the field.

Proper field care and handling demonstrates respect for the game. It promotes use of the animal once it reaches home, and use is part of the hunting process. A little work early makes consumption much more likely and waste much less common. Rapid field dressing is important, but that importance varies somewhat with the conditions under which the game was taken. In very cold weather, small game and birds may cool quickly without field dressing. Shotgun killed game, with multiple puncture wounds needs more careful treatment than does game well hit by a carefully placed rifle bullet or arrow. Any animal with a possible abdominal hit should be field dressed quickly to minimize contact with stomach contents.

Since big game has a tremendous amount of stored heat and an insulated covering, quick field dressing is extremely important with big game animals. Skinning may be vital with animals taken in warm or hot weather. Small game animals under warm conditions must be field dressed quickly, and birds are often better flavored if they are handled in a similar fashion.

Elements of Good Field Care

Proper field care starts with field dressing the animal as soon as the conditions permit. Allowing for rapid cooling aids tremendously in having a high quality carcass. Carcasses should be cooled as quickly as possible and kept at a temperature below 40°F if possible. Field conditions sometimes dictate treatment of the carcass, as do legal conditions. Skinning and plucking are easiest immediately after the animal is killed, but carrying the animal in the field or other conditions might preclude that.

Be sure you are familiar with legal constraints that might require that the animal remain essentially or partially intact until it is in camp or at home. Federal regulations require that at least one fully feathered wing remain on the carcass of migratory birds until they reach one's residence or are prepared for consumption. Some states require that evidence of sex or species must be maintained until the animal is prepared for preservation or consumption as well.

One key to good field care is avoiding contamination of the meat. Keeping wild game clean keeps it looking good, avoids possible problems during preparation or consumption, and helps to prevent decomposition of the meat. Wise hunters are aware of possible sources of contamination or off flavors. Crop or intestinal contents, hair or feathers (even those shot into the carcass), soil, stones or grass, and other foreign materials can be a problem. Secretions from the animal's skin, or carried on the hands or knife can cause problems. Taking these precautions also eliminates the need to remove scent glands found on the hocks, neck and head of many animals.

Flies and other vermin can also create a problem if the carcass is not protected from them. Protection for carcasses may be through airy game bags, cloth meat sacks, or chemical barriers. Black pepper or liquid "game bag" sprays based on pepper are excellent as well. Plastic bags are not a good idea except during cold weather. They tend to retain both heat and moisture, creating ideal conditions for decomposition. Since evaporative cooling by circulating air helps to cool the carcass, good ventilation around the carcass is important.

Keeping the inside of the carcass clean and dry aids in quality as well. Badly soiled or contaminated body cavities can be washed with water if necessary. It should be drained and dried after washing, however. Carcasses can be wiped clean with a dry cloth or even leaves or grass in a pinch.

The key to doing a good job with the field dressing process is to take enough time and care to do it properly. Think before you cut, taking care not to contaminate the flesh or to cut yourself. Watch for ways to make the task easier, like rolling the animal slightly or holding other organs aside while making cuts. Taking your time prevents making hasty errors that can be costly to table quality. This reduces the amount of time required to clean up prior to cooking; and makes for better meals.

Safety Considerations

Field dressing game animals has some hazards. The hunter usually uses either a sharp knife or shears, and perhaps a saw in handling game. In addition, there may be bone splinters, broadheads or blades, or even broken pieces of arrow shaft material in the body cavity. As a result, the hunter must be careful when field dressing game animals to prevent personal injury.

Kitchen gloves or surgical gloves are a wise addition to any field dressing kit. They help to keep the hands clean, reducing the risk of chapped hands or fingerprints on firearms. They also offer some protection from disease organisms or parasites and infections. Infection is a possibility with any scrape or cut. These may be a mild inconvenience or life-threatening. Prevention and careful clean up are the best ways to prevent infections. While it is not common to contract diseases from handling wildlife, the potential for human disease is possible through contact with blood or tissue fluids. Concerns are greater with mammals than with birds, and they vary by season, species and region or area. Field dressing gloves are a significant aid in avoiding those diseases.

Field Care and Processing Small Game

One decision that must be made with a small game animal is whether to skin it in the field or wait until returning to camp or home. If, the hide is to be saved, it can be removed easily by slitting the hide from heel to heel and removing the entire hide like a glove. Only the initial cut and minor cutting around the ears, eyes and lips is needed. If it is not to be saved, a small cut in the center of the back can be used. Insert the fingers of both hands in the opposite sides of the cut and pull the pieces in opposite directions. The head and feet may be cut off before skinning or immediately after pulling the skin off the carcass. If conditions dictate leaving the skin in place, field dress the animal by simply removing the entrails.

The entrails may be removed by making a midline cut from the pelvis to the chin or front of the chest, being careful not to cut the entrails or the bladder. Reach forward and grab the chest contents with the fingers, then pull them toward the tail to strip all the entrails from the animal. The pelvis can be split with a sharp knife to remove the remaining intestines. If desired, the heart, liver (without the gall bladder) and the kidneys may be saved and used.

Allow any excess blood to drain from the body cavity, then clean the body cavity with a dry cloth or a handful of grass. Once the cavity is clean and nearly dry, cool the carcass quickly and protect it from flies and foreign materials. Be sure to allow for air circulation if the animal is to be carried for the remainder of the hunt.

Processing for the table can be done in the field or at home. Most hunters wait until they are home or in camp to do their processing. That allows more time for hunting while permitting them to use the hide and hair or feathers as a protective layer for the carcass. Processing a small game animal results in having six serving size portions. Remove each front leg by lifting the leg away from the chest wall and cutting around shoulder blades. Remove each hind leg by splitting the pelvis along the backbone on each side. The flanks and ribs can be left in place or trimmed away. Trimming them away allows the pieces to lay flat in the pan. If they are trimmed away, they can be saved to prepare soup stock. Next cut the back into two sections by cutting behind the last rib. Cut off the bony tail section of the back where the hind legs have been removed. Take the time to examine all six pieces, removing any hairs or foreign material and picking out any imbedded shot or hair wads. Badly blood-shot areas often can be salvaged by soaking them in cold salt water for a few hours or overnight. This results in a pan ready game animal that is easily used in nearly any cooking method.

Field Dressing and Processing Game Birds

Field dressing game birds usually requires only the removal of the entrails and the crop while in the field. Going beyond that point requires that the hunter comply with legal requirements under both state and federal law. Federal laws require that at least one fully feathered wing remain on migratory game birds while they are in the field and until they are prepared for preservation or consumption. State laws may require that evidence of species and sex be retained or that birds be tagged immediately after being killed.

Feathers provide some protection for the bird while in the field. Plucking the bird, however, is easiest immediately after taking the bird. The next easiest time to pluck a game bird is after the bird is completely cold.

Two common methods are used in removing the entrails of game birds. One is a simple midline cut from the tip of the breastbone to the vent. This method is quick and simple. Start by making a shallow cut through the skin and body wall right behind the tip of the breast. Extend the cut to the vent, being careful not to cut so deeply that you puncture the intestines. Extend the cut around the vent to free the intestine, then reach up into the chest cavity as far as possible and scoop the entrails out.

The second method uses a pair of cuts. First, make a diamond shaped cut around the vent to free the terminal end of the intestine. The second cut is a lateral one through the middle of the abdomen between the legs. This leaves a small strip of skin between the two cuts that allows the legs to be tucked tightly to the body for compact packaging. The removal of the viscera is the same with either method.

Many hunters like to save the heart, gizzard and liver of their game birds. Trim the heart to remove the loose blood vessels. Carefully remove the gall bladder from the liver, being careful not to puncture it and spill its bitter contents on the liver. Split the muscle of the gizzard until the tough, fibrous lining is exposed. Then peel the muscle away from the core. Trim the remains of the intestine and esophagus from the gizzard, and it is ready to prepare. The giblets can be used for making gravy or as a main ingredient in a hearty meal.

Regardless of the method used on the viscera, it is wise to remove the crop from game birds. This is particularly true with pheasants or ruffed grouse in areas where they feed on rank or bitter berries or seeds, like skunk cabbage seeds or some viburnum and dogwood fruits. Simply make a midline cut at the base of the neck. Use a finger to loosen the thin-walled crop from the body tissue. Pull gently on the crop, and the remaining part of the intestine will pull free with it. Then just trim the esophagus to remove the crop. Inspection of the crop contents can lead to a better understanding of the current food sources for the game birds. The contents can be dried and preserved to make a gamebird food collection.

As with small game animals, the carcass should be cooled and protected from flies and dirt. Some people may carry plastic bags and an ice chest to permit them to pluck their birds in the field and put them on ice immediately. This is an excellent idea in parts of the country where dove hunting or early teal seasons take place in hot weather. A game bag or bird carrier is adequate in cool or cold weather.

Processing game birds is relatively simple. For birds that are to be roasted, boiled, smoked or grilled on a rotisserie they may be left whole. Birds may be split, either fully or half-way for broiling or barbecuing. Small birds, like quail or doves, are often opened along the back and spread flat for cooking. Larger ones may be cut into serving pieces for frying or grilling. The process is similar to what is done with small game. If the wings were retained intact, remove them by cutting to the ball joint at their bases. The legs can be removed, by lifting the leg up from the body and cutting to the hip joint. If desired, the drumstick can be separated from the thigh by cutting through the joint between them. The breast muscle can be separated from the back and ribs by cutting through the tops of the ribs above the breast. It can be separated into two serving pieces by cutting down through the breast along the edge of the breast bone. The back may be separated into two pieces by simply cutting it in half across the spine. Birds that have been cut up in this fashion should be packaged as compactly as possible to minimize the air in the package and reduce freezer burn.

Field dressing big game

Before starting the field dressing process, be sure to comply with all state regulations for tagging or keeping evidence of the animal's sex on the carcass. This is also the best time for taking pictures of the trophy - before field dressing and after placing the tongue back in the mouth.

Field dressing male big game animals usually starts with getting the sex organs out of the way. Carefully cut through the skin of the penis and scrotum and lay them toward the rear of the carcass. Pressing a closed fist into the pelvic region of the body will put pressure on the bladder and eliminate most of the urine, reducing the risk of nicking the bladder and spilling urine on the meat. Females can be handled in a similar fashion.

Next cut carefully around the anus or the anal and urogenital openings and free the rectum. This action is similar to the process of coring an apple, and it becomes easier with practice. The penis is held in place by a pair of ligaments attaching it to the pubic bones. These must be cut away without cutting the penis itself. Once cut free, applying a gentle pull on the penis will draw it and the bladder clear of the carcass. Pull the rectum free and tie it closed with a piece of cord.

Using a sharp knife (or a specially hooked blade designed for the purpose) carefully cut through the skin and abdominal wall from the crotch to the breastbone. Since the intestines lie immediately under the body wall, take great care to avoid cutting the gut. The specialty blades are designed for the purpose, but any sharp knife can be used if a small incision is made and two fingers are inserted in the abdomen to act as a knife guide. The fingers pull the abdominal wall away from the intestines and keep the knife blade covered from below.

If the animal is going to be skinned on the spot or transported by vehicle from the point of the kill and it is not going to be used for a mount, the cut can be continued the whole way to the animal's throat or chin. If it will be dragged any distance, or if it is going to be used in a mount, the midline cut should stop at the point of the breastbone. Cutting the diaphragm clear of the chest wall allows access to the chest cavity. Hold the stomach and intestines out of the way as the diaphragm is cut. Holding the knife in a manner where you will not cut yourself, reach as far forward as possible in the cavity and locate the esophagus and trachea. Cut through them and pull them toward the rear of the carcass, bringing the internal organs with them. Be careful not to tear the tenderloins, and cut only where necessary to free the organs. Roll them to the side, grasp the terminal end, and gently pull the tied end back through the pelvis. If the penis and scrotum were not removed earlier, pull them through as well. The heart, liver and kidneys may be

salvaged from the internal organs if desired. All of them are edible organ meats, although the kidneys are quite small.

Once the internal organs have been removed, roll the animal over and elevate the head and chest to allow excess blood to drain from the body cavity. Try to keep foreign matter from getting into the cavity while the animal is being drained. If necessary, wipe the cavity clean or wash it with clean water to eliminate any spilled gut contents. Roll the animal on its back, elevated if possible, and prop the body cavity open to allow it to dry and cool.

This method of field dressing minimizes the exposed area that can get dirty when getting a deer back to camp, home or vehicle. It also leaves adequate intact hide for taking a cape that will permit a shoulder mount if desired. If a vehicle can be brought to the kill site, the abdominal cut can be carried forward through the chest to the throat. This allows the trachea and esophagus to be removed and promotes rapid cooling. If the animal is to be backpacked out, the best method of handling it is to bone it (where that is permitted by law). Quartering it is the next best alternative, particularly with larger game species. Make sure that the head and cape are well decorated with blaze orange tape or cloth when backpacking an animal out of the field. Note that nowhere in this sequence was it necessary to cut the animal's throat to "bleed" it. The arrow or bullet wound is adequate to bleed the animal.

Processing Big Game

Boning is recommended as a processing method for big game animals. The technique is easy to learn. No special equipment is required. It can be done anywhere, even in the field; and it results in high quality, straight grained meat.

All that is needed is a flat surface like a counter top or table, a meat saw or fine toothed carpenter's saw, a sharp, narrow-bladed knife, containers for meat, scraps and bones, and suitable wrapping paper. Boning separates choice meat from connective tissue. It allows dirt, hair and bloodshot meat to be removed. It avoids spreading bone dust or marrow through the cuts, and it requires less freezer space to hold the animal. For the backpacking hunter, it greatly reduces the weight that must be carried out of the field.

The basic boning process simply separates major muscle masses from their bony attachments. The process is much like preparing a small game animal except for the scale. Start by removing the front shoulders and cutting the shoulder into a shoulder roast, arm roast and shank. The bone may be left in the roasts or removed at your choice. Next remove the backstraps or loins by dissecting them away from the vertebrae and ribs. These can be left in meal sized portions for chops or roasts. The flank meat can be used for ground meat or as a foundation for fajitas or other dishes using strips or small cubes. The neck can be sawn off at the base of the ribs or disarticulated by cutting through the vertebral disks. It may be boned for stew meat or ground meat, or it can be used as a large bone-in roast. The ribs may be handled as spare ribs by cutting them into lengths and plates suitable for the family size and cooking method. They may also be boned and used in ground meat. The tenderloins are usually left intact when they are removed. This is the most tender meat on a big game animal. The spine may be sectioned and boiled in a large pot to produce an excellent soup stock, or it may be discarded after trimming away as much edible meat as possible. The roasts and steaks of the hind legs are handled by separating the legs from the pelvis, isolating the major muscle groups and cutting those muscles across the grain into the portions desired. The shank meat can be processed as ground meat or cut into small cut into cubes for stew or soups. Package the meat in meal-sized portions and label each package carefully to prevent guess work when meal time rolls around.

Sharing an Exhibit Suggestions

1. Prepare a set of photographs or drawings or a videotape showing the field dressing and/or processing procedure for a game bird or mammal.

2. Develop a demonstration or illustrated talk on some aspect of field dressing and game processing.
3. Make a game processing table or counter top that can be used at home or camp.
4. Develop a report on both federal and state game handling regulations in your area. Share that summary with your group or another interested group.

Hunting from Stands and Blinds

Why Use Blinds and Stands?

Hunting from blinds or stands is an effective means of hunting many game animals. This process shifts the odds in the hunter's favor, allowing him or her to take advantage of game animals that are not aware of their presence. Moving objects are far easier to see than are stationary ones. Since game moving into or through a stand site is moving while the hunter remains still, shots at undisturbed game animals are possible. The hunter remains in a prime location in an excellent position for a shot, waiting for game animals to come within range. Hunting from a stand also takes advantage of other hunters moving game. As the game animals move away from still hunters or drives, they may pass within shooting distance of a hunter who is unseen and undetected.

Although reaching a stand site may require considerable effort, the process of hunting from the stand itself requires much less energy than do more active forms of hunting. Thus, the use of stands or blinds is suitable for hunters almost without regard for their physical conditioning or any physical impairments. In most cases, shots fired from stands are at modest to short ranges or at known distances. This permits better shot placement and selection. Where legal, the use of blinds or stands allows the hunter to use baits, lures or decoys as part of their hunting technique.

Stand hunting, however, is by no means a sure thing. Some stand or blind hunters are successful because they wind up in the right place at the right time. However, consistent success using this technique requires patience, understanding of the area and the game being hunted, and attention to detail. The best placed stand is of little use if the hunter has given up on it and moved to another location. A stand that was extremely successful in a previous season may be completely useless if the conditions that made the site attractive have changed. Preseason scouting and preparation are key elements in consistently good stand hunting success. Sites must be scouted and located. Blind sites must be located to take advantage of the prevailing conditions.

Stand hunting requires that the hunter remain attentive and alert for long periods of time. Many hunters simply do not have the patience required for effective stand hunting except for short periods of time. Stand hunters also must remain still for extended periods. Under warm conditions that may require contending with mosquitoes, biting flies, fire ants or merely the heat. Under cold conditions, it may require dressing much more heavily than would a moving hunter. Cold penetrates quickly when the body is not using a lot of muscle contractions to produce heat, so the standing hunter needs to have additional layers of clothing that can be added after reaching the blind. Finally, the hunter who uses stand or blind hunting must be willing to forego the pleasure of seeing new country during each hunt, restricting themselves to a limited area.

Types of Stands or Blinds

Many types of stands or blinds are used in hunting. Ground blinds are among the most common. These blinds are simply structures that allow the hunter to move slightly without being detected.

Box Blinds - Box blinds are very popular in some parts of the country for some types of game. Made of framed plywood or other building materials, these blinds tend to hold warmth, break the force of wind, and allow considerable amounts of movement without detection. Some box blinds have padded seats, shooting rests, sliding windows, and heaters for cold conditions. Box blinds generally require early placement on the stand site to permit game animals to become acclimated to them. Even when painted in camouflage colors, they tend to be rather obvious with straight lines and hard edges that are readily noticed by game animals. Since most game animals are somewhat neophobic (fearful or cautious about new things in their environment), acclimation times may range from a few weeks to several months. In addition, the bulky and heavy materials involved in building box blinds usually require vehicular access to the site since carrying them a

significant distance is usually not practical. Most box blinds are installed for the entire season or left in place permanently with pre-season servicing to eliminate the wasps and other critters that may have taken up residence. Most box blinds are used only on private lands either because access cannot be controlled on public lands or because regulations prohibit their use on public lands.

Ground Blinds – Commercially made ground blinds are available in a variety of sizes, setup scenarios, price ranges, camouflage patterns and materials. These are usually lightweight and easy to transport. For many hunters, the selection, effectiveness and ease of use makes the commercially made ground blinds most attractive.

Many ground blinds are simple natural blinds using materials that are native to the area at the blind location. These blinds have many advantages. They blend into the surrounding area making the blind relatively inconspicuous. The size of the blind can be tailored to fit the needs of the hunter or hunters. For a single hunter, it can be small, relatively simple, and inconspicuous. If a party of hunters is to be using the blind, as in hunting waterfowl over decoys, the blind can be made as spacious as necessary to provide for their needs. The height of the blind can be varied to meet the needs of the hunter(s) as well. It may be low enough that the hunter can sit on the ground with his/her feet in a shallow pit, creating a low-threat profile. It may be made just high enough to allow the hunter to sit comfortably on a bench, stool, chair or bucket. Or it can be high enough to allow several hunters to stand with an overhanging roof to protect them from being detected by overhead birds. Ground blinds may be as minimal as a few small seedling trees or branches near a stump or downed log to aid in breaking up the hunter's outline. They may include camouflage netting, natural materials and other structures to completely screen the hunter from game animals. The size and complexity depend upon the hunter's needs and objectives.

"Stump Sitting" - The most frequently used and simple type of stand hunting is frequently known as "stump sitting". This technique involves locating a likely spot and sitting on the ground, a convenient stump, log, or rock. Some hunters may enhance the site with some additional materials, but most simply sit quietly and wait for passing game. Since no concealment is offered, this type of ground "blind" requires the hunter to remain perfectly still. Stump sitting simply involves locating a likely spot and sitting down. It requires no building and stump sitters are usually exposed to the elements, so they can get hot, cold or wet, and they must contend with the wind. They do have the advantage of moving their "blind" to another spot if the situation or their inclination dictates. Like other types of stand hunting, stump sitting is demanding on the hunter's patience and mental toughness because of the demand for stillness while facing the elements and long bouts between game sightings.

Sub-surface Stands- Some stands are situated so the hunter is concealed at or below the surface of the ground or the water. Pit blinds can range from simple slit trenches with minimal cover to semi-permanent or permanent pits equipped with cooking and heating gear. Temporary pit blinds are useful for many types of big game animals, reducing the silhouette of the hunter to a less threatening stature. All sorts of pit blinds are useful in waterfowl hunting, both on the water and in field shooting. Although sink boxes (low floating devices that permit the hunter to hide below the surface of the water) have been illegal for waterfowl for many years, waterfowlers in some regions use permanent pits with waterproof curtains as aquatic pit blinds. They also use low floating or low silhouette boats as gunning platforms. Layout boats, scull boats and gunning coffins are commonly used by waterfowlers throughout the country.

Elevated Stands - Elevated hunting stands are quite popular in some parts of the country and for certain types of game animals. These stands often permit greater visibility, particularly when they are high enough to permit the hunter to see into openings in dense brush. Many types of elevated stands are portable, so they can be moved easily from one location to another as the hunter desires. These types are generally somewhat small and seldom comfortable. They require the hunter to climb into the tree or tower, a potentially dangerous process. While they tend to keep

the scent of the hunter above the game - a strong advantage when hunting big game mammals, the elevated position is subject to higher wind speeds and greater wind chill than are ground blinds.

Tower Stands - Tower stands are very popular with big game hunters in some parts of the country. These stands are generally free-standing, requiring no trees for attachment, and they are usually equipped with an easily climbed ladder. Many of them have an enclosed box blind attached to the top to allow the hunter some protection from the elements and concealment from game, but they are extremely obvious and must be placed well before the season to allow game to acclimate to them. These stands are expensive and bulky, and their use is restricted almost entirely to private lands.

Portable Tree Stands - Where they are legal, tree stands are among the most popular types of elevated stands. A wide variety of tree stands are available, including both climbing stands and lock-on or hang-on stands. Some of them include built in seats or climbing aids. Most tree stands have the advantage of easy movement from one location to another as conditions dictate. They are useful on both public and private lands, although some public lands require that the stand not penetrate the bark of the trees on which it is used. Because these stands are generally placed above the normal line of vision of big game animals, they do not require early placement to be effective. As with all elevated stands, the hunter must be careful to observe all safety precautions when using tree stands. Numerous safety harnesses are available and are a critical part of the hunter's equipment. Climbing harnesses are recommended as well as harness use when in the stand.

Naturally, selecting a sound tree that is well-rooted and live is important to tree stand security. A wise hunter also understands how the stand locks in place and is careful to work with the stand to avoid having it twist or break loose from its grip on the tree. Often the hunter can place the stand so his or her silhouette will be merged with a cluster of major limbs or trunks. This injects another vertical element among the cluster and tends to conceal the hunter among the structure of the tree. This arrangement also can make it possible to have spots for hanging extra gear that might get in the way on the stand. Free movement of the bow limbs or recoiling firearm barrel is essential, and the flight path of the bullet or arrow should be completely clear of obstructions. The safety harness can be adjusted to allow free movement, but to restrict the hunter as the edge of the stand is reached.

Fixed Tree Stands - Many hunters continue to use either simple platforms or tree house-like stands, particularly for big game hunting. Platforms can be as inexpensive and simple as a notched board nailed between a couple of upright stems on a tree, or platforms may be large and enclosed among the major boughs forming a tree's crown. Because of their invasion on trees, these stands are normally limited to use on private lands. These stands cause damage to the trees, pose a potentially life-threatening risk to loggers, and can become dangerous because of rot, corrosion or tree growth. They are generally not recommended as a viable alternative to portable tree stands or ladder stands.

Elevated Stand Safety - Safe use of elevated stands of all kinds requires safety consciousness. The stand must be checked thoroughly to be sure that it is in safe and sound condition. Climbing into the stand is potentially dangerous, particularly in wet or frosty weather. Wise hunters NEVER climb into a tree stand with their full set of gear. Empty rifles, shotguns or muzzleloaders, bows and arrows are left on the ground, attached to a hauling line, until the hunter is safely settled in the stand. Climbing blocks or tree steps (where they are legal and the tree damage is not a factor) are used to help the hunter get to the stand. While pole climbing gaffs could be used, their level of damage to trees is excessive for most landowners. The use of a climbing safety harness is recommended. Once the hunter is in the stand, attach the safety line or harness and be sure it is secure. These safety devices are critical because they restrict the fall, should the hunter slip or inadvertently step off the stand. After securing safety devices the rest of the equipment may be hauled into the tree using the hauling line.

Stand placement

How you put your stand in place is important for both success and safety. Often the hunter can place the stand so it will be merged with bushes or some background material. Be sure you can see well and that you have free movement of the bow limbs or firearm barrel. Be sure bullet or flight paths are clear of obstructions.

Location of stands

Location is critical to the utility of any stand. Numerous elements enter into selecting a prime stand location. The first of those factors is the use of the area by game animals at the time of year when the stand will be used. Several things influence that use. Hunting pressure can move animals into denser cover or through passes or saddles toward escape cover. Wind direction, ease of finding the location in the dark, access to the location for construction, availability of materials to build a blind, and numerous other things can influence the selection of the stand location.

Locations can be selected using many sources of information. Experience with the area, the game animals, and their behavior in the area being hunted is tremendously valuable in picking a blind or stand site. Scouting large areas to look for well-used trails, escape routes, foraging areas, concentrations of seasonal foods, bedding sites or escape cover is vitally important. Topographic features and knowledge of the way the game being sought works those features is also important. Game animals often select the easiest routes to and from various cover or habitat types. When pressured, wildlife use similar routes to seek relief from human disturbance. These features may include major saddles, low notches between areas of steep terrain, relatively gentle terrain in areas with deeply dissected structures, or preferred types of escape cover, like swamps or dense "black timber" areas. Planning for using these features or using other hunters to move game to your position can often be accomplished with the aid of topographic maps. This will identify good possible locations for scouting efforts as well as areas from which hunting pressure might come and potential travel routes for game being moved by that pressure. These maps are tremendously valuable to hunters who know how to read them and use them as scouting and hunting aids.

Safety Considerations

Hunters who hunt from blinds or stands must be conscious of all usual hunting safety principles as well as some that are specific to the types of stands they might be using. Safe shooting directions must be determined, with the entire path of an arrow or bullet being determined before any shot is fired. Safe zones of fire must be defined either for the lone shooter or for individuals sharing a blind. Hunters must also determine that the firearm can be safely fired from the blind or stand without damaging the firearm or its sights and without hitting obstructions that cannot be seen through the sights. Limbs of the bow must not strike anything as the string is released.

The blind or stand must be placed in a safe location. It should be isolated by distance, obstacles or by facing in different directions from other blinds. Safe backstops for all projectiles should prevent any shot from endangering any other hunter. The blind or stand location description should be shared with at least one other person in case of an accident or injury that requires someone to locate the hunter. Hunters using elevated stands must remember to use a hauling line to bring their unloaded firearms or archery tackle into the stand after climbing into it and securing themselves with a safety harness.

Stand Hunting Comfort

Many factors enter into comfort when preparing a blind for stand hunting. For best comfort, the blind should be adequately large to permit the hunter to stretch his or her legs with adequate room for all necessary equipment, including clearance for rifles, shotguns or bow limbs. Comfort is increased if the blind is large enough and well enough screened to permit the hunter to shift positions, even stand without becoming obvious to game animals. If more than one hunter will

share the blind, there must be adequate room so they are not crowded and interfering with each other.

Providing the means to stay either warm or cool as the conditions dictate can greatly increase the ability of the hunter to wait patiently and successfully use a blind or stand. Careful observation of wind direction is essential for success when hunting mammals that rely on scent to detect danger. Wind barriers are important for keeping warm, while adequate ventilation and shade are important for comfort in hot weather. Situating the blind in the shade, looking into sunny areas is important for best vision. Using hay, grass or leaves as an insulating layer around the feet and legs can increase warmth as can being prepared with additional layers of clothing to be worn after the blind is reached.

If the blind has adequate screening the hunter can move around or shift positions without spooking game. The hunter may eat a snack or drink without worrying about the motion. He or she may relax, take a nap or even read a paperback while passing the time.

Providing for a comfortable seat greatly increases the hunter's ability to stay on the stand, holding still and remaining attentive while hunting. Waterfowl blinds frequently have benches built into them, but a log, rock, stool, chair or bucket can provide excellent seating in a blind. Having some back support greatly increases comfort, as does some padding or insulation between the hunter and the ground or hard seat.

Where blinds or stands are used for an extended period of time, the challenge of handling the call of nature is sure to arise. Where mammals are being hunted, spreading scent in the vicinity of the blind can have a pronounced impact on hunting success. Of course the hunter can leave the blind, move a considerable distance downwind of the area being watched and handle their needs there. This leaves the area unwatched and risks spooking game animals while outside the blind. Many tree stand hunters carry a urine bottle so they can urinate without leaving the stand and without spreading scent around the blind site. Where the urine bottle is inadequate for the situation, the hunter must leave the stand area and move well downwind of the blind. Staying away from water sources, dig a shallow hole and bury both the feces and the paper you remembered to bring.

Considerations for Blind Builders

Numerous considerations enter into building a blind. Familiarity with the laws and regulations in the area is an essential first step. Some states prohibit construction of any permanent stand. Others prohibit tree stands or regulate their height to some maximum above the ground. Many states in timber producing regions prohibit driving nails or screws into trees or even the use of any stand or climbing device that penetrates the bark of trees. Even where those laws do not exist, hunters must be ethically responsible for their actions, making sure they do not create a situation which could be dangerous to future loggers or behaving responsibly toward the wellbeing of the trees.

Summary

Use of blinds and stands is an outstanding hunting strategy under appropriate conditions. Blind location is extremely important, and it is best determined by using a variety of information from experience, scouting and knowledge of the game being hunted. Patience is the key for successful stand hunting, and careful planning with a generous portion of faith in your selection process will greatly enhance success.

Exhibit and Sharing Suggestions

1. Scout an area for a stand or blind site to be used in hunting a selected species. Put together a series of photographs, drawings or other items that show the area, why it was selected, and how the stand was developed. Report on your results to your club.

2. Conduct a camera hunt for species that occur in your area using a variety of blinds. Record the results of your observations from the blind along with the photographs you took in an illustrated talk or a photographic story.
3. Plan a stand hunt using topographic maps and other data that has been discussed in the lesson. Share your site selections with your group and ask them to discuss it with you in an effort to improve the blind sites.

Stalking Game Animals

One of the most satisfying skills a hunter can master is the ability to stalk game. Sometime stalking is the final approach to animals you have spotted. Some hunters stalk the entire day to increase the chances of seeing the prey before the hunter is spotted. Stalking involves knowing how to read the wind, blend with the foliage, move silently and understand the behavior of your prey. No matter how well you learn these skills, you can always get better.

Reading the Wind

There are arrays of commercial products available that claim to cover, mask, eliminate or hide human odor. There is no doubt certain products containing charcoals and baking soda will absorb some odors. There is no doubt enclosing a human in an air tight bag will hold odor in. However, the best and only sure way to be certain your scent is not getting to the animals you hunt is for you to keep wind and air currents from going from you to the animal.

Understanding the power of the sense of smell of game animals will help hunters understand the futility of relying on masking scents and odor absorbing clothing. Note the key word is "relying". There is nothing wrong with doing all you can to get a few yards closer when a stray air current carries your scent in the wrong direction. Having apple scent mixed with your human scent or having less human scent flow toward the prey might give you an extra moment before you are detected. But you WILL be detected.

A deer can smell an apple or even an acorn through six inches of snow, so it will not miss a hunter's odor drifting past its nostrils. From 15 yards away, a German shorthair pointer can smell a 3 pound rooster hunkered down in a cattail swale. Deer and other game animals which use their nose to detect danger have a much better sense of smell than the best pointer. The point is: don't be lulled in to thinking you can ignore wind direction because you have the latest scent elimination hunting suit. Your doe-in-heat lure may drive your hunting buddies out of the tent, but if it is blowing toward a buck, that buck will also be able to smell you. Hunters who do all they can to address wind and air currents will be much more successful in approaching game.

Staying clean and washing with a non-deodorant soap will reduce the scent envelope around any hunter. We all know how much stronger our buddy smells by the 5th day of the hunt. The game will also know! That sponge bath, the solar shower or even a cold bath in the creek will help keep your odor envelope under control. Commercially made and home-made baking soda sprayers will absorb odors in shoes and other parts of the body,

A wind direction indicator should be a part of every hunter arsenal. Small, commercially available bottles are sold which burp out a small puff of powder when they are squeezed. This is an excellent way to see the direction of even the slightest air currents. You can make your own using a small toiletry bottle sold for travelers to keep shampoo in. Fill it with baking soda. A length of yarn which is frayed at the end can be attached to your gun barrel or the upper side of your bow. The yarn will indicate the direction of any wind or air currents.

Try to predict what the wind and air currents will be doing during your hunt. If your area has prevailing winds, plan your day accordingly. Because warm air rises, morning air currents will travel up valleys and drainages. Evening air currents will go downhill after the sun sets.

Sometimes it is impossible to hunt directly in to the wind. Keep in mind if you quarter into the wind your scent will not be flowing in the direction you are going. Smart hunter will use this technique to approach their blind rather than going directly with the wind. Finally, if you must move with the wind at your back, you will still have both sides of your path of travel scent free for a short distance. Remember that the further your scent travels the wider the band it will cover as it dissipates.

The Art of Camouflage

Successful hunters know camouflage goes beyond the clothes you wear. Many other stalking habits can help you remain unseen. Hunt the shadows and go around small forest openings rather than across them. Use the shadows by standing with something behind you to break your outline. Always peek around the side of a bush, tree or rock rather than over it. Never walk on a ridge or across a saddle that would cause you to be skylined. Move "sloooow", so the motion you make will less likely be spotted.

But camouflage clothing is important. Camouflage clothing is designed for concealment. It aids the hunter in avoiding detection by game animals. Camouflage acts by breaking up the outline of the hunter (disruptive camouflage) or by allowing the hunter to blend into the background (cryptic camouflage), or both. Disruptive patterns often place sharply contrasting blocks of color next to each other, disassembling the hunter's image into separate blocks. High contrast is often needed to accomplish this task, and disruptive patterns are found in most military camouflage and the traditional "woodland" camouflage. Cryptic patterns are designed to make the hunter blend with the background. Increasingly large assortments of patterns are available which represent bark, leaf, brush, rock or other backgrounds. Some waterfowling camouflage even imitates the vertical structure of green on green or tan on tan found in marshland plants. White or black on white camouflage works extremely well under snowy conditions such as hunting predators or late season bowhunting.

Selecting a camouflage pattern that works in your area is not difficult. Simply hang various patterns you are considering in a typical part of your hunting area and step back about 40 yards. The ones to reject are those that first catch your eye. The keepers are the ones you have to search for so you can go home! To get a second opinion, hang the cloths and then go get your buddy to try spotting them. Obviously you must hang the samples in similar backgrounds for this test to work.

Many hunters go to great lengths to find the perfect camo for their area then wash it with color enhancing detergents. Some game animals see with a different visual spectrum than do humans. They are able to detect wavelengths in either the infrared or the ultraviolet range. Many of today's fabrics and detergents have color enhancers that fall in the ultraviolet range for reflectance. Wash you camo in detergent without color enhancers or use some of the products that act as UV "killers," reducing the ultraviolet reflectance of camouflage clothing.

If it is legal in your area, blaze orange camouflage can make you visible to other hunters while breaking up some of the "bright white" that color-blind big game animals see.

Moving Without Sound

Some people are just noisy! They breathe hard. They step on everything. They bump their head. They brush against things. They drag their feet. They wear cloths that swish. Even their stomach rumbles loudly!

However, everyone can do things that will allow them to move through the woods more quietly. Moving more slowly will make the biggest difference. If you find yourself stepping on things that give your location away, you can eliminate most of this problem by walking slow enough that you are able to see where you will place your foot at every step. Be conscious of the quietest place to place your foot. Stepping on a branch is noisy. Placing your foot on a firm rock, clump of grass or bare ground is much more silent.

Be aware of background noise and use it to your advantage. Wind noises can be your most common allies. Notice that when wind moves the limbs or whistles through the treetops the noise you might make is less noticeable. That airplane or pickup going down a distant road can help cover some of your noise. If you are in the final phases of stalking an animal, some of the noise it

makes can hide your approach. As they walk through leaves, nip buds, or crunch acorns, they are making noise that will make them less likely to hear you.

The shoes you wear are very important. Soft-soled boots or even sneakers are the quietest. Some of the thin soled-waterproof boots are very quiet. Some hunters put wool socks over their boots at least during the final stages of a stalk. It is surprising how quit a hunter can be when making a final stalk with NO shoes on. Approaching that bedded deer can be totally silent when a stocking-footed hunter can feel every pebble or twig before total weight is placed on the foot.

Stalking can be enhanced by wearing clothing made of fleece or some of the quiet fabric available today. Wool is a naturally quiet fiber. Nylons, canvas or other tightweave fabrics are noisy if you brush against a branch,

Moving quietly in the woods is something that gets better with practice. But the most important factor is to always be aware of the sounds you are making and always try new things to eliminate those sounds.

Behavior of your Prey

The more you know about the animal you are hunting, the better you will be able to exploit its weaknesses. This is certainly true when stalking an animal. Knowing likely feeding and bedding areas will prompt you to move most cautiously when you approaching them. Knowing when they will be feeding will let you know if you are likely to be seeing a bedded or a feeding animal. Social behavior will let you know if solitary animals are most likely or if there might be multiple ears and eyes watching for you. Do they call or make detectable noises? Do they run a long way when disturbed? Do they bed and feed in the open or in cover?

Does your prey depend on certain senses? Are certain senses limited? Deer are color blind. Turkeys cannot smell well. The eyesight of bears is not as refined as their sense of smell. Elk make a lot of noise as a herd so they are not as quick to react to some sounds.

The body actions of an animal will give you clues about their disposition. Some are obvious such as rutting behavior of deer and elk indicating they are distracted. But a cud-chewing deer is relaxed and has not detected danger. A cud-chewing bedded deer is likely to stay bedded for awhile. A swishing tale on a deer indicates it is relaxed. Staring or a stomping foot means a deer is alert and concerned. An elk that urinates while staring at potential danger is ready to bolt.

Learn about the movement behavior of the animal you might be stalking. Are they likely to move more or stay put in the middle of the day? Do they feed as a group or might some stay bedded while others feed? Do the males stay with the females and young during breeding season or do they wander from group to group?

Practice and Experience

Improving your stalking abilities is guaranteed if you practice them. The more experience you have the more you will discover the things you can do to be a better stalker. The more time you spend stalking through the woods the more likely you are to detect little things that make you more successful.

Sharing and Exhibit Suggestions

1. Try several boots and shoes and see which are quietest when you walk in different hunting conditions. Note the advantages of each. Do the same thing with others and compare opinions.
2. Using several strong scents, see how wide the scent band is at different distances.
3. Select a game species and list the behavior characteristics that would enhance a stalk and those which would make a stalk more difficult.

4. Use a baking soda filled travel shampoo bottle filled to make a wind detection tool. Practice with it and see how it compares determining wind direction by feeling wind on your skin.

HUNTING WITH DOGS

Using a well-trained dog can increase the effectiveness and enjoyment of many hunting situations. Dogs extend the hunters ability to find game, give a warning of its presence, and help hunters cover territory more completely. An untrained dog may cause more problems than its help is worth. Good dogs enable hunters to recover downed game more effectively. Their game locating ability reduces stress on the hunter and desire to take unwarranted shots. They also extend the hunting enjoyment by activities beyond the season.

Basic Care of Gun Dogs

Caring for and training a dog are major investments of time, energy, money, and affection. The cost of a good dog, well suited to your needs, is a relatively minor part of that investment. Knowing your wants is important to selecting the right type of gun dog and the breed within that group. Whatever breed is chosen, getting an animal from proven hunting stock is important. In many cases, selective breeding for show characteristics is detrimental to hunting or field performance; but high performance dogs can look good, too - if they are bred for a combination of characteristics.

Not only should the breed be selected for its qualities, but the personality of the dog should be matched to the task and the personality of the hunter. A fiery, strong-willed dog may be fine for field trials but a poor choice for a gentle, new trainer. Most breeders know a number of psychological tests that aid in picking a puppy.

Regardless of breed, basic health care is critical to the animal. Immunizations for common dog diseases like distemper, leptospirosis, hepatitis, and Parvo virus can save the dog's life. Rabies vaccination is essential for field dogs. Prophylactic treatment for heartworm, fleas, ticks and other parasites is a good precaution where they are indicated. Periodic inspection for roundworms and tapeworms is also available.

The dog needs an adequate ration of high quality, nutritionally balanced food. Most commercial foods are fine. Some owners prefer to feed their dogs on a schedule. Others provide both food and water as the dog desires them. Puppies raised on ad lib food and water generally learn to regulate their intake to their needs. When dogs are working hard, their usual ration may need to be supplemented to allow them to maintain their conditioning. Both fat and skinny dogs are less effective in the field than those that are properly conditioned. Water is vital to any dog's health and should be available as needed.

Housing is essential for the health and well-being of your gun dog. Some form of confinement or control is essential to the dog's training, health and safety. Unconfined and uncontrolled dogs tend to get into trouble, develop bad habits and are more at risk from accidents and health problems.

Although many people believe that making a pet of a gun dog ruins it in the field, others maintain that the relationship between the family members and the dog is strengthened by living with people. Many breeds can successfully serve as both pet and hunting companion. Doing so requires training sometimes for both the dog and the people involved. "Indoor" dogs need plenty of exercise and outdoor exposure in order to become conditioned and fit, particularly in severe climates.

Some gun dog owners stake or chain their dogs, providing secure shelter from the elements. Overhead or ground-level cables are often used to permit the dog to cover more ground without dragging excessive amounts of chain behind them. Sanitation is important in these situations and the dogs should be checked frequently to make sure they are able to move freely. Many owners of large hound breeds select this method of control.

The use of some type of kennel is among the most common ways of confining and controlling a gun dog. Warm, secure shelter is essential, and the surfacing or substrate of the kennel should be chosen carefully. Soil is a poor choice. While it is easy on the dog's feet, it is very difficult to clean and disinfect. Gravel poses problems for sanitation and the control of parasites and disease, but it is an outstanding conditioner for gun dog feet. Although concrete is not the best substrate for feet, it is the easiest of the common base materials for kennels to clean and disinfect.

Basic Gun Dog Training

All dogs need a few basics of control to be useful in the field. Basic obedience training can begin as soon as the pup comes home. The dog will need to know who is in charge and that you mean what you say. Lots of short sessions of training at about 15 to 20 minutes at a time every day, or several times a day, is much better than longer periods at greater intervals. Usually positive reinforcement of desired behaviors with praise or rewards is the best teaching method. With puppies that have a strong desire to please, this approach can be used almost exclusively. The key lies in the trainer being able to communicate what he or she wants to dog to do effectively. Negative reinforcement may be necessary in some circumstances. This may take the form of sharp words, picking the dog up at arm's length or mild "punishment." Excessive use of negative reinforcement, or strong punishment, can ruin a dog. Negative training techniques should be used with caution.

Every breed can profit from learning a few basic control commands, like sit, stay, come and heel. Any basic dog obedience course will help with the process. The dog should learn one command at a time, and each session should end with a review of things it knows well. Hand and/or whistle signals should be built in early, and they should be simple and clear. Avoid signals that demand excessive movement, particularly for retrievers.

The dog should also learn to live with people, even if it is always kenneled. It needs to know that "No!", or whatever substitute word is used (pointers may confuse "no" and "whoa"), means stop doing what they are doing. A barker is a nuisance in most situations, so "quiet" may also be a necessary command. A "polite" dog is much more helpful in getting permission to hunt private land than is an unruly one. Shaking "hands," giving up retrieved game to the command "thank you," and similar refinements can be nice touches.

Most types of sporting dogs need some special handling commands. Hounds need very few additional commands. The hound tends to hunt game, with the hunter tagging along. Other types of gun dogs need directional commands or additional handling commands to maintain control over their range or activity. Pointers may need to understand "steady" as they feel the need to move on a point. Where they hunt in a wide array of cover types, pointing breeds may need to understand "close" or some other command that helps them limit their range to the sight and ear-shot of their handlers. Flushing breeds, like springers, need to be under strict control, even when they are actively "making game. The dog should sit on the command "hup" or a single sharp whistle, moving on only after they have been told to "go on" or gotten a whistle command to continue. Retrievers need to understand a wider array of control commands, so the handler can assist the dog in making long, blind retrieves. In addition to the "back" command, they must understand "in" and "over" with a hand signal. Numerous books, manuals and videos are available that will assist the new trainer in producing a well-trained dog.

Types of Dogs and Their Behavior

Hounds - Hounds are basically trailing animals. Most hunting breeds use their noses to follow selected game. The hunter hunts with the hound. Most of them accept or tolerate only minimal control and become very single minded when working game. The hunter intercepts trailed, flushed, treed, or bayed game. Hounds are selected for their independence, drive, and voice quality as well as scenting ability.

Retrievers - Nearly the opposite end of the hunter-dog partnership spectrum are the retrievers. They tend to hunt or work for their handler. Their primary task is retrieving downed game, but they also function well as flushing dogs. Some retrievers also point naturally or after training. Most use both air scent and ground scent to locate game. They need to be eager, enthusiastic, strong, and responsible to their owners. Retrievers need direction commands so the handler can assist them in long, difficult retrieves.

Flushing Dogs - Most spaniels are adapted to locating and flushing game. They are good retrievers as a rule, but their main job is flushing hidden game. They must stay under the handler's control, even (or particularly) when "making game." They must be vigorous, energetic dogs with excellent responsiveness. Teaching the dog to sit or "hup" is critical to hunting success with a flushing dog.

Pointing Dogs - Several breeds of dogs have a natural tendency to freeze or point when they scent game. Hunters use pointers mainly for hunting upland birds. Some retrieve naturally, others must be taught to retrieve. Sometimes the dog will refuse to retrieve, but "point dead." Pointers are trained to hold a point until the hunter flushes the game, to cover their hunting area systematically, and to adapt their range to the conditions. Preferences in pointers vary with the habitat. Open country allows for wide-ranging dogs if the birds hold well. Flighty birds or dense cover calls for close-working dogs. In either case, pointers are selected for style and "bird sense".

No matter what kind of dog you choose, training it to hunt with you will help you become a better hunter. You will also increase your pleasure afield when the day is shared with a canine friend.

Sharing and Exhibit Suggestions

1. Research the history of a favorite gun dog breed. Share that information in an illustrated talk or presentation to a dog, hunting or 4-H group.
2. Consider a hunting situation you prefer, and select a gun dog breed to fit your hunting interests. Discuss your ideas with a family member, friend or breeder in your area.
3. Interview several gun dog owners who share your interests in hunting, asking them why they have selected the dogs they are using and what their preferences are in gunning dogs. Share your findings and conclusions with family members, friends or your group.

SECTION 6: Popular Game Species

1. Hunting Rabbits and Hares
2. Hunting Squirrels
3. Hunting White-tailed Deer
4. Hunting Ring-necked Pheasants
5. Hunting Waterfowl
6. Hunting Wild Turkeys

Hunting Rabbits and Hares



Photo by Nancy San Julian

Rabbits are the most popular game animals in North America. For many years they have been number one in both the time spent afield and the number bagged. They are abundant and widespread animals that are both sporting hunting and excellent table fare. Hunters use a variety of techniques and can hunt almost anywhere in the country.

Identification

Rabbits and hares are lagomorphs. Although they have large incisors, like rodents that are adapted to gnaw and chew plant material, they differ from rodents in several ways. Rabbits and hares are unique among mammals in having a flexible joint in their skulls that acts as a shock absorber when the animals are bounding at high speeds. They also have four upper incisors (the large middle gnawing teeth). There are two small rounded ones located directly behind the functional ones in the front of the mouth. They are not rodents; although some biologists think they are a fairly close relative.

Rabbits and Hares

Female cottontail rabbits build a fur-lined nest and give birth to young that are blind and relatively helpless at birth. Biologists refer to young having these characteristics as being **altricial** young. Depending upon the species, they may be naked or well-furred when they are born.

In contrast to rabbits, hares do not use a fur-lined nest. Their nests consist of a matted area in the vegetation or a shallow depression known as a form. The young are much more **precocial** than those of rabbits and they are much more able to fend for themselves at birth. They are born well-furred, mobile and with their eyes open. They are larger than rabbits with disproportionately longer ears, legs and feet.

The several species of cottontail rabbits are fairly similar. They have relatively large ears, eyes and hind feet. They have a small tail that is carried with the underside turned up and visible. Adult cottontails range from about 10 to 22 inches in body length. Females are slightly larger than males. The heaviest of the cottontails is the swamp rabbit, which reaches a weight of about 6 pounds. The smallest of the group is the pygmy rabbit, weighing only about a pound. The eastern cottontail is the most widespread species.

Eastern cottontails reach weights of about 3.5 pounds and lengths of about 18 inches. Their general coloration is yellowish brown to rusty brown or gray above. Each of their guard hairs has an agouti pattern, that is, it has alternating light and dark bands that give the overall coat a speckled or "salt and pepper" appearance. Pelage (coat) color varies substantially with the

seasons and within a region. The belly is pale gray to white in most specimens. Young cottontails frequently have a white blaze between their eyes that fades and disappears as the young rabbit takes on adult pelage.

The hares in North America belong to one genus. The whitetailed jackrabbit is the largest with a length greater than 22 inches and a weight up to about 9.5 pounds. It changes from a generally gray coat to a white one in the winter. The long ears are gray on the front edge and white on the back edge with black patches at the tips. The relatively long tail is white above and below. It may be marked with a narrow black stripe on the top, but the stripe does not continue onto the lower back.

Black-tailed jackrabbits are almost as large. They are longer, reaching lengths of up to 25 inches, but slightly lighter, reaching weights of up to 8 pounds. Their pelage is generally grayish brown with a black wash. The ears are brown with black tips. The tail is white below and black rimmed with white on the top. The broad white stripe continues onto the lower back of the animal.

The varying hare or snowshoe rabbit looks very much like an over-sized cottontail. It reaches lengths of about 21 inches and weights up to about 4.5 pounds. The coat color changes from brown in the summer months to white in the winter. The ears are tipped with black or gray at all seasons.

Behavior

Most rabbits and hares are nocturnal (active at night) or crepuscular (active around dawn and dusk). During the brighter parts of the day, they tend to remain concealed in heavy cover unless they are disturbed. Sometimes black-tailed jackrabbits will be active during the day as well.

The notion that rabbits serve as a way of turning grass into meat for predators is not far from wrong. Rabbits are preyed upon by a wide variety of predators, including humans. Although they are the number one game animal in the country, the impacts of human predation are relatively small.

They practice **coprophagy**, eating their own soft, green droppings that have gone through their digestive system. They eat them again to extract more of the nutrition from their foods.

They rely on a combination of concealment and swiftness afoot to avoid predators. They frequently hold very close, waiting for the last minute to bolt from hiding and head for escape cover. When disturbed, most species are reluctant to leave their established home range. That home range size will vary with the species, but the rabbit will stay within it, circling back when it nears the edge of the range. Most species use established trails and stick to relatively heavy cover when pursued by a predator, thus their behavior is relatively predictable. Swamp rabbits, marsh rabbits, eastern cottontails and black-tailed jackrabbits all swim readily when presented with a water barrier. If pursued too closely or under adverse weather conditions, cottontails frequently take to burrows, brush piles or other types of refuge. Hares seldom do so. They rely more on running speed, and often take to open country or run long courses in an attempt to evade pursuit.

Habitat Use

Habitat use differs among species and with the area in question. Generally cottontails prefer dense cover. A mixture of grasslands, shrubs, old fields and woodland edges is excellent cottontail habitat. Bottomlands and wetlands are also heavily used, particularly by marsh rabbits and swamp rabbits. Shrub and succulent deserts are also prime habitat for cottontails. Row crops are usually relatively poor cover, although some types of harvested crops may provide excellent cover for rabbits. An interspersed set of cover types with breeding and feeding cover in close proximity to escape cover with a good supply of refuge sites will hold good populations of rabbits.

Varying hares prefer dense, woody cover. High ridges with dense stands of hardwood saplings and evergreen swamps and thickets are excellent cover within the range of the species. The presence of dense understory cover seems to be a key factor in holding good populations. Like their cousins to the north, varying hares may go through pronounced fluctuations in population size.

Jackrabbits of all types prefer relatively open areas. Prairies, pastures and crop lands as well as open shrub lands and open woodlands interspersed with grassy areas or desert flats are fine habitat.

Food preferences change with the area, species and season. During the growing season, rabbits behave primarily as browsers, eating mainly forbs. In the winter or dry seasons, they switch to woody vegetation, including bark, twigs, brambles, vines and young trees. Grasses are relatively less important than forbs, although they are eaten. Both rabbits and hares can cause substantial amounts of crop damage to field crops, forage crops or gardens when populations are high or preferred foods are planted next to good holding cover.

Escape cover and refuges are quite important to most cottontails. It exists in several acceptable forms. Dense vegetation, including briars or dense thickets of shrubs and small trees, is excellent escape cover. Densely overgrown hedgerows make fine cover, as well. Burrows and brush piles are used as refuges when needed. They provide shelter from both predators and foul weather. Abandoned woodchuck or marmot burrows, stump piles or bulldozed trees, brush or slash piles, abandoned buildings, pipes and culverts and even artificial burrows are excellent refuges.

Hunting Clothing

As in most types of hunting, the clothing selected must fit both the conditions and the terrain. Good, comfortable boots are essential, and brush pants that turn briars and brambles are almost essential for hunting heavy cover. A vest or coat to match the conditions along with a hat or cap protect the hunter from the elements and help to regulate body temperature. The value of blaze orange in hunting clothing increases as the cover gets more dense, and safety glasses are a very good addition, not only for the usual reasons but for turning twigs and debris aside as well.

Arms and Ammunition

Nearly any type of firearm or archery equipment can be used in some type of rabbit hunting. Shotguns are by far the most popular hunting arms, with all sorts of action types and gauges being used. Chokes and loads are commonly tailored to the conditions of the hunting area and the species being hunted, but medium to large shot (#6 to #2) is most frequently used. Even hares are relatively fragile and easily killed with well-placed shots. Some hunters prefer to use a smaller charge of large pellets to encourage complete penetration of the animal and very few pellets left in the flesh.

Many rabbit hunters prefer to shoot a rifle or a handgun. Safety is a critical issue here. Be sure that the terrain and hunter density set acceptable limits on the use of guns other than shotguns before taking to the field with a rifle or handgun for rabbits. Stalking sitting rabbits along an abandoned railroad right of way can create challenging and productive hunting. For close range work, the .22 rimfire is completely adequate, but hunters shooting jackrabbits as varmints may want to select a flat-shooting and accurate center-fire cartridge.

Archers may use nearly any type of bow with most types of arrows in hunting rabbits. Both broadheads and blunts have devotees, and many archers prefer flu-flu fletching to make recovery of their arrows easier. Some hunt with a dog. Others stalk through cover looking for sitting rabbits. Bowhunting for rabbits is a tough challenge for any archer, particularly in modestly heavy cover.

Hunting Techniques

Still Hunting - Rabbits may be hunted using a wide variety of techniques. Some hunters enjoy still hunting for them. This technique is best around dawn and dusk when the animals are most

active. The still hunter slips quietly through good cover watching and listening for signs of rabbit activity. They may use any legal type of equipment, but most still hunters prefer an accurate .22 rifle, handgun, light centerfire rifle or archery equipment. The trick is to spot the sitting or moving rabbit before being spotted or heard.

Jump Shooting - Many rabbits are jump shot. Hunters move through likely cover at any time of day, thoroughly covering all areas that might hold a sitting rabbit. Most shots taken are close and fast at moving rabbits. Shotguns are most commonly used with open chokes and medium sized shot. Cottontails are fragile and easily bagged, but the larger species may require a bit more choke and heavier shot charges to anchor them consistently.

Varmint Hunting - Long range varmint hunting is frequently practiced on western jackrabbits in situations where excessive population numbers are causing range or crop damage. This technique involves spotting the animals with binoculars or a spotting scope, then shooting them with precision centerfire rifles. Jackrabbits taken in this manner are most often left to scavengers.

Hunting with Hounds - Hunting with hounds is considered the classical method of rabbit hunting by many people. Nearly any ground trailing dog can be used, but beagles and bassets are the most commonly used breeds for cottontails. Larger hounds are often used on hares and jackrabbits. Most hound hunters use shotguns, but all types of equipment is useful. The main considerations are for the safety of the hunters and the dog and the fact that the game may be on the run when it is shot. Shot types vary with the species and the cover, but most cottontails are taken at relatively close range. Hares are often taken at somewhat longer distances. This form of hunting exploits the rabbit's tendency to stay inside its home range, even when pursued. Since the animal tends to stick to heavy cover and to circle back after it reaches the border of its range, the hunter may pick likely stands and wait for the dog to push the bunny by the gun. The waiting hunter must remain still and quiet, since the rabbit's ears and eyes are adept at picking up the presence of any predator. In addition, the hunter must watch well ahead of the dog, since the rabbit may be a considerable distance ahead of the dog and moving slowly. Easy shots may result if the hunter is prepared. Standing where a little elevation is available helps. It aids the hunter in seeing into the cover and enables him or her to cover a wider area. This type of hunting requires patience and confidence that the dog will bring the rabbit around. Any time doubt arises about the proper course of action, trust the dog. Its nose is much better than yours, and it has a finely honed desire to find the rabbit.

It is absolutely essential that the hunter know where any companions are stationed and that they take every precaution to protect the dog.

Hound etiquette places a few demands on the guest hunter. First, let the owner handle the dog. No matter how well-intentioned, extra confusion for the dog can reduce its effectiveness and irritate the handler. Second, no matter how the dog behaves, keep your comments positive. Even the best of dogs can have a bad day or botch a chase. Chiding or disparaging remarks will get you uninvited on the next hunt.

Third, watch out for the dog's safety! Some beagle or basset owners feel closer to their hounds than to their families (almost). No rabbit is worth shooting the dog. Keep your shots strictly safe. Finally, follow the owner's instructions. This seems very simple, but too many guest hunters think they can out-run a rabbit. The owner knows what he or she is doing and probably knows the cover and the normal behavior of rabbits in that cover. They almost invariably will try to place the guest or companion in the best locations for the best shots. Even when the rabbits do the unusual and the owner gets most of the action, the lonely station they put you on was calculated for success.

Driving - Driving is a traditional method of rabbit hunting in some areas. Generally, large groups of hunters move through likely cover, pushing rabbits ahead of them. The rabbits are pushed toward areas where breaks in the cover will result in open shooting opportunities. This method is

most commonly used with western jackrabbits, although it is occasionally used in some southern cottontail covers. Caution must be exercised to maintain high standards of safety and prevent accidents when the shooting begins.

Field Care of Game

All species of rabbits are excellent table fare. Proper field care and cooling helps to preserve quality. The rabbit should be field dressed as quickly as possible after it is bagged, then allowed to cool to at least air temperature. In addition to rubber gloves, the shooter will need a good, sharp knife and a means of carrying the game where air can circulate to cool the carcass.

Immediate field dressing is important if the rabbits bagged are going to match their potential on the table. Shot may have penetrated the digestive tract, spilling gut contents into the body cavity. If allowed to remain in a warm animal, the intestinal bacteria may begin to break down the flesh or to impart off flavors. In warm weather, the body cavity could essentially spoil before the hunter leaves the field. Cleaning the animal eliminates those problems and allows the flesh to cool, keeping it in better condition.

Rabbits sometimes carry diseases that can be transmitted to humans. As a result, using rubber gloves (kitchen gloves work very well) when field dressing the animal is a good idea; and disposing of the viscera where dogs cannot get into them can reduce the need to worm the dogs. The old practice of giving part of the viscera to the dog to increase its hunting desire is unwise.

To field dress a rabbit, simply slit the abdomen and chest cavity with a sharp knife. Either remove the viscera by grasping them with one hand and pulling them out or hold the head and rear legs and give the rabbit a sharp, downward snap with the wrists. The viscera will usually tear free, leaving a clean carcass. Be careful around the bladder, and remove any clear, watery-looking cysts from the pelvic area. These are cysts of dog tapeworms. Either bury the viscera or hang them in a low bush. Birds and other scavengers will soon clean up the remains.

Where it is legal to do so, many rabbit hunters skin the animal immediately. The thin skin is easily removed, even without cutting, when the animal is warm. If the skin is removed, the flesh must be protected from dirt and debris. Plastic bags are an obvious choice, but they should not be used in warm weather. The plastic can act as an incubator, promoting spoilage. In warm weather a muslin meat bag is a much better choice. Many hunters prefer to leave the skin intact until they reach home or camp. There the task is quickly accomplished by cutting off the feet and the head, making a small incision in the middle of the back, inserting the fingers of both hands in the incision and pulling. The skin comes away cleanly, leaving a carcass that is ready to cut into serving pieces.

Final Cleaning and Using Rabbit

Some hunters wash the carcass before cutting it into serving pieces. Others wait until the rabbit has been cut up to wash the flesh and prepare it for use or storage. The rabbit can be cut conveniently into six pieces: two hind legs, two front legs and two back pieces. Some hunters trim the ribs and the flanks off the back pieces to make them less bulky without losing more than an ounce or two of meat. Cutting the rabbit into these serving pieces increases the likelihood of its being used, makes a more compact package for storage and reduces the probability of freezer burn. Bloodshot pieces can be soaked in a mild brine solution prior to use or storage. This treatment removes most of the blood and gives the flesh a more pleasing appearance when cooked. The rabbit may be used immediately, but it should be frozen or otherwise preserved if it is to be held more than a couple of days.

Rabbit is a rich, delicately flavored meat. It is adaptable to most chicken dishes, often surpassing domestic fowl in flavor. The delicate flavor demands light treatment with cooking methods like barbecue. Experiment with it. Enjoy the gastronomic benefit of the time you enjoyed in the field.

Management Considerations

Popular thinking uses rabbits as examples of prolific breeders, and that image has a strong basis in fact. In most area of the country rabbits begin breeding with the first warm days of early spring and continue through the summer. Young born in the first litter or two also will produce young before the breeding season ends. A conservative example might look like this. A single female may produce four litters of five young each (4x5) in a single season. Even if the first litter came late in the spring, the females in that litter (let's assume that there were three) will breed before the season ends. Since we have elected to have three females, let's give them litters of four to remain conservative (3x4). The first female would have produced 20 offspring. Her female offspring would have produced 12 more. Thus, the single female has generated an additional 32 rabbits in one season. Only one of them needs to survive to replace the original animal, leaving an excess of more than 30 individuals who must either find new places to live or die before the next breeding season. Most of them die, resulting in high turn-over rates with or without human predation.

Hunting has very little impact on rabbit populations in most situations. Adequate habitat generally supports good populations of these popular game animals. Adequate habitat requires a mix of breeding, feeding and escape covers. Feeding and breeding cover is seldom limiting. Where escape cover or refuge is limited, that can be planted or built. Shrubs and hedgerows may be planted, offering escape and resting cover when they have matured. Wind breaks may be established, with the accompanying dense vegetation providing all the cover needs for the animals. Brush piles, artificial burrows and similar structures may be constructed where they are needed to increase wintering populations.

Rabbits are able to tolerate long seasons and heavy harvests. They serve their purpose of transferring energy from the sun through vegetation to predators while providing a richer environment and millions of hours of enjoyment afield each year. It is not necessary to hunt rabbits, but their population dynamics permits hunting this abundant and popular game animal without jeopardizing their future or the futures of animals that eat them.

EXHIBIT AND SHARING SUGGESTIONS

1. Prepare and exhibit of the rabbits and hares found in your state or area. Point out the field marks that may be used to distinguish one species from another and the habitat types that they prefer.
2. Try a number of rabbit recipes to determine your personal preferences. Develop your own recipes by experimenting with them. Enter a rabbit dish in a food show or serve one at a club meeting, picnic or other gathering.
3. Sponsor a "Beast Feast" where members of your club or a local sportsman's organization can share wild foods and recipes for those wild foods. Consider using it as a fund raising event where that is legal.
4. Study the diseases and parasites of rabbits. Share your findings with your club or another interested group.

Squirrel Hunting



Photo by Craig Gautreaux

Squirrel Identification

Many kinds of squirrels are found in North America. Among them, the most popular game animals are the gray squirrel, fox squirrel and, in some areas, the red squirrel. Although those names are fairly descriptive, each species has several color phases or pelage stages.

Gray Squirrel- The gray squirrel, sometimes called the "cat squirrel" in parts of the South, has two major color phases. The typical gray squirrel has a generally gray-brown pelt that comes from the agouti pattern on its guard hair. Each hair is basically brown with black bars and a silver tip. The tips of the hairs give a gray cast to the animal's head, back and upper sides. The flanks, legs, feet and face are rusty brown; and the belly and chest are pale gray to white. The black color phase of the gray squirrel, often called a black squirrel, has a generally black pelt with a rusty to brown belly and chest. In some parts of the country the black phase is extremely common, while in other areas it may never be seen.

Fox Squirrel- Fox squirrels have several color phases. The red phase is the most common in most of the country and is the basis for the species common name. It typically has an overall rusty appearance with the back and shoulders rusty red to rusty gray. Unlike the gray squirrel, fox squirrel guard hairs are not barred. The belly is usually yellowish to orange. The gray phase is silvery in appearance without any hint of brown. It is white below and may be marked with black on some parts of the body, particularly the face and ears. The black phase is generally black with lighter areas around the lips, nose and ears.

Red Squirrel - Red squirrels, sometimes called pine squirrels or chickarees, are generally bright red-brown above and grayish white below. The sides vary from rusty or olive gray in the summer to paler olive gray in the winter. A prominent black line separates the rusty sides from the white belly in the summer. In the winter the ears are tipped by short tufts of red or black hairs.

Size and Weight - Fox squirrels are the largest of this group, weighing up to about 2 pounds. Their total length, from the tip of the nose to the tip of the tail is up to about 21 inches, and the tail may be up to about 10 inches long. Gray squirrels are smaller. They reach total lengths up to about 19 inches with tails that may reach a length of 9 inches. They may weigh up to about 1 1/2 pounds but specimens from some parts of the country may be considerably smaller. Red squirrels are the smallest of this group, reaching weights of up to about 1/2 pound and lengths to

about 12 inches. Their tails may be as long as about 5 inches. These measurements are taken from adult squirrels. Young ones may be considerably smaller.

Squirrel Behavior

Food Habits - Understanding the food habits of a game animal can be extremely helpful to a hunter. It aids in pre-season scouting by giving the hunter some cues to look for in selecting hunting areas. It also helps in locating the best hunting locations during the season, as squirrel activity changes with the foods being eaten. All of the squirrel species mentioned here are primarily vegetarian. They eat a wide variety of seeds, fruits and nuts as well as fungi, bulbs, tubers, and vegetative parts like buds and bark. Evidence of squirrel feeding is relatively easy for careful observers to find. Squirrel hunters usually refer to feeding signs as cuttings. They are often observed at the base of trees or on logs, stumps or prominent rocks. They may consist of seed husks, large chips or chunks of nut hulls, opened nutshells (usually in pretty good-sized pieces), corn cobs or stripped pine cones. Foraging activity may also leave other signs. Small holes dug in the forest floor or grassy areas may be evidence of squirrel feeding on buried food items. Disturbed areas in leaf litter also may be associated with squirrel foraging. They may mimic deer or turkey foraging patterns in leaf litter, or they may simply dig pockets or channels while searching for food.

Squirrels commonly cache food while it is abundant, usually burying it in the ground or storing it in cavities. Since they frequently bury more than they recover, squirrels may do considerable service as planters of potential replacements for forest or woodlot trees. For quite a long time some people thought that squirrels remembered where they had stored each seed. Now scientists generally agree that the buried food is relocated with the aid of a very sharp sense of smell.

Other Signs of Squirrel Activity - Frequently a careful observer can locate other signs of squirrel activity. Tracks in mud, sand, loose soil or snow are obvious signs. The pattern of two large, parallel hind foot tracks followed by two smaller, nearly parallel front foot tracks is diagnostic.

Leaf nests are another obvious squirrel sign, particularly after the leaves have started falling. These nests are usually found in trees that are 30 or more feet high, and they are most often built from 10 to 100 feet above the ground. A typical leaf nest is globular or slightly flattened and about 1 1/2 feet in diameter. It is usually located in a limb fork and securely anchored in the tree.

Tree cavities are frequently used for escape cover or refuges from severe weather. Active tree cavities frequently show worn or gnawed areas around the cavity opening. Scratches in the wood or bark of trees and hair tangled in tree bark give evidence of squirrel activity in the vicinity as well.

Squirrels frequently can be located by sound as well as sight. Squirrels "bark" as a means of communicating with each other (perhaps a territory announcement) and as part of an alarm call. The territorial call is a series of sharp "kuk" sounds. Hunters may imitate this call to attract the attention of their quarry and elicit a response. When it is used as an alarm call, each "kuk" may be accompanied by a descending trill or chirr. This is accompanied by rhythmic twitches of the tail which can be used as a visual cue in locating the animal. A more rapid and high pitched chirr often is used during the breeding season or during aggressive encounters among squirrels.

Movements and Activity - Squirrel movements and activity are geared to the season, weather and time of day. Most tree squirrels are almost entirely diurnal (active during the daylight part of each day). They are generally most active during the most comfortable parts of the day. During warm weather periods, they are most active in the morning and evening. During the coldest parts of the year, they tend to be most active during the middle of the day and afternoon until just before sunset. During periods of prime activity, squirrels recover fairly quickly from disturbance and will seldom remain inactive for more than 15 to 20 minutes at a time. Fox squirrels and

urban/suburban squirrels are often active throughout the day. They acclimate readily to people and human activity and use distance as a primary defense.

Squirrels prefer calm, mild weather conditions. High winds or heavy precipitation will usually drive them into shelter, but gentle rains or misty conditions may promote activity throughout the day. Calm days that are bright but cold will often see squirrels basking in the sun on tree limbs. During foul winter weather, squirrels may remain in their dens for several days at a time, emerging periodically to forage.

Squirrel activity peaks in the fall. Populations are at their peak during that time and juveniles are dispersing. Adults, too, may be moving, seeking concentrated food sources. At times, these movements may give the appearance of "migrations" although the animals are relatively sedentary once they have established a home range. When concentrated food supplies are available or foods are scarce, squirrels will tend to concentrate around those available foods. Food caching is extremely important to survival, and much of their fall activity is related to gathering and caching foods.

The three species of squirrels addressed here all use both the ground and trees. Fox squirrels are the most terrestrial and may be found some distance from trees and other woody cover. Red squirrels are the most arboreal, spending most of their time in the trees. Gray squirrels are intermediate between the other species, but are seldom far from the trees and are more arboreal than terrestrial in nature. Squirrels have excellent vision, hearing and scenting abilities. Hunters who seek them must use caution with excess noise and hold their movements to a minimum.

Habitat Use

Cover preferences of squirrels are associated with their behavior. Gray squirrels prefer forested or woodland sites with a more or less continuous canopy. Hard mast production is a vital element in good gray squirrel habitat, so a mixture of reliable mast producing trees is associated with high squirrel densities. Over their range this species is found in both upland hardwood and mixed forest and in bottomland hardwoods.

Fox squirrels prefer more open or patchy woodlands. They are frequently found on forest edges or in small woodlots, often closely associated with open areas or agricultural land. They readily use fencerows or hedgerows as travel lanes, even those with relatively small trees and shrubs. Fox squirrels prefer upland woodlands or well drained bottom lands, since they spend much of their time foraging on the ground. They frequently use open pine stands in the South.

Red squirrels are most commonly encountered in coniferous forests or in conifer patches within mixed forest. They may be found in urban conifers where adequate travel lanes to woodlands are available. Red squirrels also may be found along forest edges.

All squirrel diets are relatively similar. In the spring they consume sap, buds (particularly flower buds), flowers of trees and other plants, spring fruits (like maple keys), and a wide variety of bulbs and tubers. Summer diets are dominated by seeds and fruits of trees and shrubs as well as a variety of fungi and some insects, including caterpillars. Fall diets are dominated by hard mast as it becomes available, corn and other agricultural crops and apples or other fall fruits. Hickory nuts, beech nuts and acorns provide most of the hard mast with walnut, butternut, pecan, hazel and similar trees being locally important. Other hard mast is also exploited. Basswood and cherry seeds may be significant in some localities, as are maple keys. Winter diets rely heavily on stored or cached mast. Available agricultural crops will also be used. A variety of bulbs and tubers as well as bark and buds may be used late in the season.

Hunting Squirrels

Tactics used in squirrel hunting are very similar to those used in hunting white-tailed deer. In fact squirrel hunting is an excellent warm-up and training ground for deer hunters. A wise hunter needs to learn to identify preferred habitat for the species being hunted. Hunting is best when it

can be done, but adjusting hunting activity to the activity patterns of the squirrels will bring the greatest success. Heavy rain, high winds or snow squalls are detrimental to squirrel activity, thus days dominated by those types of weather might better be used hunting waterfowl or some other activity.

Hunting from a stand or a series of stands is an excellent and very successful technique for squirrel hunting. The location of the stand is critical to success. It should be near dens, food sources and travel lanes. These can be located by scouting the area to be hunted and observing squirrels and squirrel sign. The stand site should offer good visibility and a clear field of fire, while allowing the hunter to be both comfortable and concealed. Concealment may be as simple as a tree bole against one's back or as complex as a blow down or brush pile to hide behind. This approach is very useful almost any time squirrels are being hunted, but it can be a hunt saver under tough conditions. When the leaf litter is dry and moving sounds like walking through giant corn flakes, remaining motionless can calm the squirrels and allow them to become active after your approach. When conditions are poor and activity levels are low, watching an area with a high probability of squirrel activity is frequently preferable to wandering large areas hoping to surprise an active animal. Finally, this technique is very good in open habitats where movement is easily detected and squirrels are likely to hide well before the hunter locates them or gets into shooting range.

Basic stand hunting technique involves arriving at the stand site before activity is expected if possible. The hunter should make a minimum of disturbance getting to the stand; but if a disturbance is inevitable, its length should be minimized. The hunter should get situated comfortably in the stand then sit or stand quietly and as still as possible for a minimum of 20 minutes. All movements should be kept slow and quiet, as though a squirrel were studying the hunter at all times. (One is very likely to be doing just that!) Allowing activity to get well under way before shooting is often a good idea, and the hunter should wait a while for the area to settle down after each shot. Frequently, particularly when the hunter is shooting a .22 rifle, squirrel activity will resume rather quickly.

Still hunting for squirrels is much like still hunting for deer. It is essentially a slow stalk with frequent pauses. Still hunting is effective when the canopy cover is dense. It allows the hunter to detect feeding squirrels without being seen. It is also effective when the cover is quiet because of moisture or snow cover, when squirrels are sunning or moving about very actively or when the terrain or cover offer many opportunities to approach squirrels from concealment. Many hunters like to combine still hunting with stand hunting, stalking between stand sites. It is wise to make relatively long pauses every 10-15 steps, watching and listening carefully for evidence of squirrel activity. Camouflage clothing may be helpful to the hunter where it is legal.

Still hunting with a partner is often very effective, particularly after the leaves are down. The hunters should alternate their movements, with the stationary partner watching carefully for any squirrels that may be moving to hide from the moving hunter. Both hunters should remain still periodically to watch and listen. As in all other hunting, it is extremely important to pick only clear, safe shots when hunting with a partner. Skylined shots are risky.

Many hunters enjoy hunting squirrels with a canine companion. Almost any small breed of dog can be helpful, both those that trail by scent and those that are basically sight hunters. The squirrel frequently runs to the security of a tree when pursued by a dog. They tend to focus their attention on the dog, often allowing the hunter to get good, clear shots.

Float hunting is a very effective squirrel hunting method where it is legal and safe. Both shotguns and rifles are useful, since a variety of shot types will be offered. Float hunting is usually best with a partner. One can control the boat or canoe while the other hunts, switching between shots or on some other agreed upon criterion. Only one shooter should be active at any time from a boat or canoe, but areas of high squirrel activity might be explored on foot.

Squirrel Hunting Arms and Ammunition

Almost any type of gear, from archery to precision rifles, may be used in some form of squirrel hunting. Most hunters prefer to use either a .22 rifle or a shotgun. Shot placement is important with a smallbore rifle, and most hunters prefer an accurate, scoped .22. One inch scopes are much better than smaller tubes in gathering the light that is available, particularly under a dense canopy or in the dawn and dusk activity periods. The majority of hunters use 4x or 6x scopes.

All types of .22 ammunition is used to hunt squirrels, from .22 shorts to hyper-velocity loads. The best advice is to shoot test groups with the rifle from a bench rest. Long rifles are preferred by most squirrel hunters for their added velocity and energy down range. Squirrels are tough and hardy, and poorly placed shots may result in lost game that is doomed to serve the scavengers. Standard velocity or target ammunition may give the best performance, and the minor difference in energy is insignificant relative to the need for accuracy.

Many squirrel hunters prefer to use a shotgun because they commonly encounter running shots. Any gauge may be used, but modified or full chokes are preferred. Dense patterns with heavy loads of medium-sized shot may give the best performance on these small, tough targets. Most hunters prefer to use #4, 5 or 6 shot, with #6 being the most commonly used. Some hunters use combination guns with the option of using either a rifle or a shotgun as the opportunity presents itself.

Squirrel hunts have been a tradition with muzzleloader fans since Colonial times. They are no less popular today. Any caliber of muzzleloading rifle may be used, but the .32 - .36 caliber rifles are designed with the squirrel hunter in mind. Light, accurate loads are the choice when muzzleloading for squirrels. Patched round balls are traditional and adequately effective for small game, even in these light rifles.

Some squirrel hunters prefer to use handguns of some type for their sport. Break action single shots, bolt actions, revolvers and semi-autos are all useful in hunting squirrels. Most handgun squirrel hunters use either .22 rimfire or small caliber center fire loads. The choice of metallic or optical sights is up to the hunter.

Other Gear

As in any other type of hunting, the squirrel hunter needs to have some additional gear. Boots and clothing appropriate to the conditions are essential. They should be selected to match the terrain, weather conditions and other needs of the hunt. Clothing should be legal, quiet and layered. Where legal and appropriate, camouflage clothing is helpful for these sharp-eyed animals. Shooting glasses are essential to protect the eyes from gases, debris and twigs. Selecting appropriate glasses can also aid the hunter by sharpening contrast. A game bag, pouch or strap of some type is handy for carrying game. Some hunters use a giant safety pin (GI laundry pin) as a carrying device. A squirrel call may be useful. Finally, a field dressing and field care kit is important. A sharp pocket knife may be all that is needed, but many hunters like to carry plastic gloves, a small rag or towel to wipe the carcass dry, and a muslin sack to carry skinned and field dressed squirrels. Assemble your field dressing kit and make sure you have it with you.

Care of the Game

Field Dressing - Squirrels should be field dressed as quickly as possible after they are bagged. This prevents spoilage, reduces contamination from gut contents on animals hit through the abdomen and increased the future table quality of the animal. Field dressing a squirrel can be an extremely simple process. Using a sharp knife, slit the underside of the squirrel from anus to throat, being careful not to puncture the bladder. Grasp the viscera in the chest and pull toward the tail. All the internal organs with the exception of the kidneys should come free in a mass. If not, simply grasp those remaining and pull them free. If the cavity is bloody, wipe it dry with a cloth, dry grass or leaves. Hanging the carcass in the open air or where air can circulate around it promotes cooling and is preferable to stuffing the carcass in a lined game bag.

Where it is legal, many squirrel hunters prefer to skin their quarry immediately. They come prepared to keep the skinned carcasses clean. Several skinning methods are used, but all of them are designed to prevent getting hair or debris on the carcass. The skinned squirrels must be protected from dirt and hair in the field. Although a sealable plastic bag seems like the ideal solution, they should be avoided except in very cool or cold weather. The plastic tends to seal in both moisture and heat, creating ideal conditions for spoilage. A tight muslin bag is much better. Many hunters prefer to leave the skin in place to protect the meat if the weather is cool enough.

Skinning Techniques - Squirrels can be skinned effectively using several methods. The two most common methods involve taking the skin off in one or two pieces. The two piece approach starts by removing the head, feet and tail. Next, a small transverse cut is made through the skin in the middle of the back. The index fingers are inserted on either side of the slit, and the hands are pulled apart, removing the skin in two inverted pieces.

The one piece method begins with removal of the feet. A cut is then made through the base of the tail, cutting only through the bone. The fingers are worked around the base of the hips to provide a firm grip. The skinner stands on the tail and pulls upward on the hips, pulling the skin down to the ears of the squirrel. Remove the head and the skinning task is complete.

Sometimes warm weather squirrel hunters will locate large fly larvae, known as bots, when skinning the squirrel. These larvae look gruesome and unappetizing; but they do not affect the flesh. They are confined to the skin and removed with it.

Making Squirrels Table Ready - A fundamental principle of wild game cookery is to make the animal as table ready as possible when it is dressed for cooking or storage. Someone unfamiliar with these animals is more likely to use them if the pieces look like something they are used to using. Squirrels may be cut into 6 useful serving pieces very quickly. Cut between the pelvis and the spine to remove each hind leg. Next, cut under the shoulder blades to remove the two front legs. Then, trim off the flanks and lower ribs before cutting the back into two pieces near the last rib. Animals that will be prepared by a method that involves boiling or steaming and boning may be left whole or merely cut in two to fit more easily into the pot. Bloodshot areas may be removed or cleaned by soaking the pieces in a refrigerated salt solution overnight.

Squirrels as Table Fare - Squirrels are excellent table fare. They have a fine flavor and are adaptable to many recipes. They can be cooked like rabbit or chicken. Young squirrels may be fried, fricasseed, or browned and simmered in gravy. Older ones might need to be parboiled a bit before being given the same treatment. Other traditional squirrel recipes include Brunswick or hunter's stew, squirrel Stroganoff and squirrel ala king. Many other recipes are useful with squirrel. Try some of your favorites to see how you like them with these abundant small game animals as the foundation.

In some parts of the country, squirrel heads are a main ingredient in stews or gumbos. The skinned heads are used whole or with the eyes removed. This treatment uses more of the animal, but may be repugnant to some diners. Decide how you would like to treat the heads.

Squirrel Management

Squirrels are among the most popular small game animals in North America. They are available over most of the country, and they make are excellent game for young hunters. Their economic impact is strong.

Habitat quality is the key to squirrel populations. The dependability and abundance of mast crops and the availability of den sites are among the most significant elements in habitat quality. Hunting pressure can influence squirrel abundance, particularly in small woodlots. Heavy pressure can reduce populations below their carrying capacity or even extirpate squirrels in small localities. The social carrying capacity for squirrels may be lower than the biological carrying capacity, particularly where nut farmers, fruit growers or other agriculturalists are impacted by

concentrated squirrel populations. Reproductive success in squirrels tends to increase when populations are low and decrease when population densities are high.

Regulating harvests is the principle management tool used with squirrels. Seasons, where they are imposed, are generally confined to the fall and winter, although late summer and mid-spring seasons are traditional in many parts of the country.

Habitat management is normally confined to maintenance of mast-bearing and den trees. Artificial nest structures may increase squirrel densities where den sites are limiting, and several types of nest structures have been developed. In general, however, squirrels are managed by their environment with harvests being permitted because of the presence of a harvestable surplus at the end of the breeding season.

Exhibit and Sharing Suggestions

1. Collect tails from legally harvested animals or road-kills (where legal) and prepare an exhibit to illustrate species identification and the use of tails in aging squirrels. Show your exhibit at an appropriate event or as part of your club activity.
2. Develop a photographic exhibit or paper on squirrel habitats and habits. Compare and contrast the squirrel species living in your area and include appropriate regulations or management activities related to squirrels.
3. Collect tails from squirrels you have bagged. Use the tails to tie flies, jigs or other fishing lures.
4. Try squirrel hunts using different techniques and various types of equipment. Record your experiences in a field notebook or hunting journal. Assess which habitats, weather and seasonal conditions, techniques and equipment gave you the most success and satisfaction. Share your discoveries with your group.
5. Try several recipes using squirrel as the foundation. Sample them with your family or friends to see which ones are preferred. Share your recipes with members of your club or another group interested in wildlife cookery.

Hunting White-tailed Deer



Photo by Tom Barnes

White-tailed deer were relatively rare over much of their range less than a century ago. Thanks to management and recovery of their preferred habitat, these game animals are among the most widespread and commonly observed big game species in North America.

Whitetail Characteristics

Whitetails are variable in appearance both regionally and seasonally, but they are fairly easy to recognize anywhere they occur. Their color ranges from bright tan or reddish-brown to gray-brown or gray with white or creamy hair on their bellies and the insides of their legs. Coat color changes seasonally. Summer coats are usually tan or reddish with white around the eyes, inside the ears, around the muzzle and at the throat. A black patch shows off the white at the chin. Winter coats are usually gray to gray-brown with less contrast on the face. The throat patch and black and white pattern on the chin are still obvious. Young of the year, called fawns, are born reddish with white spots. The spots are usually lost before the first winter, when the newborn summer coat is shed.

Several characteristics can be used to distinguish whitetails from other deer. The tail is dark above (brown, black or a combination) and white below, with relatively long, erectile hairs that can increase its apparent size. The tail is raised with hairs erected showing a white flag when the deer are alerted and displaying to other deer. The white inner legs and belly combined with a raised and spread tail present a large white flag as the deer is moving away from potential danger. The prominent white throat patch is another distinguishing characteristic, as is the large, white-edged metatarsal gland on the lower leg. The tarsal gland, located on the inside of the hock is also very prominent. Whitetail antlers, found only on bucks or males except in very unusual situations, curve upward and forward. Typically they have brow tines and unbranched tines coming off the main beam. Atypical whitetails may have points going in all directions off the main beams.

Whitetails vary in size geographically. Northern animals are heavier, with mature bucks often exceeding 220 pounds (100 kg) and mature does exceeding 150 pounds (70 kg) in weight. The smallest subspecies reach maximum sizes about half as large as the largest ones. Age and nutrition also influence the weights of deer. Older deer tend to be larger and heavier; and deer with high quality food sources grow faster and carry heavier weights than do those that have lower quality foods or restricted access to food. A 1 ½ year old buck from an area with excellent food can be larger and carry larger antlers than a 4 ½ year old buck from an area where deer are malnourished or overpopulated.

Bucks are normally antlered after their first year. Their antlers are deciduous, being shed in the winter and starting new growth a few months later. Some evidence shows that older bucks shed their antlers earlier than younger ones. Antlers are among the fastest growing tissues known,

starting as a furry bulb on the head and developing into hardened bony tissue by the early fall or late summer. In addition to having antlers for most of the year bucks are usually larger than does. While does often form small herds of related does and fawns, adult bucks are normally solitary or members of small male groups. The sexes also differ behaviorally. Well-worn and established deer trails are usually those used by does and fawns. Fainter trails are often those used by bucks. Does will use open areas much earlier and later in the day and with less caution than will bucks. Mature bucks prefer denser cover, often restricting their use of open cover to hours of darkness or near darkness. While does often snort or blow, then bolt when they identify a threat, bucks frequently will remain concealed and let the danger pass or sneak out ahead of a hunter to circle back to a preferred bedding site after the danger has passed.

The rut, the time when whitetails are in breeding condition, produces several changes in both bucks and does. Early in the rut, bucks do mock battle with trees and shrubs, rubbing the bark from them. Rubs, as these barked trees are called, show the travel routes of the buck or bucks that made them and give the scouting hunter evidence of the presence of bucks. Later, they shift to digging rutting pits or scrapes, pawed out areas in the earth that are marked with urine and secretions from several glands. Almost without exception, active and working scrapes will be overhung by a branch that is marked with secretions from glands on the buck's head, particularly those around the eyes. Does that are coming into estrus locate those scrapes and mark them by urinating in them. Bucks track does from the scrapes and stay with them until breeding is complete. Since bucks tend to become, somewhat single-minded during the rut, it is an excellent time to hunt them. Their activity level increases. They may be active at any time during the day. They actively seek does, even in poor cover, and they are susceptible to calls and rattling, as well as "doe-in-heat" scents.

Sensory Abilities

Some deer hunters operate under the misconception that deer pay no attention to any sense other than smell. While whitetails are not as sight or sound dependent as are mule deer, they have an excellent senses and use all of them. Their primary sense is the sense of smell or olfaction. Their sense of smell rivals that of dogs and far outstrips our own. As a result, they often position themselves where they can sample the wind both in the direction from which they might become endangered and in the directions they move to avoid danger. Danger detected by smell will often create an immediate response without waiting for any confirmation from the other senses. Deer that have been pursued heavily or young deer may panic or bolt immediately. Mature bucks are likely to lie still and let the danger pass or sneak around it in heavy cover.

Deer hear very well and can pinpoint the location of sounds very quickly. Usually they will wait for confirmation by another sense before reacting to sound, but they will be alerted and prepared for flight when they hear foreign sounds. Even the rhythm of a hunters stealthy footsteps can alert a deer to danger, so it is often best to avoid sounding like a steadily moving, two-legged predator. Noisy or windy conditions often make whitetails skittish, because one of their early warning systems is hampered by the extra noise.

Deer are color blind but they can detect some colors as unnaturally bright white. They also have some sensitivity in the ultra-violet range. In addition, they are very good at detecting lines or objects that are not part of their intimately-known home range or spotting movement. Keeping still is critical for the standing deer hunter, because motion will capture a deer's attention. While some people believe that "deer never look up," experience with deer in areas where they are hunted heavily from tree stands reveals that they learn to expect danger from above, too. Using a tree stand does not render all of deer's senses useless, and a deer that has been disturbed from a tree stand will continue to check trees on future occasions.

Temperament and Behavior

Whitetails tend to be homebodies, even in areas where they must cover five or six square miles to find enough habitats. Their tendency to stay at home and to learn a given site intimately makes them behave in a sneaky manner. Cautious and easily alarmed, they tend to use dense cover,

often hiding rather than running from danger. They avoid obvious hazards, but will freeze in place if well concealed. When pushed beyond their normal range, they will attempt to sneak back into it through any strip of cover available. They learn escape routes from their mothers and by personal experience, and they may use small cover patches habitually when danger threatens. The locations of those cover patches may vary seasonally and regionally, often in response to the types of hunting pressure applied. In shotgun only areas, for example, open hayfields or large harvested crop fields are secure areas. In rifle country, those areas not safe for deer. In other words, the whitetail is very adaptable and uses his or her home range to advantage and seldom panics. They would rather sneak into cover than run, and they try to stay ahead of hunters in planning the next move.

Deer show their motivational states in a number of ways. Animals that are feeding occasionally lift their heads to survey the area around them. If they are calmly switching their tails, they are relaxed and unaware of danger. Those with their heads sharply erect and ears aimed at the potential danger are both alert and ready to bolt. If they are unsure, they may stomp the ground with a forefoot or blast a whistling snort. If unsure of the nature of the problem, they may begin to circle downwind to get a confirmation in scent. A slowly raised and flared tail indicates alarm. A sudden head jerks is usually a sign that the deer has you spotted, is not quite sure what to do about you, and is going to be difficult to approach more closely. Spend some time studying deer and observing what their body language tells you. It can come in handy in the field.

Strongly Habitual and Seasonal

A vulnerability for whitetails is their tendency to be strongly habitual in their movements during any given season. Barring drastic changes in food supplies, habitat structure or other features, deer will continue to use the same travel routes, bedding areas, escape cover, feeding areas and escape routes year after year. Learning those routes and areas gives the thinking deer hunter a decided advantage. In addition, it can give the hunter the confidence to pass up a poor shot in the knowledge that a better one can be made on a subsequent day or in another place.

Deer use a well-defined home range, an area in which they spend most of their time and where all of their needs are met. In good cover, that area may be as small as 600 acres (260 ha). That range varies with the cover types and arrangement of cover patches. It can be compact, linear or even web-like, as might be found along river bottoms or intersecting sets of ravines with dense cover. In some areas, the deer will move seasonally, perhaps yarding in areas where snow depth can be a problem to their movements. These movements may take the animals 20 to 30 miles away from their summer ranges and place stress on wintering habitat where deer are concentrated.

Survival demands that deer maintain energy. To help them achieve this, they avoid thermal stress. In high heat periods, they will seek shady and breezy locations to help them shed excess heat. During cold or windy periods, they will seek sunny locations out of the wind, even bedding down in deep snow to shield their bodies from wind chill. In the winter, they lower their metabolic rate through a number of behaviors, spending more time resting and feeding relatively little. This information can aid the hunter in locating deer.

Reproductive Behavior

Forest and forest edge animals, whitetails have developed extensive chemical communication tools. They have glands on their head, feet, and legs, as well as chemical communication through the urine. Does undergo repetitive heats on approximately 28 day intervals until they are bred or the day length becomes too short. They are sexually receptive only during estrus, with a peak period of about two days.

Males have a seasonal rut which is triggered by a combination of day length and weather factors. As they enter the rut, decreasing day length triggers increased testosterone and sperm production. The antlers harden, shedding the velvet that has covered them as they grew. They begin to spar with other bucks and with trees and shrubs; marking travel lanes with rubbed brush

and saplings. The marking process may be an exercise of aggression as the buck continues to build testosterone levels. When the full rut begins, the buck will make rutting pits, marking overhanging branches with facial glands and urinating in the pits to advertise their presence to does. The scrapes are tended frequently, as bucks check for visitation by does that are in estrous. This results in heightened activity levels, aggression toward other bucks, and greater vulnerability to hunters. Bucks are susceptible to rattling or grunt calls when they are actively pursuing does.

Habitat Use

Whitetails are woodland edge creatures, seldom far removed from escape cover. They like dense cover, even when it exists in small patches. They seem to prefer a mixture of habitats found along edges or in patchy environments with some woody cover. Dense cover is used as escape areas, shelter from wind or bedding areas. Shrub lands or open areas are used as a source of browse or as travel lanes between other cover types. Forests are used as well, but forest habitat demands larger home ranges and supports fewer deer per unit area. Cuttings or other openings are used very heavily since browse is abundant in these patches. Agricultural land, particularly lands that feature a mixture of woodlots or broken cover areas, shrub lands and crop or hay fields can make excellent whitetail habitat.

Cover dispersion and distribution makes a significant difference in habitat use. Where continuous or dense mixed cover is available, home ranges are small and daily use patterns are common. Deer seldom leave home ranges in these settings. On the other hand, where cover is relatively open or dissected, the actual area used is about the same, but the deer cover much more area to use it.

Food Habits

Deer are ruminant herbivores - plant eaters with a chambered stomach. They feed selectively on high value foods, digesting even woody vegetation with the aid of bacteria in the rumen. Food is eaten, then regurgitated to be chewed a second time (chewing the cud). The re-chewed food is processed again to extract the maximum amount of energy from it. Deer feed selectively on forbs (non-woody broadleaf plants), browse (twigs and leaves), hard mast (acorns and nuts), soft mast (fruits), and mushrooms. They seldom use dried or mature grasses and they tend to avoid low value foods or foods with high levels of essential oils. At the same time they are opportunistic. Their foods are selected by availability, nutritive value and avoidance of plant defenses.

Whitetail Hunting Techniques

Whitetails are hunted with a wide array of techniques, but all of them share a common component – the importance of pre-season scouting. Scouting an area before the season begins can locate good habitat, areas of deer activity, estimate numbers and movements of deer, and help the hunter determine which hunting techniques might be successful.

Stand Hunting - Stand hunting or “stump sitting” is one of the most successful techniques for whitetails. The hunter remains on a stand or watch, waiting for deer to move through the area being observed. This allows the hunter to be still and quiet, usually detecting the deer before he or she is observed by them.

Picking the right location is critical to success in hunting from a stand. Trail intersections or “crossings” are an excellent location to watch as a stander. Established stream or ravine crossing spots are also excellent, as are proven escape routes that deer take in avoiding hunting pressure. Travel lanes to feeding or bedding areas are also excellent, particularly if they are marked by signs of deer activity. Many stand hunter like to set up over a primary scrape or over a heavily used feeding area or travel lanes to one. Wind direction is vitally important to the success of hunting from a stand, and a wise hunter selects alternative stand sites to fit wind changes.

There are many types of stands available. Perhaps the oldest and most common is an open stand. A site should be selected that breaks or conceals the outline of the hunter. For success the hunter must learn to remain still and quiet. Patience is a virtue when hunting from a stand. The hunter who becomes impatient and moves disturbs the area, often to move to another one that has an equal or lower probability of producing deer.

Tree stands are increasingly popular with stand hunters. Where they are legal, they can be very helpful. They can increase the hunter's field of view while reducing scent in the immediate vicinity of the stand. As above, location is important, and sitting the stand so the hunter is lost in stems or blended into the background is good planning. Since deer seldom look up unless they have been hunted from tree stands in the past, minor movements are not as critical to success. It is still vitally important to keep still and remain quiet. In addition, the stand itself must be tuned to keep it from squeaking or groaning as the hunter shifts positions. No tree stand is complete without a hauling line and safety harnesses. The safety equipment keeps a hunter from taking a sudden long step or falling asleep in the tree to wake up suddenly on the ground. The hauling line prevents the hunter from trying to climb with firearms or archery equipment in hand.

Blinds come in a wide variety of types and complexity. Ground blinds may use brush, camouflage cloth, pop up or other concealment. Pit blinds hide most of the hunter below the surface of the ground. They may reduce scent movement, and the lower profile reduces hunter visibility, and the ground provides some protection from the wind and cold. In snake country, they need to be checked thoroughly before climbing into them. Box blinds also provide concealment with reduced scent movement. They also provide increased hunter concealment and some shooting support to help with shot placement. They do restrict both vision and hearing. The most critical element in placing box blinds, aside from getting them in place early enough to let deer become accustomed to them, is planning an entry route that does not intercept deer coming into the area. Tower blinds are a special type of open or box blind - a tree stand without a tree. They are excellent choices for treeless or brushy areas where visibility is a limiting factor.

Driving – Either silent or noisy drives are popular in some areas. Where they are used by experienced hunters, they can be a very productive hunting method.

Silent drives are essentially a combination of standing (watchers) and still hunting (drivers). They are often conducted with relatively small groups of hunters, producing low disturbance. The drivers still hunt toward the watchers, staying observant for opportunities to bag a deer. The watchers wait on known escape routes, expecting to see deer sneaking past their stands at any time. Intimate knowledge of the deer and their behavior in the area is vital to success, and walking or standing shots are common.

Organized, noisy drives usually involve a larger group of hunters. These drives can be extremely efficient in some areas but they demand tight organization and control by a recognized drive master. The leader positions “standers” on likely escape routes, giving strict instructions on where shots may be taken and where they cannot. The drivers are then taken to the start of the drive area and similarly instructed. On a pre-determined signal, they begin moving forward toward the line of standers, often barking, hooting or otherwise making noise as they walk. Drivers occasionally get shooting opportunities, but most shots are taken by the standers. Often shots must be taken at running animals. Hunters rotate in their responsibilities with each new drive to give all participants a chance at preferred escape routes. These drives work best in patchy cover, where the movements of deer are predictable and escape routes are limited. In some areas, particularly in the South, dogs are used as drivers. In most parts of the country, the use of dogs for deer hunting is illegal.

Still Hunting - This technique is mis-named. The hunter is seldom really still, but rather is moving slowly and carefully through the cover, stalking places where deer might be located. Most of the time is spent looking carefully in places where a deer could be. Many experienced deer hunters consider this the most challenging form of hunting, meeting the deer on their terms in their

habitat. To be most effective, the still hunter must locate the deer before the deer locate the hunter. This demands quiet movement, acute observation and intimate knowledge of deer behavior and habitat. Patience is a critical virtue for the still hunter, since a single errant step can ruin hours of careful hunting.

Trailing or Tracking - Trailing or tracking deer can be a form of still hunting or stalking when proper conditions for trailing deer exist. The basic technique involves following deer. It demands an ability to read sign. Often the hunter can loop around the trail to still hunt into areas where the animal(s) might be. Persistence and patience are important to the tracker. A momentary lapse of attention can ruin several hours of careful trailing.

Stalking - Stalking is a process of locating deer, usually with binoculars or a spotting scope, then planning an approach that will get the hunter into shooting range without spooking the quarry. Most useful in relatively open areas, stalking varies in difficulty and utility with the terrain and conditions. It is less useful with whitetails than with mule deer because of the density of typical whitetail cover.

Hunting Tools for Deer Hunters

Hunting equipment is covered in several other lessons, but some of the high points are skimmed here. The archer needs a basic set of archery equipment including a bow in the 50 pound class and razor sharp broadheads that fly well from the bow.

There is no "perfect" arm and ammunition combination for deer hunting. Selection criteria for a deer rifle should include acceptable accuracy, adequate terminal energy, adequate penetration, shootability, a suitable action type and the personal preferences of the hunter. Most eastern and southern deer hunters take their animals inside 150 yards, while western hunters or those hunting in open habitat types in other parts of the country may take shots that are much longer. This should enter into the selection process.

The arm should deliver a minimum of 500 lb-ft of energy to the animal, with about 1000 lb-ft being a more desirable striking energy. The terminal energy provides for quick, clean kills – a responsibility of the hunter. Most smaller handguns and .22 centerfires are eliminated from contention by these considerations. Although steady and experienced shots may be able to kill whitetails with a .22 Hornet or .218 Bee, most hunters should consider .24 caliber (6mm) rifles about the minimum for deer. Lots of good deer cartridges are available for selection, including rounds like the .243 Winchester, 6mm Remington, .257 Roberts, .25-06, .270 Winchester, .280 Remington, .284 Winchester, 7x57 Mauser, 7mm-08, .308 Winchester, .30-06 Springfield, .30-30 Winchester, .32 Special, .35 Remington and .444 Marlin, as well as other cartridges in those classes.

The bullet should give up most of its energy in the animal, since it is the absorbed energy that does the killing; but it should retain enough energy and momentum to exit and leave an adequate exit hole to make follow up on any wounded animal easy. Bullet construction and mass have a significant impact on momentum and should be considered carefully.

Shootability is a critical factor, particularly for the beginning deer hunter. A hunter who can place a .243 bullet well is better off with that than with a poorly placed .375 H&H Magnum. Shootability is a combination of recoil tolerance, noise and the physical mass and size of the firearm. It cannot be determined in the store or just outside the gun safe. It needs to be determined on the range with live firing.

Action type is often a matter of personal preference. Although bolt action or single shot arms are generally considered the most accurate and strongest, there is ample room for semi-automatics, pumps or lever actions where regulations permit. Any of the latter three is likely to be faster on a second shot than either a bolt action or a single shot. Reliability, ease of operation and other personal preferences should be taken into account when picking an action type.

Telescopic sights dominate the hunting market today, and they do so for a reason. They offer a single sighting plane and precise shot placement. These sights should NEVER be used to observe other people.

Regardless of the area being hunted, a good pair of binoculars is a valuable tool for the hunter. They can help you distinguish between stumps or logs and bedded deer, between does and bucks, and between a good buck and a fantastic one. They can help you pick bedded deer out of the brush and trees on the far side of a snowy ridge. They are even good for looking at the chickadees and red squirrels.

Spotting scopes may or may not be of value. They are nearly useless in dense cover, but almost essential in open country.

Hunting clothing - Hunting clothing must be adapted to the habitat, climate and current (or potential) conditions. It should offer protection from the elements, the potential for layering, and be both quiet and comfortable. For most applications, it should have a soft surface, making wool and some synthetics ideal. Depending upon the climate, it should either wick moisture away or prevent it from getting to the skin. It should retain or readily shed heat. Further, the hunter should adapt the clothing to the technique being used. Active types of hunting, like still hunting, tracking or stalking, require less clothing than do more sedentary types like standing. The question of color must also be addressed. Legal and safety considerations as well as the relationship to the technique should enter into that decision.

Other equipment can be carried in a pocket, fanny pack or day bag. Basic field dressing equipment includes a knife, possibly a bone saw or honing kit, a bag for the heart and liver, and a pen for filling out the tags. Tape, string or dental floss will be handy for attaching the tag or tying off parts of the gut during field dressing. If the animal is to be quartered in the field, a light block and tackle and some meat sacks would be helpful.

The day bag should also include some other equipment. A prudent hunter carries a minimal first aid kit and survival gear, even for a short hunt. A lunch or some snack foods can be an energizer and a way to chase the chill. Water is necessary to prevent dehydration. Extra clothing, ammo or other equipment, plus a sealed plastic bag containing toilet paper and a few moist towlettes can be very useful. A GPS and a compass and map of the area is also helpful.

The Role of Hunting in Whitetail Management

There is little doubt that whitetails must be managed. They are a dominant and adaptable herbivore that can impact not only their own habitat but that of many other less adaptable species. Failure to control deer numbers to limits of the habitat causes numerous biological and societal problems. How deer are managed is the question.

Hunters may behave as either passive or active management tools. In most situations, hunters are passive tools of the wildlife manager. They are the primary means of deer population control through the harvest of does. The buck take is almost incidental to that harvest. Total harvest, along with sex ratios in the harvest, is controlled by controlling access, creating incentives, or otherwise managing hunting pressure. The biologist uses historical data on hunter performance and success as well as biological data on deer populations to project a required harvest to meet both biological and sociological carrying capacities. This helps the manager achieve population management goals for deer.

In this system, hunters behave as opportunistic predators. Intent of the hunter is not part of the issue, only the numbers, effort and success rates figure into the plan. This is commonly the approach used where open, public hunting predominates.

Hunters may become active management tools of the biologist when hunter-based management plans (high productivity, high trophy value, maximum encounters) are coupled with limited access, strong record keeping and control over hunter behavior. This is commonly seen on leased or restricted access lands where harvest type can be controlled to meet objectives.

Deer Hunting Aesthetics

Deer hunting is a complex behavior with many satisfactions. The atavistic pleasure of providing food for one's family is a part of the equation for many deer hunters. They enjoy the venison as food for both body and soul, and they take pride in hunting for venison. Others may hunt for a different kind of a trophy. For some, any deer is a trophy. For others, the animal must meet certain predetermined criteria to be considered a trophy. The point to this is that trophies are in the mind of the hunter. They are a way of savoring the experience and they need not be the biggest ever taken to be worthy.

Finally, most deer hunters hunt to enjoy the experience. For one it is privacy and communion with nature. For another it is sharing a deer camp with friends or family members. For others it may be keeping a journal or taking pictures to capture experiences or telling stories of today's hunt or others long past.

Exhibit and Sharing Suggestions

1. Prepare an exhibit of deer foods found in your area. Display your exhibit at a county fair, hunter's exhibition, or some other event.
2. Observe deer movements and behavior in a favorite hunting area. Record those observations and use them to develop hunting plans.
3. Collect lower jaws from harvested deer and use them to create a jaw board to be used as a training aid in aging white-tailed deer. Exhibit your board appropriately or use it as a teaching aid in a class on whitetail hunting or management.

HUNTING RING-NECKED PHEASANTS



Photo by Paul Curtis

Pheasants are extremely popular game birds in areas where they have been successfully introduced. Most of the pheasants hunted in North America are Ring-necked Pheasants but several other species have been established in some parts of the country. Pheasants are chicken-sized birds, with males (called cocks or roosters) weighing up to about 3½ pounds and having a total length of nearly 36 inches. Their pointed tail makes up half or slightly over half of that length. They have the relatively short, rounded wings found in most chicken-like birds, with a wing span up to about 32 inches. Hens are about two-thirds the size of roosters.

Pheasant wings and breast muscles are adapted to short bursts of rapid flight. Typically pheasants will flush nearly straight up into the air, accelerate to full speed quickly, then glide to their intended landing area. Short bouts of rapid wing beats during the glide may extend the flight distance.

Sexual Dimorphism

Pheasants are sexually dimorphic, that is the sexes are different in size and appearance. Game managers can use those characteristics to concentrate hunting pressures on males which leaves more hens to reproduce. The smaller hen is basically tan with darker brown to blackish mottling. Hens often have a rusty to reddish wash on their head and upper neck. Immature pheasants resemble hens until molting into adult plumage, and young cocks are often as large as or larger than adult hens early in the season.

Males are generally coppery to iridescent red and gold with rich brown and black markings on their back and breast feathers. The head is iridescent green with a bare, red patch around the eye. The top of the head may have a lighter patch that appears olive to tan. The green of the head is carried down the neck to a fairly broad white ring of feathers. This ring may be incomplete. The rump feathers may be rusty to powder blue, and the feathers under the tail may be nearly black.

Both sexes have long, pointed tails that are useful in distinguishing them from all other game birds except possibly sharp-tailed grouse. In cocks the tail may reach lengths of over 22 inches. Hens and immatures have shorter tails, but they are still quite long for the size of the bird. The lower leg (tarsus) of pheasants is bare of feathers, like those of quail. Like chickens and turkeys, male pheasants have tarsal spurs. The length and shape of the tarsal spur is one way to distinguish adult birds from young of the year in the field. A long, sharply pointed, glossy spur that is nearly black indicates an adult bird. A relatively short, blunt gray spur with little luster is probably a young bird. The diagnosis can be confirmed by lifting the bird by the lower part of its beak. In an adult bird, the beak is strong enough to support the weight of the bird. In younger birds, the jaw will bend. These features can be useful in deciding how to prepare the bird later.

Behavior

Cocks are quite vocal, but hens seldom use obvious calls. Roosters crow to advertise their territories in the spring. The raucous call is commonly heard in prime pheasant range during the early spring and sometimes in the fall. Early morning and late evening are the most common times for these territorial calls. A wise hunter can use them to check areas for the presence of pheasants and some indication of their relative abundance during the spring crowing season. It may be helpful in locating new areas to hunt in the fall.

Roosters frequently cackle when flushed. This call is an explosive and rapid series of "kak" sounds. The call may be prolonged and is often repeated in flight. The combination of a raucous call, an explosive flush and rapid acceleration often unnerves a predator, including human hunters.

Pheasants have acclimated to human hunting pressure by running or hiding when adequate cover is available. Cocks tend to run more from human disturbance or dogs than do hens. They frequently move ahead of dogs or hunters until stopped by the end of suitable cover. They may freeze in the last remnant of cover and allow a hurrying hunter to pass by before running back into the cover patch. Pointing dogs trained on birds that hold must learn to handle runners effectively before they will overcome the frustration of pheasants.

Most of the year pheasants are solitary or in small groups unless they are concentrated by food, cover or hunting tactics. Concentrations of birds may be encountered late in the season in good winter cover. Early in the season, hunters may encounter "family groups" of young birds. Birds may be herded by hunting tactics, like driving large blocks of cover. They also may concentrate in good escape cover because of intense hunting pressure in other habitat types. Finally, concentrated food supplies may tend to concentrate birds during feeding periods.

Pheasants seem to prefer dense escape cover. Marshes with rank vegetation, brushy areas or woodland edges draw birds that are flushed in more open area.

The typical flight begins with a leap and rapid acceleration to top speed, followed by a glide to escape cover. Short bouts of powerful wing beats may be used to extend the glide to a considerable distance. Flushed pheasants seldom fly less than 200 to 400 yards, and extremely long flights to good cover are not unusual. The flush of a pheasant from heavy cover often includes three phases. The vertical leap is powered by both the legs and the wings. The bird may hesitate a split second while it changes from the vertical to the horizontal phases of its flight, but it accelerates very rapidly into that long glide after leveling off. The shooter must take his or her time and remain calm to make effective shots.

Pheasants have excellent vision and sharp hearing. They are conditioned to hunters and the sounds of hunting parties very quickly, and they tend to move away from disturbing conditions. Excess noise and commotion should be avoided to prevent driving them from the cover before you get a chance to hunt it.

Habitat Use

Ring-necked pheasants are primarily farmland and grassland birds. Grassy areas, particularly native grassland or old fields, are preferred for nesting, brood rearing and roosting cover. Shrubby areas, marshes, dense hedge rows and wooded areas are used as escape cover, while marshes and other areas with robust, dense vegetation are preferred as wintering areas. Croplands are used primarily for feeding on concentrated food sources, but food is seldom limiting to pheasants.

Alternative cover types may be used for nesting if grasslands are limited. Unmowed roadsides may be extremely important in some areas. Where hedge rows or fence rows have adequate

cover and are relatively wide, these areas may also be used for nesting. Width and cover density is critical in these habitat strips, since those factors influence the hunting efficiency of nest predators. Hay fields provide excellent nesting cover, but the hay cropping strategies put both broods and hens at risk during early mowing. Use of a flushing bar saves hens, but brood losses are high. Nearby old field or native grassland cover can draw hens away from forage crops and reduce loss rates. Other types of cropland are used if necessary, but hens selectively avoid them as nesting and brood rearing sites.

In many areas, pheasants move between patches of preferred seasonal cover. Movements of two or more miles have been documented, although having the preferred patches close together minimizes movement. During this "migration" birds are exposed to increased predation losses. Since these movements take place after most population losses have occurred, predation may limit pheasant populations where adequate cover is not available. Creating patches of cover for all seasons in close proximity can increase pheasant populations.

In response to hunting, pheasants prefer to run or hide rather than fly. The birds may use very small patches of cover as hiding places, and even the brightly colored roosters seem to vanish into very sparse cover. They use cut grain stubble effectively and will hold at the extreme edge of good cover unless pushed into the air by dogs, a pause by a close shooter or some other stimulus. The birds are tough and tenacious. They have the ability to "carry a lot of lead" even when hit fairly hard. Unless killed in the air or broken down to the point of immobility, they can be a difficult bird to recover. Adequate loads and good shooting are essential, and the use of a well-trained and capable dog is extremely valuable.

Hunting Methods

Pheasants may be hunted in a variety of ways, but the two most common techniques are driving and hunting with dogs. Group driving is adapted to large groups of hunters and relatively large blocks of cover. Basically, the method involves a line of hunters moving on parallel courses through a patch of cover toward another line of hunters who serve as "blockers" or "standers." The method requires two basic ingredients: enough hunters to cover the block of habitat being hunted and clear breaks in the cover that force the pheasants into flying. The "drivers" must be able to move birds ahead of them effectively. In very dense cover, they may need to be spaced as close as 15 to 20 yards apart. In more open cover, they may be able to move out to 30 to 40 yard spacing. Unless dogs are used to fill the gaps, some pheasants will merely hide and let the drivers pass by them. Others will run to the gaps and move in the opposite direction. The standers must be strategically placed to block all potential escape routes. The cover breaks must be adequate to expose the birds and force them to fly.

Although some birds may flush at any point during the drive and from any location, the majority of the action will be concentrated in the last few yards of cover. As birds flush near the standers and the shooting starts, a quick flurry of action may be expected. In some cases, this may seem to be a mass flush of both cocks and hens. A few stragglers and tight sitting birds may be expected in the last bits of cover. Obviously, this type of hunting requires extremely disciplined shooters with absolute attention to the safety of their shots. Safe zones of fire must be established and strictly used to avoid accidents.

Relatively long range shooting is frequently part of hunting pheasants with this technique. Most shooters prefer tightly choked shotguns with heavy loads of medium to large shot to insure clean kills. Modified and full choked guns with heavy, high velocity loads of number 6, 5 or 4 shot are preferred by most pheasant hunters.

A single hunter or a small group of hunters may adapt this technique to small patches of cover or broken strips of cover. Making movements methodical and erratic enhances the effectiveness of the technique under these conditions. An unpredictable hunter close to a bird that is confused can produce a flush and a shot.

As we discussed before, pheasants are tough birds. Well hit birds can escape if they are not killed outright, particularly in the confusion of a flurry of action. Well-trained dogs or concentration on a single bird to make sure it is retrieved increase the recovery rate and show evidence of strong sporting ethics.

Hunting pheasants with dogs provides different kinds of challenges. The dog needs to be well-trained and controlled, but the hunter must learn the dog's behavior and trust the dog. Many types of dogs are used in hunting pheasants, but they fall into two major categories: pointers and flushers.

Pointing dogs are often challenged by pheasants. The tendency of the cock birds to run or skulk away from the point may frustrate the dog. Unless they are well-trained, this can lead to rushing the birds or coursing them with flushes out of gun range. Experienced pheasant pointers will often circle a running bird, pinning it between the dog and the advancing hunter. Time and lots of birds seem to be the best teachers of a pheasant dog. You can help by keeping excess noise to a minimum and allowing the dog to work into the wind. Young dogs will develop faster if they are used in relatively small patches of cover and given plenty of exposure during the training season. Regardless of the type of dog selected, they should be sure and competent retrievers of downed game.

Shooters hunting over pointing dogs frequently experience close flushes. The quick, short-range shooting that results permits the shooter to select open choked guns with more modest loads of medium shot. Many gunners prefer to use an improved cylinder or a modified choke. Even skeet borings may be used effectively over pointers. They often fire a high velocity load of number 6 shot.

Flushing dogs come in many varieties. The classic flushing dogs are spaniels or retrievers. Many shooters enjoy mixed bag hunting in pheasant cover by working beagles or other small hounds on rabbits and pheasants. Many a "mixed breed" serves well as a pheasant flusher, too. These dogs pursue or press the pheasant until it flushes. Keeping those flushes within gun range requires a well-trained and controlled dog, a very well conditioned and athletic shooter or both. The shots will be variable in length and sometimes unexpected. Most shooters prefer to use the tightly choked shotguns and larger shot size. Critical disciplines here include wise shot selection and critical attention to safe zones of fire. Retrieving or at least locating downed game is a critical element in selecting a flushing dog.

Clothing

Pheasant hunting clothing is similar to the clothing needed for other types of upland bird hunting. The hunter must be equipped with gear that is suitable for the weather conditions, terrain and cover being hunted and the amount of activity. Since walking is a major part of pheasant hunting, the boots should be comfortable as well as suitable for the conditions. Comfortable, loosely fitted field pants that offer adequate protection from both briars and the weather are important. In wet conditions, which are excellent for the dog and getting birds to hold, water repellant chaps or leggings might be useful. A coat or vest is needed to provide protection, carry ammunition and accessory equipment and carry downed game. It should be matched to the weather and activity level, and the hunter should wear blaze orange for visibility. Whether use of blaze orange is required by law or not, the bright fabric makes hunters more obvious to other hunters. It reduces the potential for "unseen hunter" or "in the line of fire" accidents. A cap or hat is also very useful. It helps the hunter control heat loss and provides shade for the eyes. Because it is worn on the head, a blaze orange cap or hat is particularly effective in revealing your location in heavy cover.

Sometimes pheasant hunting clothing may seem a bit odd. In late season hunts over marshy terrain, the pheasant hunter may seem to have more in common with duck hunters than with other upland bird hunters. Remember to dress for the conditions you face and be prepared for the possibilities you might encounter during the hunt.

Shotguns and Ammunition for Pheasants

Most states restrict pheasant hunting to shotguns only. Although any shotgun may be used for pheasant hunting, the two most commonly used gauges are the 12 gauge and the 20 gauge. The selection depends mostly on the preferences of the shooters and the hunting conditions. Where long range shooting is the rule, heavily loaded 12 gauges offer a greater margin for error.

Pattern control is important to the pheasant hunter, and choke selection depends upon the hunting style and the cover type. Most hunters tend to over-choke themselves because they over-estimate the distance of their shots. Even where "long range" shooting is the rule, most pheasants are bagged within about 35 yards of the hunter. Opening the choke somewhat increases the chances of bagging a bird and reduces the damage to birds that are taken close to the gun. With a well-trained and controlled flushing dog or a staunch pointing dog, the shooter can use skeet or improved cylinder chokes very effectively. Modified chokes are the generalists of the shotgun game, being a little tight for really close shots and nearly perfect at the maximum ranges where most upland birds are taken. Full choke guns are needed only for large patches of cover or wild flushing birds. Variable chokes or interchangeable choke tubes are a real asset when conditions change. Many hunters prefer doubles, choked either improved cylinder and modified or modified and full, for pheasant hunting.

A quick handling gun is a distinct advantage in close covers, and light weight is a benefit to the shooter who is covering miles during the day afield. Longer barrels with increased muzzle mass are helpful to the shooter encountering long shots where a smooth swing has a premium over quickness. Whatever the choice, you should find a shotgun that fits, has a pleasing "feel" and inspires confidence. Matching your preferences and wants is a major element in hunting pleasure. You will carry a shotgun much more than you shoot it in any upland hunting situation, so carry one that you like.

The primary concern with pheasant hunting ammunition is that it be adequate for the task. Pattern density and pellet energy must be sufficient to assure clean kills. The most commonly used pheasant loads are high velocity field loads carrying 1 to 1 ¼ ounces of medium sized shot. Sixes are the most commonly used shot size. Some shooters prefer 5's or 4's, particularly for driven birds or hunting with a flushing dog. As cover grows sparser and feather growth increases, many hunters like to increase shot size slightly to assure adequate retained energy.

The key is to match the load to the gun and the conditions. Pattern sheets fired at normal hunting ranges can help determine the loads that work best for you. Although some cost is involved, the increase in hunting success is worth the investment. Besides, it gives you a chance to shoot, tinker with loads and chokes and otherwise build hunting and shooting knowledge during the off season.

From the Field to the Table

Pheasants are outstanding table fare. The birds have an excellent flavor that is mild, pleasing and suitable for a wide variety of dishes. A successful pheasant hunt can provide gourmet fare if the birds are cared for in the field and handled well once they are brought home. Mishandled or neglected in the field, the birds can be ruined as table birds because of unpleasant flavors associated with pheasant foods. Good field care can eliminate the problem almost entirely.

The main culprit in foul flavors is gut or crop contents. The birds often eat berries, seeds or fruits that are bitter or rank in odor and flavor. Fruits like nightshade, viburnum, dogwood or even hawthorn are preferred foods; but they are extremely noxious to humans. Seeds like skunk cabbage are excellent pheasant food, but the flavor of fermenting or digesting skunk cabbage is extremely unpalatable. The key to avoiding them is to field dress or draw the bird immediately after bagging it and to remove the crop and its contents. In addition to providing some assurance of top quality eating, this process provides some clues to the types of cover pheasants are using.

during feeding periods. It also aids in cooling the birds, reducing the development of any bacteria.

Field dressing or drawing the birds is relatively quick and simple. Make a shallow cut right below the point of the breast. Poke your finger in and up to hook the esophagus. This will allow you to pull out the crop and everything else right down to the vent. Sometimes if the crop is full, you may need to pull it off from outside the chest cavity.

Completing the dressing task takes a little longer, but it is not difficult. Although pheasants, like most birds, are most easily plucked immediately, they are also relatively easy to pluck when they have cooled thoroughly. In addition, most states insist that a bird remain identifiable to species and sex until it is being prepared for consumption or storage. Plucked birds tend to retain their juices better than skinned ones, and the skin and small amounts of fat associated with it add to the flavor. Birds taken early in the season may be unsightly because of numerous pin feathers. Many hunters simply skin all birds for the sake of convenience. Pheasants may be plucked dry, either by hand or using a commercial-style plucker. They can also be plucked wet, using hot water (about 180°) to loosen the feathers. Care must be taken to avoid tearing the skin while the bird is being plucked. The hair-like feathers that remain after the bird is plucked may be singed off with a torch or any clean flame. Once the bird is plucked or skinned, any visible feather wads or shot should be removed. If necessary make a crosscut over shot holes to be sure the shot and any feather wads are removed.

After the head, neck and lower legs are removed, the carcass is ready to be rinsed in cold water and patted dry. Make the carcass as clean and appealing as possible. If the bird is to be used in a dish where it must be disjointed, prepare it for its intended use before storage. The more closely it resembles a commercially available bird, the more likely it will be used in the normal course of cooking. This is a subtle way of reducing the hesitancy some people have toward eating game. Now is also the time to match the condition of the carcass and the age of the bird to the intended use. Lightly hit birds might bear a label "company bird," while heavily hit ones might best be used in dishes where the meat is boned, like pot pies or pheasant ala king. Experiment with the birds. They are easily adapted to nearly any dish that calls for chicken without the excess fat and blandness chicken often has.

If the bird is to be used in the next couple of days, refrigeration is adequate to keep it fresh.

Management and Hunting

Pheasants are exotic game birds. The ring-necked pheasant is a native of China, and the initial stocks in North America came either from China or from English stocks that had been acclimated to that country earlier. Their range includes most of the prime farmland in North America, from the MidAtlantic States westward through the Plains States and Canadian Prairie Provinces to the intermontane valleys of the Mountain States and the West Coast. Attempts at introducing them into much of the Southeast have been largely unsuccessful for reasons that still remain in question. Farmlands of the prairie states hold the best wild populations, but huntable populations exist throughout the range of the bird where habitat is adequate.

Stable populations demand availability of adequate cover in sufficient quantity and in close proximity. All cover components must be present. Nesting, brood rearing, feeding and loafing, roosting and escape covers must be available in quantities adequate to produce and support the birds. Nesting and winter or escape covers are critical in most areas. Robust grasslands and brushy or marshy areas adjacent to grain fields provide most of the needs of the birds.

Winter feeding is seldom desirable. It tends to concentrate birds around the concentrated food supply, exposing them to increased predation pressure as the concentration of birds draws opportunistic predators. Except under extreme conditions, pheasants are usually able to locate adequate food in their preferred covers.

Stocking pen-reared birds is a controversial management tool. Sustained stocking is not a prime management alternative. Costs are relatively high. Recovery rates are modest, and contributions to breeding stocks are usually negligible. In spite of that, all North American stocks were established using this technique.

Stocking may be useful in some situations. Where local populations are depleted, stocking may speed recovery. The best strategy in this situation is to release young birds (keeping rearing costs low) into prime cover. A "gentle" release after pre-conditioning them to predators and minimal contact with humans seems to be best. Even then, loss rates to predators during the first couple of weeks can be expected to reach 60 to 85 percent. The survivors behave like "wild" birds and those that survive the gunning season are likely to breed. The result is an increase in potential recreational opportunity for pheasant hunters and a potential boost in breeding bird numbers to aid in recovery. Where winter cover is limited and native birds have saturated the covers, the second benefit is negligible. Stocking in that case is merely a costly means of increasing the fall population slightly.

Stocking directly for the gun uses a different strategy. Since the loss rates for naive birds are so high in the first few days, release of older birds immediately before or during the hunting season increases the recovery rate. While this may provide some recreational opportunity, it is costly; and the quality of the hunt is greatly reduced where the birds do not behave as "wild" birds. Minimal carry-over can be assumed for these birds, and impacts on breeding populations are essentially nil.

Like many other upland birds, pheasant populations experience turnover rates of 70 to 80 percent annually. Fall populations are dependent upon wintering success and spring breeding success. Pheasants also suffer from periodic declines for unexplained reasons. Most of the proposed reasons center on habitat quality and quantity.

Hunting has little effect on pheasant populations where cocks-only regulations are in effect. Hunting pressure usually drops off significantly when the success per unit effort drops to a threshold for the average hunter. Normally this drop occurs before desired ratios of cocks:hens have been reached. Since pheasants are polygamous or promiscuous and hens raise their broods alone, small number of cocks is sufficient to sustain a population if the habitat is adequate and hen survival is high. Cocks-only regulations are a means of focusing the pressure on the males without having a significant impact on the population's potential productivity.

Conclusion

Pheasant hunting is fun. It is also hard work. Where the birds are available, it is one of our most popular types of hunting. The activity is healthful. The association with other people and with dogs who are well-trained and dedicated to their mission is good for you and your spirit. The products of the hunt are mostly intangible, but the tangible ones are delicious.

Exhibit and Sharing Suggestions

1. Construct a poster or other teaching aid that helps in identification of pheasants and other game birds in your area. Share it with your club, leaders or hunter education instructors.
2. Study the habitats of pheasants in your area, and determine some things you can do to improve that habitat. Consider contacting Pheasants Forever and/or your state wildlife agency for information or assistance.
3. Conduct a spring crowing survey in your area to see where the breeding pheasants are. Share that information with your hunting partners and discuss the reasons you think the birds are in that area.
4. Locate a variety of recipes that might be useful in cooking pheasants. Learn to prepare several of the dishes that appeal to you. Consider entering a pheasant dish in a food show or staging a "Beast Feast" for your club and its leaders or some other group.
5. Make a centerpiece or some other craft project using pheasant feathers.

6. Study pheasant management and prepare a report on pheasants in North America. Share that report with your club.

Hunting Waterfowl



Photo by Jim Knight

Waterfowl hunting involves complex regulations that require the hunter to identify both species and sexes of most species. That is relatively easy after a little practice, but the practice needs to take place before the hunter goes afield. Spring can be a good time to study ducks and geese. Fall scouting can serve double duty as a refresher course in identification. Birds that are common in the local area and those that have special restrictions, like canvasbacks and black ducks, should be very familiar.

Waterfowl Habitat and Habits for the Hunter

The best waterfowl caller is the person who is situated where the ducks or geese already want to be. Being in that situation requires that the hunter understand the habits and the habitat preferred by the birds. During the hunting season, waterfowl require feeding and grit sites, resting or loafing areas and roosting areas. Usually the birds leave or enter roosting areas outside the normal shooting times. In addition, leaving those areas secure tends to hold the birds in the vicinity longer. As a result, most experienced waterfowlers tend to leave roosting areas alone or hunt them very lightly. The areas where birds feed, find gravel or other grit, or loaf are the best sites for the hunter. The types of habitat involved vary with the species, from wooded swamps and beaver flowages to huge areas of open marsh or bay. Within any given habitat, however, the birds will tend to have specific travel routes and to use specific locations. Discovering those specific areas is the key to being successful. Most species show a preference for specific types of cover, e.g. emergent aquatic vegetation or high spots in picked corn fields. They tend to avoid conditions that force them- to move, like strong currents, windy areas with lots of wave action, moving ice or similar circumstances.

Flock Size and Behavior

Just as individual species tend to have specific habitat preferences, they also have relatively predictable flock size and flock behavior. Nearly all ducks and geese are gregarious (like to hang out in groups), but flock size and distribution differs. Common golden eyes (whistlers) tend to have rather small flocks (up to 6 or 8) while Canada geese or lesser snow geese may travel in flocks of hundreds of birds.

Some species change their flock size with changing habitat. Mallards for example, may be in small groups or scattered as individuals in flooded brush or on small ponds. When they are using large marshes or lakes they may travel in flocks of 50 or more birds. Although that may not seem too important to the hunter, the normal flock size can have an impact on the size of the decoy rig needed to effectively pull birds within shooting range.

Decoys and Decoy Rigging

A good way to start an argument among duck hunters is to ask whether they would rather have a few large decoys or lots of smaller ones. Both sides of the argument have some validity. Bigger

is better. The larger decoys are most visible, and nearly all waterfowl are drawn better by larger decoys. They are also more bulky to carry and store. More is also better. Large spreads of decoys will often draw birds that will ignore a smaller rig. Those who like lots of small decoys rightly point out that the large mass of decoys draws birds very well, even when the blocks (decoys) do not really look like birds (e.g. bleach bottles, white diapers).

The best advice may be to use a number and type of decoy that can be placed so they appear natural, they can be seen easily, and they are attractive to the species being hunted. Small areas require only a few decoys. An opening in a beaver pond may require only 4 to 6 decoys to be effective. Bigger areas require larger spreads. Gunning large bodies of water late in the season may demand 100 or more decoys to be most effective. The waterfowl hunting literature is full of rigging techniques that will increase a hunter's success. Most of them really work, at least in the areas where they were developed. Basically, the rigs are designed to imitate the birds themselves. The fish hook pattern used with diving ducks can often be seen under windy conditions. Actively feeding birds will be in a knot at the head of the "fish hook" with resting birds trailing off down wind. Incoming birds tend to fly the line of resting birds, landing at the rear of the knot of actively feeding birds. Puddle ducks, because they have a tendency to flush straight up off the water, generally do not fly over other puddle ducks to land. They land in openings or at the outside edge of a decoy spread. Often hunters place their decoys in a C, U or W shape, with a landing hole on the downwind side of the spread. Birds landing in holes in tall cover often look for openings that can be approached almost vertically. Geese tend to avoid cover and prefer to land near the middle of fields or on high points. They will fly over decoys to get to such a spot, but they may also land short, much like a puddle duck.

Calls and Calling

Waterfowl communicate with a variety of sounds, and they often can be attracted by using calls that imitate their vocalizations. The types of calls available range from the human voice to an assortment of reed, diaphragm, bellows, flute or whistle devices. Some of them are extremely simple and easy to learn. Others demand quite an investment of time and effort. Beyond learning how the call works, however, the caller needs to learn how to talk to the species being hunted. Most waterfowl species have "hail" or "greeting" calls, "feeding" (really flock talk) calls and "mated pair" calls. All of them can be used effectively to bring birds to the gun or camera.

Calling can be learned effectively in several ways. A local caller may be willing to teach the basics. Videos (DVD's) are available from most manufacturers of calls. Listening to wild or domesticated birds can also be effective. An accomplished duck hunter should be able to use a mallard call, a diver call and a pintail whistle. The mallard call is the familiar "quack." It is produced by blowing air through the diaphragm through slightly pursed lips and shutting the flow off with the top of the tongue. The effect is one of saying hoo-oot! with an inflection or increase in air pressure on the second part of the call. The note should be sharply cut off at the end, not allowed to slur. Once that is learned, the hail or high ball is simply the conversation of a hen mallard: "Qua quaaaaa quaaaaa quaaa quaaa quaak" with a rising inflection on the first couple of quacks and a slightly falling one on the rest of the notes. Listen to hen mallards talk and try to imitate them. The feed call (not really, but that is what it is called) is simply a series of triple tongued "tuks. It is made by saying "duga duga duga ... " or "tuka tuka tuka ... " into the call while puffing gently from the diaphragm. Those two calls are the basics for mallards and many other puddle ducks. The "come back" call is similar to the high ball, but somewhat more drawn out, sounding pleading. Many divers have a burring call that can easily be produced by vibrating the tongue while blowing through the call. The result is a "brrrrt brrrrt ... " with a rising inflection on the latter part of each call that will capture the attention of passing canvasbacks, redheads and scaup.

Pintails have a piping whistle. It can be produced by using a police whistle without a ball, a couple of soda bottle screw-on caps with a nail hole in them, or a commercial pintail whistle. The resulting call is a "wheeeep wheeeep ... that is attractive to pintails, teal, wood ducks and widgeon.

Several manufacturers also make specialized wood duck calls that imitate the squealing call of the hen wood duck.

Goose callers have a similar range of possible calls. Canada geese use the familiar "ker honk!" for long range communication. They also "grumble" or "growl" both on the ground and in the air. Mated pairs use a doubled "kee honk kee" to discuss their locations and status when they land. That mating call is very effective when used in the fall. The array of calling devices for geese can be bewildering to the beginner. Pick one that you can use effectively and learn how to use it. Once that call has been mastered you can expand your repertoire. Snow geese and white-fronts use a choppy call that sounds almost like barking.

Enhancing a Decoy Spread

Several techniques have proven themselves effective at adding movement to a decoy spread. Hunters may use either white or black flags (they should contrast with the background for best visibility) to attract the attention of passing birds. Some people use rubber straps or pulley devices to move decoys through the water. Motorized decoys and waterfowl kites are also available.

Occasionally throwing a handful of pebbles into the middle of a decoy rig will turn ducks effectively. Where the gunners are standing in water, doing a dance to produce some splashing and waves may work, too. Hunters in pit blinds may move goose decoys by hand to give the impression of live birds. These tricks may not work all the time but they may help on days when the birds are not cooperating with more conventional methods.

Safety

Waterfowl hunting takes place during fall and winter. Waterfowlers like weather that is usually cold, often blustery and frequently wet. Those conditions are good for hunting ducks, but they also pose some serious problems for the hunter. The type of weather described here is excellent for producing hypothermia, a potentially life-threatening condition. Even relatively mild temperatures can cause problems. Since hypothermia is easier to prevent than to treat, the best approach is to have adequate protection against wind, wet and cold. The waterfowl hunter needs freedom of movement, good wind protection and good wetness protection. Since plenty of work is often involved before the sitting begins, the clothing also needs to be layered.

Most waterfowl hunting takes place around water. Hunters usually wade or use water craft of some type to reach the hunting areas. Fall and winter water is very unforgiving of foolishness like overloading boats, failing to use personal flotation devices and venturing out in boats inadequate for the conditions. The waterfowler should have a high quality, sealed foam PFD and use it! They should have adequate boats for the conditions and be very skilled in using them. Prevention may be the only way to avoid disaster on a lonely marsh or bay in the dark.

The basic rules of shooting safety also apply in waterfowl hunting. Nearly every accident that takes place in the marsh is the result of a violation of simple safety rules. One of the most critical when shooting from confined quarters is well defined zones of fire. Waterfowlers need to be concerned about the potential dangers of shooting at cripples (ricochets from the water's surface, other hunters in the line of fire). They must also be aware of the range of the loads being used to be sure that the entire shot fall zone is clear. Careful determination of clear fields of fire is particularly important in crowded public areas, since the other shooters are likely to be camouflaged and difficult to see. Waterfowlers should also be aware of potential dangers from others. Watch for signs that the stopped vehicle on the road may be sneaking up on your decoys. Give such situations immediate and clear attention, being careful not to become a victim of an unrestrained shooter.

Arms and Ammunition for Waterfowl Hunting

A few legal restrictions apply to modern waterfowl arms and ammunition. Firearms must be capable of holding no more than three cartridges and they cannot be larger than 10 gauge. Heed the requirement that approved non-toxic shot be used. Ethical restrictions require that the shooter use a combination of arm and ammunition that affects clean kills and that the gunner stays within the limitations of the tools at hand. The arms and ammunition need to be matched to the ability of the shooter, the game being hunted, and the conditions of the hunt.

The traditional lead shot loads for waterfowl ranged from #6 shot over decoys to #4 and #2 shot for longer range shooting. The wise waterfowler goes up at least one or two shot sizes when switching to "steel." Although the number of pellets in a lighter load of steel shot is slightly smaller than in a comparable load of lead shot of a smaller size, the hardness of the shot tends to keep a higher percentage in the pattern. Thus, the shooter may get better patterns with steel than with the best lead loads from the same gun. That change in pattern density may be enough to permit dropping down choke without losing pattern density. Most ammunition manufacturers have produced sets of recommendations for shot charge and shot size for waterfowl. A third major difference in shooting steel shot is the increased velocity of the steel loads over standard lead loads. The increased velocity adds energy to the shot, but some shooters will tend to over-lead birds until they adapt to the ammunition. Swing through shooting normally gives better results than sustained lead shooting in learning to hit with steel. As with any other shotgun shooting, patterning your shotgun to see how well and where it puts its patterns is a very important process.

Concealment

Most waterfowl hunting is done from some type of concealed position. Ducks and geese see very well, and even hunters who are jump shooting find camouflage clothing to be helpful. Pass shooters and decoy hunters usually use some type of blind. The simplest (and often best) blinds are patches of available cover barely large enough to conceal the hunter. Keeping blinds small and unobtrusive is a good strategy whenever possible. On the opposite end of the spectrum, extremely large and obvious blinds may also be quite effective.

Sometimes a boat serves as a blind. It is usually covered with netting or vegetation. Specialized boats, known as layout boats, are used in gunning waterfowl. These craft are low floating, wide-beamed boats that offer a very stable shooting platform with a low profile. Layout boats are used mainly in hunting diving ducks. A coffin-like boat, known as a coffin box or gunning coffin, is often used to hunt marshes. It is pulled or pushed into the marsh vegetation, covered with vegetation, and used as a single person blind. Boats may also be pulled into a hedge or screen of netting or vegetation and used as a gunning platform within that box or screen.

Blinds may be built on the shore from available materials that blend with the shoreline, e.g. rocks on a stony point, brush along the edge of a beaver swamp, or cattails along the edge of a marsh. Where snow cover is common, a simple white box makes an excellent blind. These blinds can be moved into shallow water by placing them on stilts or stakes.

Pit blinds, from simple slit trenches to elaborate heated pits, are used in hunting waterfowl in many areas. Where tidal movement is minimal, pit blinds with extendible curtains to keep out the water may be used. They cannot float, however, since any floating device that conceals the hunter below the water becomes a sinkbox and is illegal.

Beyond blinds, waterfowl hunters usually employ camouflage clothing. That clothing comes in many patterns and colors, designed to blend with the background (green, brown, rusty, white, leaf pattern, cattail pattern, etc.) and to break up the outline of the hunter. Sometimes an obvious color is used (white, for example) that blends better with the decoys than with the background. That amounts to hiding by being very obvious. The best of camouflage and blinds cannot make up for flashes of skin when hunters look at their potential prey or for movement in the blind. Skin color can be changed using camo head nets or face paint. Movement needs to be the responsibility of the shooters themselves.

Waterfowling Tactics

Waterfowl are hunted in many ways, but the techniques may be lumped into three categories: jump shooting, pass shooting and decoying. Jump shooting includes sculling and drifting as well as sneaking up on resting or feeding birds.

Jump shooting involves stalking feeding or resting waterfowl or potential locations for them. Usually the action comes fast and relatively close. It is over in seconds. The hunter must move very cautiously and quietly through the cover, while remaining alert for signs of waterfowl. Often an open choked, short barreled gun is used, but more often an upland bird gun is most effective for jump shooting.

The pass shooter is at the opposite end of the waterfowling spectrum. Pass shooters wait below traditional flight lines, shooting waterfowl that are flying along those routes. Pass shooting is usually at long-range that involves long-barreled (for better pointing and smoother swing), tight-choked guns shooting maximum charges of big shot. Pass shooting is more deliberate and requires good range estimation and restraint.

Decoying waterfowl is a technique that attempts to bring the birds to the gun. The hunter must know the birds, their habits and their habitats. Decoys must be rigged in an attractive manner and the gunner must often use a call. The decoy hunter pays careful attention to the wind and the way that various species come to the decoy spread. They may use more open guns than the pass shooter, but often they will have at least one barrel that is tightly choked for flaring birds. Decoy hunters may employ confidence birds, like coots, herons, gulls or crows to increase the drawing power of their sets. Duck hunters often add a few geese to a rig, both in an effort to pull some geese and to add visibility and drawing power for ducks.

Shooting Techniques

As in most other types of shotgun hunting, waterfowlers use three basic forms of shooting: sustained lead, swing through and spot shooting. Sustained leads are used most often by pass shooters, where a visual distance between the passing bird and the muzzle that results in consistent hits is determined by trial and error. Basically, the bird is towed through the skies by the muzzle of the gun. Quick calculation of sustained leads requires processing of the complex data set involving flight velocity of the bird and travel time for the shot charge. That requires either a great deal of experience or a mini-computer. Some hunters find the system works well for them, most find the swing-through better.

Swing-through shooting establishes the appropriate lead by controlling the speed of the barrel's movement. The shooter starts behind the bird, swings rapidly through it, fires as the muzzle clears it and continues with a fast follow through. Lock time and travel time for the shot provides some lead and at least partial compensation for distance. Swinging through shots is relatively independent of flight angles and somewhat more "instinctive" than is sustained lead shooting. It also assures greater target concentration and is similar to the techniques used in basic shotgun marksmanship.

Spot shooting involves the use of a stopped gun, pointing at the spot where the bird is expected to be when the shot charge arrives. Some gunners are very effective with the technique, particularly on jumping or decoying birds; but it is not consistent with good shotgun shooting in general. Other techniques are much more likely to produce consistent results.

Waterfowling Summary

Waterfowl hunting is a complex sport, but one that can be learned in stages. It involves hunting fast-flying game at a variety of distances in many types of cover. The quarry ranges in size from buffleheads, ruddy ducks, and green-winged teal (about the size of the average fist) to giant Canada geese, tundra swans and mute swans (14-26 pounds). The shooting can be fast and close or deliberate and at long ranges. A variety of strategies can be employed, but they all boil

down to a few basics. The hunter tries to get the birds as close to the gun as possible, to make the shots as simple as possible, and to assure easy recovery of cleanly killed birds. That involves careful selection of hunting techniques and tools to match the situations at hand. It also argues strongly for plenty of scouting and study of the birds, their habitat and their habits. Dedicated waterfowlers often become active in a variety of conservation organizations and in the other activities that surround the sport - retrievers, boats, decoys, conservation activities, wildlife art and wetland conservation.

Sharing and Exhibit Suggestions

1. Interview several waterfowl hunters about their experiences and preferences in techniques, guns, ammunition, dogs and gear. Summarize their discussions and share them with your club or group.,
2. Prepare a checklist of waterfowling gear for a type of waterfowl hunting you like to do or would like to do. Share that list with your group.
3. Prepare a set of posters on decoy rigging for various types of waterfowl and conditions. Present a talk on rigging decoys at an appropriate event or activity.
4. Make your own decoys for hunting a species available in your locality. Exhibit those decoys in a fair or similar event.

Turkey Hunting



Photo by Jim Phillips

Turkey hunting can be both demanding and challenging. Most of the time, it requires use of all the hunter's skills - use of camouflage, reading sign, calling, patience, keen observation, identification skills and shooting skills. This combination presents an ultimate challenge and a very satisfying experience for hunters of all ages and skill levels.

General Description

Wild turkeys are large, chicken-like birds native to much of North America. They are similar to domestic turkeys generally, although domestic birds were developed from a different species taken from Mexico. They share the robust body shape and bare heads of the domestic birds. They differ from domestic birds in having a much more slender body with relatively longer legs.

They have a broad fan-shaped tail that is folded compactly except in flight or during displays. In all subspecies it is tipped with lighter colored barring than the contour feathers. The wings are broad and rounded, and turkeys are capable of explosively strong flight. The primary feathers are white to pale gray with some amount of darker barring. The secondary feathers are mottled brown. Their contour (body) feathers are generally brownish to black with lighter barring. The color of the tips of these feathers is different between the sexes, and males generally have darker and more iridescent feathers than do females. Color varies significantly among the subspecies.

Sexual Differences

Male turkeys are called toms or gobblers. These birds are the quarry during the spring hunting seasons. Mature gobblers weigh up to 25 pounds. They have spurs on their lower legs that may reach up to an inch in length. A clump of hair-like feathers, called a beard, grows from the upper breast of adult gobblers. The beard can be up to 12 inches long. Gobblers have fleshy wattles hanging from their throats, a leader or snood projecting from their skin near the base of top of their beak, and caruncles (fleshy, wart-like projections) on the head and upper neck. Gobblers can vary the color of their nearly naked head and upper neck from a pale bluish white to intense blue or brilliant scarlet.

Young gobblers or "jakes" possess most of the characteristics of mature birds. They have shorter spurs and beards, often have central tail feathers that are longer than the lateral ones, and their behavior is more subdued. While the gobbler usually gobbles, jakes often call with a raspy, coarse yelp. Gobblers of all ages can be recognized by several signs. Their feathers have darker edges than do hens. Their droppings are elongated, about the size and shape of a "cheese puff". Their feet are larger than those of hens, even in immature birds. When a gobbler struts in suitable locations, the dragging wing tips sometimes will show as thin lines on either side of his tracks.

Female turkeys (hens) are much smaller than toms, weighing up to 12 pounds or a bit more. They are generally paler and less iridescent than the gobblers of the same subspecies. Their legs normally lack spurs, although a small rounded scale may be evident where the spur grows in toms. Hens usually have grayish heads that are much less colorful than toms' heads. In addition, hens usually have some hair-like feathers even on the "bare" portions of the head and neck, and they are more feathered in those areas than are toms. Up to 10 percent of all hens may have some evidence of a beard, but hen beards are generally small and not noticeable - often hidden in the body feathers. Hens have proportionately smaller feet than do toms, and the length of their tracks can be used to distinguish between the sexes from fall through about mid- summer. Young jakes will be larger than their mothers by early fall. Hen droppings are usually spiral shaped or globular in contrast to the elongate curves of gobbler droppings. Finally, shed feathers can be useful to the person scouting for turkeys, since the tips of the hen feathers are much lighter and less colorful than those of gobblers.

Subspecies

Four subspecies of wild turkey are widely recognized in North America. They are the Eastern, Merriam's, Oseolas and the Rio Grand. Some would add a fifth, the southwestern Gould's turkey to that list. They are similar to the Rio Grand but they do differ in habitat, flock size, body size, coloration, and response to calling.

The eastern wild turkey is widespread, even beyond its ancestral range. It can be found from Florida to Maine and parts of Canada, westward to the edge of the eastern forest and southward along the edge of the forests to East Texas. Eastern toms are nearly black with brilliant iridescence and chocolate to chestnut barring on their contour feathers and the tips of their tails. The tips of most of the contour feathers are glossy black. Hens are lighter in color, but still have a generally black appearance at a distance and considerable iridescence. Their contour feathers are tipped with brown.

The Florida or Oseola wild turkey is limited to parts of Florida. It is very similar to the eastern bird in most characteristics, but has almost no dark barring on its primary feathers.

The Rio Grande wild turkey occupies riparian zones, patchy woodlands and prairie or desert where suitable roosting and feeding areas are available. Their range begins in the savannas of central Texas, extends southward into much of northern Mexico, westward into parts of California and northward (by transplant) to many of the plains states. They are not present in the Rockies. Rio Grande's are lighter than the eastern bird, with pale chestnut to buff tips on their tail feathers and the feathers of the lower back. Males still appear black at a distance, with some light accents, but females appear somewhat dusty.

Merriam's wild turkey is the turkey of the western mountain woodlands and wooded breaks. Their range includes the Rocky Mountain region and extends eastward into the Dakotas, Montana, and Wyoming and westward to many of the west coast or intermountain states by stocking. Much paler than the Rio Grande, these birds have off-white, creamy or buff tips on the back feathers and the tips of the tail feathers. They are also slightly smaller on the average than are the other subspecies.

Turkey Behavior

Turkeys are very social animals and usually roost and feed together. Most of the time they will group by age and sex. Jakes form bachelor groups. Small groups of mature gobblers stay together and hens with their young usually group together. In the fall, several hens and their young of that year often gather into larger flocks. In late winter, prior to the mating season, mixed flocks of all sexes and ages are much more common.

Turkeys are extremely wary animals. Unnatural sounds, movements or colors will alert them. Even movements by other animals can alarm the birds. They usually react instantly to danger.

Dangers detected at some distance may cause the bird or flock to move into cover or skulk away from the sources. Those detected at close range usually cause the birds to react immediately by flushing or running. Young birds, surprised at close range, may flatten against the ground and remain perfectly still, at least for a few moments. Poultts will normally remain in their frozen position until the hen calls to reassemble them.

Communication Among Birds

As social animals, turkeys communicate both visually and vocally. The obvious visual displays are primarily associated with the breeding season, but even the posture of other birds is used to convey information.

Turkeys are extremely vocal animals. They use an impressive array of calls with meanings that are best learned by observation. These calls range from contented clucks, chirps and whines to the sharp putt of alarm, cackles and gobbles. They keep the group together, warn of danger, express contentment and much more. Getting a flock reorganized each day is often accompanied by a lot of turkey talk both just before flying down and immediately afterward. Some calls that sound similar carry different meanings with minor changes in tone or rhythm. Turkey hunters recognize a small number of basic calls, and often a hunter could get by with one or two calls in the spring and another one or two in the fall.

The cluck is a brief, relatively monotonic call much like the cluck of a contented chicken. It varies in volume from one that is barely audible to moderately loud. It can be a single note, or a series of clucks strung together - sometimes called cutting by callers. Clucks are used in basic flock organization and they are often heard when individual birds are at ease, feeding or loafing contentedly. Hens occasionally cluck as they forage, much like a person might hum or sing absentmindedly while working.

A putt sounds like an explosive "cluck." An alarm call, the putt is hard and sharply defined regardless of the volume at which it is given. Softly called it is an alert message. Explosively and repetitively given, it is an immediate alarm. Some hunters use a soft putt to stop a gobbler and stretch his neck when they are ready to shoot.

A yelp is a higher pitched, multi-toned call. It is longer than a cluck or putt, often with a blend of at least two notes that drop in tone at the end. Yelps are often given in series by hens when they are in reproductive condition or as a recall signal to young birds that have been scattered. Jakes often use a very coarse, low-pitched, raspy yelp if they respond to a hunter using a hen yelp in the spring. These sound like a very poor caller using a box call. Mature gobblers use a similar yelp to help them get back together when their groups have been broken up.

Turkeys often purr when they are contented and undisturbed. The purr sounds like a warbled, rising string of very short clucks. Individual hens that are feeding contentedly will often mix purrs, clucks and whines into their repertoire, even when other birds are not present.

The whine or whistle is exactly what one might expect, a softly rising, whistle-like call. It is part of general flock talk and indicative of contented or unalarmed adult hens. Sometimes it is used by poultts (juvenile) birds when they are mildly nervous about something.

The kee-kee or kee-kee run is an assembly call used by scattered flocks of hens and young birds of both sexes. It is extremely variable among individuals, but constructed of a loud, high pitched, rising series of whines (usually from two to four) followed by one or more yelps. The name is derived from the whining notes that initiate the call. This is the most important call for the fall hunter.

Hens often cackle when flying down from the roost in the spring or reputedly when they are excited about a gobbler. A cackle sounds like a rapid series of short clucks that rises then falls in

pitch, slowing in tempo at the end. When gobblers are reluctant to move or when a hunter is prospecting for birds during the day, an occasional cackle can be used to elicit a response. It should be used sparingly.

The gobble of an adult tom is probably the best known of all turkey calls. A jumbled series of loud, rattling notes, this call is both a warning to other males and an advertisement to receptive females that a mature male is in the area. Gobbling can be heard in the fall of the year as well as in the spring, although it is much less frequent. A bird that gobbles as it comes to the hunter helps the hunter keep track of its progress in areas where visibility is limited, but many gobblers (particularly in heavily hunted areas) come to the call completely silently. Active birds often will gobble in response to a loud or sharp noise, like an owl call, crow call, other birds singing, car door slamming and much more. Sometimes they seem to gobble at any small noise. This habit, called shock gobbling, is used by hunters to locate birds on the roost in planning a hunt.

Turkey Habitat

As with all wildlife species, turkeys require certain habitat elements in order to survive. Both individual birds and flocks tend to use habitual roosting and feeding sites that are learned. They seem to thrive best in a diverse habitat that includes mature stands of trees, grassy openings, dense cover areas, sheltered areas for protection from inclement weather and adequate food and water.

Turkeys will eat almost anything that fits in their mouths, taking a wide variety of plant and animal foods. Grassy openings, meadows and crop fields are important spring feeding areas and birds in areas with snow cover use springs, seeps and stream edges. High protein content is important to both spring birds and to growing poults. Family flocks can often be seen hunting grasshoppers or other insects in openings during spring and early summer. Mature trees and shrubs that have either hard or soft mast (nuts, acorns, berries) are important staples of summer, fall and winter birds. Greens, like dandelions, alfalfa and other forbs, are important early spring foods; and those that green early are in great demand. Studies in several areas have found dandelions to be a prime turkey food in the spring.

Mature woodlands are preferred for roosts, although turkeys may acclimate to using other roost sites in some areas. Wooded swamps and arid shrublands are used frequently, where roost sites are available.

Tracts of mature mast trees are preferred areas in the fall and winter. Since turkeys roost with only two or three birds to the tree under most circumstances, an abundance of roost trees is desirable. Roost trees are commonly located in sheltered areas offering protection from wind and drainage for cold air. In the spring, preferred roosts are often on the south and east facing slopes in hollows, the heads of small drainages or flats below the top of ridges. Sometimes turkeys will stay in their roost trees during periods of bad weather, often for several days at a time.

Ideal turkey habitat has mature, mast bearing trees, grassy openings, patches of dense cover for brood rearing, and plenty of food and water. Habitat management should work to maintain that mix of components.

Spring Turkey Hunting

Preparation is more important to success in turkey hunting than it is for most other species. The principles are much the same. The turkey hunter must select camouflage clothing to match the site, prepare physically for the hunt, test loads and pattern a shotgun (or sight a rifle or bow), study the area being hunted, prepare all equipment, and learn to call the birds successfully. As a result, successful spring turkey hunts start well before the season.

Camouflage - Calling a wary bird with outstanding eyesight and hearing to within shotgun or bow range requires that the hunter and his or her equipment be well camouflaged. Camouflage clothing should be selected to blend with the structure of the habitat being hunted. More than one pattern may be required in a single season. The clothing should both blend with the habitat and disrupt the outline of the hunter. Turkey hunters use face nets or masks, gloves, or camouflage makeup to cover their hands and faces. Failure to do so can bring a hunt to a sudden and unsuccessful conclusion.

The hunting equipment must also be flat finished or camouflaged for greatest success. Pay careful attention to anything that might shine, like watches, rings, eyeglasses or the receiver of a shotgun. Even the flash of the edge of a broadhead can send a big gobbler scurrying for shelter. Socks that show a little color, tee-shirt necks and similar items are likely to be spotted by a gobbler. They can also be a potential safety risk if they are in a color like white, blue or red. These colors might be mistaken as a turkey head by an overexcited hunter. Complete camouflage is the best and safest bet.

Calling - Spring turkey hunting is a calling process. To hunt turkeys successfully in the spring, you must learn to call them. Calling turkeys intimidates some people but it shouldn't. Most turkeys do not sound as good as the better callers, and there are enough call choices available that everyone can find one that will work for them. There are five basic types of calls: box call, peg and slate call, tube call, bellows call (for gobbling) and diaphragm call. A little practice with any of them can make you effective.

Many turkey sounds are imitated with calls, but only one is absolutely essential for spring hunting – the hen yelp. The other calls are used in situations where a reluctant gobbler must be finessed into range; but about 90% of the turkeys called in come to a basic hen yelp. Play with the call for a while, and then practice making the sounds heard at turkey farms, on instruction videos or by other turkey callers. Practice any time you have a chance but be careful about too much indoor practice at home. Wives and mothers who are not practicing themselves may find several hours of turkey music a bit irritating. Lots of turkey hunters practice on the way to and from work. Others go to the woods to practice. Be careful not to practice too much in areas you intend to hunt, however. The birds may learn to associate your rhythm and tone with danger, in spite of your sounding great. They can tell each other apart by tone and timing, and they can catalog you as well. As you master one call, begin trying others. That is how proficient callers got proficient.

Sporting Arms and Ammunition - Careful selection and practice with your choice of firearm or archery tackle for hunting turkeys is also vital to success. Shotguns are the most common choice, often the only legal choice aside from archery equipment. Most turkey hunters consider the 20 gauge about the minimum choice for hunting these big birds, and many prefer 3 inch 12 gauges or something even heavier to give them greater range and more margin for error. The most commonly used shot sizes are #5, #6 and #4, with some hunters going both heavier and lighter. A dense pattern of fairly fine shot at close range is needed to kill a turkey with hits in the head and neck - the only shot that should be considered.

A wise turkey hunter will pattern his or her shotgun with several potentially useful loads to see which ones consistently provide adequate pattern density and energy at the expected maximum range for a shot. In fact, while most turkey hunters consider a shot over 40 yards to be too long, the pattern density may dictate that birds must be closer than that with your shotgun.

If a variety of choke tubes are available, it is wise to try several of those designed for tighter patterns, e.g. full, ex-full or turkey choke, to see where your best choice lies. Once all of the combinations have been selected, pattern them at distances from about 20 to 45 yards to see which ones consistently put multiple hits on the vital areas of a turkey head and neck silhouette. Mount the silhouette on a larger target to check for pattern location, and adjust your hold or mount sights on the gun to center the pattern on the hold point. Note that this is not pointing as in most shotgunning, it is aiming.

Archers should tune their bows to shoot broadheads precisely and make sure that their broadheads are razor sharp. Practicing shot placement on turkey silhouettes from several angles is an excellent investment. Many turkey hunting archers feel that tracking string is almost essential. A hen decoy is an excellent investment for a turkey bowhunter, since it can divert the tom's attention allowing a draw and it can draw the bird in close enough for a better shot. Practice timing your shots to turkey behavior, like waiting until a gobbler is in full strut and facing away before drawing. Remember that the bird's vital areas are located rather high and near the base of the wings.

Rifles are legal in some areas for both spring and fall hunting. Where rifles are chosen, safety considerations are expanded and extreme caution with shot selection is required. Before any shot is taken, the hunter must know where the bullet is going to stop and whether that entire flight path is safe. Rifles and ammunition must be selected carefully to obtain the right combination of lethality on the bird with minimal destruction of edible meat. Most rifle hunters prefer low to modest powered .22 caliber centerfires like the .218 Bee, .22 Hornet, or .222 Remington. Some use the .22 WRM, limiting their shots to about 50 to 75 yards. Full jacketed bullets are often used to minimize damage.

Rifle hunters must avoid the temptation to take questionable shots, whether it is because the turkey is moving through cover, too far for a sure kill, or positioned where destruction of flesh is very likely. Discipline as a hunter and skill as a shooter are required for either head/neck or high back shots on these tough birds. Limit your shots to under 40 yards.

Preseason Scouting

Preseason scouting to locate turkeys is very important. Spend time in the potential hunting area scouting for locations and signs of birds that might be useful when you are ready to hunt. Look for tracks in mud, sand or soft soil. Search for dust baths and study the feathers lying in the area. Look for droppings or signs of feeding activity. Note that spring scratching may be restricted to very small areas, so study them carefully. Walking roads and trails, cruising along the edges of pastures, crop fields or meadows, and searching the heads of small drainages will get you in shape, acquaint you with the cover and give some indication of where the birds are. Listening for gobblers early in the morning and late in the evening can get you motivated and pinpoint some likely spots for opening day.

Once the season is open, try to roost a bird in the evening. This means, try to locate a bird on the roost using an owl hoot, crow call, gobble or some other sharp noise. If the gobbler responds, you can sneak into position and be prepared to call him to you when he flies down. Gobblers can also be located during the day by using a yelp or a cackle. Although a gobble might work well for locating a bird, the potential danger is having a hunter think the gobble is being made by another turkey and place you in danger. Save the gobbles for pre-dawn and after shooting hours. Be alert for sign while hunting, too. Sign tells the same story during the season as it did before, and that information can help you bag a bird.

Setting Up

When setting up on a gobbler, try to stay 100 yards or so from its location, staying out of sight while working into position. Locate a spot that is in range of where a gobbler might like to strut. Face the anticipated path of the gobbler when coming in, and sit with a tree, bush or rock at your back. Place your gun or bow in position to raise it with a minimum of movement. Most shotgun hunters set up with the gun resting on a knee in a braced sitting position. Select some points along the path a gobbler may take to the call where terrain or cover may allow you to raise the gun while the bird is not looking. Check to make sure that everything is in place and that you are ready before making the first call. Some toms come on a dead run, others may take over an hour of dialogue before they come in.

Calling

If you are calling to a roosted bird, begin the calling sequence with a soft, slow yelp (a tree yelp). It should be quite quiet and "sleepy." call sparingly and quietly while the turkeys are on the roost. Call just enough so the gobbler will know where you are when he flies down. Once he flies down, respond with a series of soft yelps. Call only as often as necessary. It is not necessary or even desired to keep the gobbler responding all the time. Many hunters call only every 5 to 10 minutes, but some conditions require "demand" calling where a steady conversation is maintained.

A gobbler that is coming to the call may not respond again with a gobble. Sometimes they will come in completely silent. Others may drum or strut almost all the way. Under quiet conditions the hunter may hear the low hum or moan of the drumming or even the rattle of wing feathers as the bird struts. The critical point is to stay ready and to be watching for the bird all the time. Being prepared and patient will put birds in the bag that would be spooked by moving too soon. While it may be difficult, wait at least 30 to 45 minutes before moving on a bird that responded before he flew down. Remember that you are trying to make a gobbler come to a hen, when hens normally come to the gobbler; so you are trying to make him work against his natural instincts. Sound seductive and try to lure him into making a mistake.

Making the Shot

Once a tom is in sight, remain absolutely motionless. Look carefully to make sure the bird is legal under the regulations in your area. Anticipate the route the bird will take and plan the best place to take a safe and sure shot that will not kill or injure other turkeys that may be with him. When the bird is where it cannot see your movement, raise your shotgun, bow or rifle into shooting position, and wait until he reaches your pre-determined shooting spot before firing. Shotgun hunters should aim at the mid to upper neck region so their pattern will cover the head and neck. Shotgunners should putt to get the bird to stretch its neck for the shot or wait until he comes out of the strut with the head and neck extended to have the best target.

After the shot, get to the turkey quickly. Safety is doubly important in the excitement of having a turkey down. Make sure the muzzle is pointed in a safe direction, get the trigger finger over the trigger guard to protect the trigger from accidental discharge, and make careful haste to the downed bird. Be prepared to fire a follow up shot if the bird shows signs of getting up. Get to the bird as quickly as possible and pin it down, being careful to avoid its spurs and wings. Well hit birds may not thrash at all, or they may do bit of flopping before they finally lie still. Once the bird is rendered into possession, fill out and attach any tags that maybe required by state law. If the weather is hot consider a quick field dressing unless the bird is on its way to the taxidermist. In areas where other hunters may be afield, it might be wise to wrap the bird in bright cloth or attach streamers of bright tape if it will be carried openly. A turkey hunter's vest may be a better transportation alternative.

Fall Turkey Hunting

Fall turkey hunting presents a different set of challenges and opportunities from spring hunting. In spring hunting, locating a gobbler can be relatively easy. He is often vocal and responsive to many tricks that can announce where to locate him before calling. In fall hunting, the birds must be located without the aid of highly vocal gobblers. The ability to read and interpret sign and to locate the birds is the most demanding part of the hunt. Calling a bird in once a flock has been scattered is relatively easily accomplished, since their drive is to-reassemble.

Preparation for fall turkey hunting is very similar to that for the spring hunting season. A different camouflage pattern or color might be required, but full camouflage is still wise. Another call must be learned, but it is easy after you have learned to use the hen yelp. The kee-kee run is a series of rising whistles or squeals followed by a series of yelps. It imitates the calls of young birds separated from the hen and trying to reassemble. The need to be up to speed with your sporting arms is just the same as it was in the spring. Adult toms are larger in the spring, and most young of the year males are nearly as large as the adult males.

Site selection and scouting are critical to success, since turkeys can cover huge amounts of territory and they are likely to concentrate on a site with preferred foods. Check all feeding and loafing areas, and assess the status of preferred foods like beechnuts, white oak acorns, or red berried juniper. While a wise hunter will always be alert for gobbling or flock talk, most of the scouting will consist of searching for signs of turkey activity.

Hunting Mixed Flocks

Hunting mixed flocks is much easier and surer than hunting gobbler flocks. They are larger, more prone to respond quickly to a call, and easier to locate than the smaller groups of mature gobblers. Once a flock has been located, attempt to scatter them. Rushing the flock while creating a lot of noise, shooting in the air or similar tactics can be used to force them to scatter. The object is to make them fly in several different directions if possible. Where they are legal, flushing dogs or retrievers are extremely valuable assistants in breaking up flocks. A well-trained retriever will push the birds into flushing then lie beside you when the birds are being called back in. It can also help in making sure that a downed bird stays down. If you decide to use the "rush 'em like a mad man technique, make sure that you keep safety first!

Once the flock has been scattered, select a good stand near that spot. Set up like you would for spring hunting, but with the ability to see in all directions. Expect birds to walk, run or fly to the call. Wait until the first bird calls, and then answer it with the same call. Keep calling frequently. Remember, you want to sound like you are lost, and you want the others to find you. If no birds call within about 10 to 15 minutes, begin calling every few minutes until other birds answer. Then answer them every time they call. Be alert! Birds could come from any direction and may nearly run over you trying to get back together. Under these conditions, picking a bird and a good shot can be a challenge. A yelp, putt or yell can halt the birds momentarily to give you a standing shot. Where only gobblers are legal game, look for birds that are larger than the others, and for the little tuft of beard that protrudes almost straight out from the breast feathers. Let the bird come within sure kill range before shooting, just as in spring hunting. Get to the downed bird quickly but safely and anchor it. Then, proceed with filling out and attaching any required tags.

Hunting Gobbler Groups

Fall gobblers are the most difficult of all turkey hunting challenges. Locating a flock is a serious challenge, but getting close enough to scatter them is even more difficult. Once that has been accomplished, calling them back together is often a trying experience for a hunter's patience. Once a flock is scattered, find a good calling location that is comfortable. You may be there for a while. Wait until a bird calls (usually a hoarse, bass YELP), or about 20 to 30 minutes. Use only one or two coarse, raspy yelps. Watch and wait and call only in response to other birds. Patience and alertness are critically important. Gobblers are much more cautious than the young birds in mixed flocks. They tend to come in very carefully, often silently, and always on the lookout for any dangers. These are adult birds that are not under the control of hormones demanding that they breed. They are in a survival mode, and anything that is out of the ordinary will spook them almost instantly. Don't worry if you are not successful every time. You are not alone in being frustrated by hunting fall gobblers by breaking up flocks and calling.

Still Hunting Turkeys

Some people who love a tough challenge like to still-hunt turkeys. Since the turkey's eyesight and hearing are both better than our own, this is seldom the best or most successful method. It should be strongly discouraged in the spring, and even in the fall it can be dangerous in heavily hunted areas. Success in still-hunting requires that you see the flock before they see you. In addition to their better eyes, they have more of them working; so the challenge is beyond the skills of the vast majority of hunters. As a result, most hunters who still-hunt for turkeys rely more on chance than skill for any success they achieve. Fall still-hunters must know their terrain, know the habits of the birds, know the most likely places to encounter them and apply all of that with patience and care. Even then, their chances of success are low. Many still-hunters turn into callers when their still-hunting scatters a flock. Others rely on rifles and good binoculars to locate the birds and shoot them at ranges beyond their normal alert distance. Regardless of the

approach used, the temptation to shoot at birds that are out of range or that present only fleeting targets must be overcome. Still-hunters always need self-discipline and patience. Turkey hunters using these methods need those qualities in massive doses.

Stand Hunting Turkeys

Some hunters like to take a stand for turkeys. Since the hunter is still, a patient hunter can be quite successful using this method. Scouting and thorough knowledge of the area are vital. Intensely used areas must be found, and the hunter must be committed to an extended period of waiting. Locating a stand on a preferred feeding site or on a travel route between preferred feeding and roosting sites offers the greatest chance for success. Topography and cover types can influence the birds in their travels. A combination of standing hunters and still-hunting hunters can be effective as well under ideal conditions. Feeders, where legal, will concentrate turkeys and offer predictable shots, but many hunters regard shooting the birds in this fashion as unsporting. Standing methods are usually more effective when combined with an accurate rifle and scope combination as described above. Low to middle power .22 centerfires are often the rifle of choice, although some hunters prefer a rifle/shotgun combination gun to cover all bets. In either event, hunters must have the self-discipline to resist shooting at birds beyond effective range.

Turkey Management

Habitat management for turkeys involves attention to several habitat components. Creating or maintaining openings or meadows is vital. These areas provide early spring food and insects that are important for the early growth of young birds. Roost sites must be preserved, since they tend to be traditional. Maintenance of diverse forest growth stages assists in maintaining strong turkey populations as well. Old growth provides important mast crops that help the birds into the winter. Middle age stands are important for nesting cover. Dense regeneration of new stands is used as escape cover and loafing areas for broods. Riparian areas provide water, early greens, good roost trees and snow-free foraging area in winter. Crop fields often provide supplemental food supplies in waste grain and green materials during lean times. Even pastures spread with manure can be important to turkeys during rough winters.

Hunter cooperation is useful in turkey research. Crops, weight and age data collected at check stations provides valuable information on the age structure, diet and welfare of the population. Leg samples collected by some states generate data on ages and sexes of birds being harvested, and the questionnaires provided often indicate data on availability and distribution of the birds.

Population Management

Established turkey populations can sustain annual harvest of 25 percent. Fall hunts are scheduled to harvest birds before the high mortality period during the winter. This provides additional hunting opportunity while taking surplus birds from a population that would be reduced in the winter months. Spring hunts for gobblers have no real impact on populations. The hunts are scheduled after most breeding is completed and hens are nesting. One mating is sufficient to fertilize an entire clutch of eggs, and one gobbler can mate with numerous hens. The breeding life span of mature, dominant gobblers may be as long as 10 years, so a single replacement gobbler in that time frame is adequate to provide breeding stock for the population. Finally, turkeys themselves provide some form of regulation on the harvest. They are not always responsive and they learn to avoid people and dangerous situations. Decreasing success rates often cause hunters to stop hunting the birds before they have reached target levels of population control and bag limits prevent others from continuing to hunt once their allotted number of birds has been taken.

Summary

Turkeys represent a wildlife success story, bringing back a native species to its entire ancestral range and some places beyond it. Turkey hunting can be both challenging and enjoyable. With

patience and development of a reasonable number of skills, almost anyone can enjoy turkey hunting.

Exhibit and Sharing Suggestions

1. Prepare an exhibit of seasonal turkey foods in your area and display that exhibit at a club meeting, sportsman's group, fair or another appropriate situation.
2. Study the aging and sexing criteria for turkeys in a wildlife management techniques manual. Prepare an exhibit of those items with the cooperation of friends, local turkey hunters, or wildlife biologists. Display your exhibit in an appropriate place.
3. Observe turkeys in the wild, studying their behavior and vocalizations. Keep your observations in a notebook and summarize those behaviors and calls.
4. Prepare a demonstration on some aspect of turkey calling or hunting and give it at an appropriate event.
5. Through local wildlife biologists, determine if there are any projects or activities you can do to maintain or improve turkey habitat in your area, then plan and carry out at least one improvement project.
6. Study the history of the wild turkey and its return to abundance. Report your findings in an appropriate forum.