

Management Plan for White-tailed Deer in Alberta

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MANAGEMENT PLAN FOR WHITE-TAILED DEER
IN ALBERTA

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PREFACE

This plan presents Natural Resources Service's goals, objectives, and management strategies for the management of white-tailed deer in Alberta. It will be periodically reviewed and updated, as necessary. Implementation will be subject to priorities established during the budgeting process.

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MANAGEMENT PLAN FOR WHITE-TAILED DEER IN ALBERTA EXECUTIVE SUMMARY

Historical Populations, Use and Management

White-tailed deer populations declined to very low levels in the late 1800s due to a series of severe winters and high hunter harvests. Numbers recovered during the first half of the twentieth century and have remained relatively high since then. White-tailed deer numbers in this century are thought to have benefited variously from climatic warming, reduced competition with elk and bison, and habitat changes associated with agricultural and other developments.

White-tailed deer provided food and clothing materials for Natives, explorers and settlers. Today, white-tails still provide a significant source of food for Albertans, although their greatest value doubtlessly relates to the thousands of days of recreation that they provide to both hunters and nonconsumptive users. Sales of white-tailed deer licences increased 3.5-fold (residents) to nine-fold (non-residents) during 1965-1990.

Hunting management of white-tails has traditionally focused on hunting season length and bag limits, sex restrictions and zoning. More recent efforts to control hunting and harvests have included limited-entry draws at the Wildlife Management Unit (WMU) level, and special licences.

Current Status

White-tailed deer occur in every WMU in Alberta and currently (September 1992) number about 171 000. In the 1990 season, a total of 84 010 white-tailed deer hunting licences were issued, including 823 non-resident licences. Resident hunters enjoyed over half a million days of white-tail hunting that year, and harvested 26 596 animals, with a hunter success rate of 42%. Subsistence harvests and illegal harvests

are unmeasured, although a violations-simulation study has indicated that poaching losses may be quite significant. Nonconsumptive uses of white-tailed deer have not been measured either, although one study showed that deer were the most commonly listed (i.e., most preferred) among "like to see" wildlife species.

The following four issues are major ones in white-tailed deer management:

1. Management of recreational harvests must be responsive to widely fluctuating white-tailed deer numbers which are, in part, a function of winter severity. The harvest must be managed to take advantage of high populations and surpluses, and at the same time protect the population in vulnerable habitats and during periods of low numbers. Three important considerations in determining the management regime are hunting opportunity, hunting quality (i.e., density of hunters) and hunter access to patented land (i.e., landowner tolerance to large numbers of hunters).
2. Habitat retention and enhancement programs require more precise inventories of white-tailed deer habitat; such inventories are the basic tools for setting habitat and population goals at the WMU level.
3. More precise information is required on sizes, distribution, age/sex structure, productivity and mortality of white-tailed deer populations. With respect to mortality, priority attention is required on both illegal harvests and subsistence harvests.
4. Deer damage must be kept within socially acceptable limits, by a combination of prevention programs (fencing, habitat enhancement), compensation, and by keeping white-tail numbers within appropriate limits.

Successfully addressing these major management issues will ensure optimum populations of white-tailed deer over the long term, and maximum opportunities for hunting and nonconsumptive enjoyment of white-tailed deer.

Management Policies, Goals, Objectives and Strategies

1. Area-specific population goals to the year 2002 are established. The provincial white-tailed deer population in summer will be managed so that it increases slightly from 170 970 (1992) to 173 425. It will be necessary to maintain 86 715 km² of summer range and 30 560 km² of winter range, to achieve this population goal.
2. Various recreational hunting opportunities (e.g., any buck, trophy buck, antlerless deer, archery-only areas) will provide for 125 570 residents to harvest 35 350 white-tailed deer annually. Limited-entry draws will be used, where appropriate, for both antlered and antlerless white-tailed deer, to ensure a high quality hunting experience, to protect the white-tail population, and to minimize disturbance of landowners.
3. Commercial opportunities in guiding-outfitting of white-tailed deer hunters will remain available.
4. Subsistence and nonconsumptive uses, and scientific and educational activities will continue.
5. Damage prevention, control and compensation programs will continue.
6. Improved habitat inventory and population monitoring programs will support the establishment of habitat and population goals at the WMU level, and ongoing monitoring will provide a measure of progress toward attaining such goals over time.

1.0 INTRODUCTION

White-tailed deer are important to outdoors enthusiasts, such as hunters and naturalists. Their popularity has economic benefits for Albertans as a whole, because both resident and non-resident hunters focus much of their spending on white-tailed deer. However, the major value of white-tailed deer comes from the hundreds of thousands of hours of recreational enjoyment provided.

Recognizing the value of white-tailed deer and other wildlife, the Government of Alberta declared a Fish and Wildlife Policy for Alberta (Fish and Wildlife Division 1982). The Wildlife Policy stated that the Government is to ensure that Alberta's wildlife populations are protected from severe decline, maintained, and passed on to succeeding generations as they were received. The Status of the Fish and Wildlife Resource in Alberta provides a brief history of white-tailed deer populations, management and harvests in Alberta and a general statement of future plans for management of white-tailed deer populations (Fish and Wildlife Division 1984).

The purpose of this management plan is to develop and present comprehensive goals for white-tailed deer populations, habitats and public uses, in order to guide management for the coming years. These goals are based on a thorough review of history and current management of white-tailed deer in Alberta. The reader is urged to review the management plan for mule deer (Odocoileus hemionus) (Fish and Wildlife Division 1989a), because management of the two deer species has been and continues to be linked in many parts of Alberta.

2.0 BACKGROUND TO THE PLAN

2.1 Taxonomy, Biology and Requirements of White-tailed Deer

2.1.1 Taxonomy and Distribution

The white-tailed deer (*Odocoileus virginianus*) is found throughout North and Central America and the northern portion of South America (Halls 1978). Thirty subspecies of white-tailed deer are recognized in North and Central America, although classification efforts are confused by integration among subspecies and historical transplants of one subspecies into the geographic ranges of others.

In Alberta, two subspecies are present, *O. v. dacotensis*, the Dakota white-tailed deer, and *O. v. ochrourus*, the Northwest white-tailed deer (Halls 1978). Webb (1967) and Dwyer (1969) believed that the Northwest subspecies inhabited the southwestern Alberta foothills and that the Dakota subspecies was found in prairie river drainages, the parkland and fringe agricultural areas in the boreal forest. Both Baker (1984) and Halls (1978) showed the Northwest subspecies as occurring along the foothills and into the Peace River country. However, Wishart (1984) reported that the Dakota subspecies occupied the Peace River parklands of both Alberta and northeastern British Columbia (B.C.). Wishart also felt (pers. comm.) the Dakota subspecies dominates in the southwestern Alberta foothills. Recent parasitological evidence indicates that white-tailed deer in southwestern Alberta are not infected with nematode muscleworms carried by Northwest white-tailed deer in southeastern B.C. (Pybus and Samuel 1981), thus supporting Wishart's views.

White-tailed deer are most abundant in the prairie and parkland regions of Alberta (including the Peace River outliers), in the southwestern foothills, and in the boreal forest agricultural ecotone north and east of Edmonton. Nevertheless, white-tails are sometimes observed at scattered points throughout the entire boreal forest of Alberta, especially in the vicinities of the Peace and Athabasca rivers (Wishart 1984 and pers. comm.; Skinner and Todd 1988).

2.1.2 General Description

White-tailed deer are commonly confused with mule deer in Alberta. The most useful characteristics for distinguishing the two species are size, shape and color of the tails and size and location of the metatarsal glands (Table 1). In addition, the antlers of adult males of these two species differ characteristically (Table 1). Size alone cannot be used to distinguish the species--weights of the two species were similar in Camp Wainwright, Alberta (Wishart pers. comm.). The heaviest adult male white-tailed deer recorded was one that weighed 108.9 kg after field dressing, and 130.2 kg when combined with the bagged viscera. The heaviest female white-tailed deer was 87.1 kg.

Matschke et al. (1984) reported that white-tailed deer have an average life span of eight years but most do not live beyond four to five years. Hayne (1984) indicated that white-tailed deer have been known to live up to 20 years. In Alberta, the oldest recorded ages for male and female white-tailed deer, based on incisor bar data, are 14.5 and 16.5 years, respectively (Treichel 1977-1987). The average age for antlered (1.5 years of age and older) white-tailed deer harvested by hunters was 2.7 years. For antlerless deer (including male fawns), the average age of hunter-killed white-tails was 2.8 years; the average age of doe white-tailed deer (1.5 years and older) was 3.8.

2.1.3 Reproduction

The breeding season for white-tailed deer in Alberta occurs between mid-November and mid-December. Hall (1973) reported that average conception dates for adult, yearling and fawn white-tailed deer were November 22, November 25 and December 14, respectively. Time of breeding is affected by nutrition prior to the rut (McGinnes and Downing 1977). Female white-tailed deer fawns do breed in Alberta, with conception rates of 56 percent as compared to 100 percent for females one year and older (Hall 1973). In comparison,

Table 1. Characteristics for distinguishing white-tailed deer and mule deer.

Characteristics	White-tailed Deer	Mule Deer
Metatarsal glands	Length of 25 mm (1 in.), surrounded with white hairs, located in lower half of metatarsus	Length of 125 mm (5 in.) surrounded with brown hairs, located in upper half of metatarsus
Interdigital glands	Surrounded with white hairs	Surrounded with brown hairs
Tarsal glands	Usually white or nearly white	Usually brown or light tan
Tail	Long, bushy and brown with white fringe, white below and fully haired becoming a conspicuous flag when elevated	Round and white with black tip, half naked on the underside
Rump patch	White rear inconspicuous when covered by brown tail	Conspicuous white at all times
Ears	Average length of 160 mm (6 in.) with occasional black trim	Average length of 200 mm (8 in.) with conspicuous black trim
Preorbital glands	Inconspicuous and shallow	Large, conspicuous and deep
Facial markings	White eye rings and white nose band	Dark forehead or eyebrows contrasting with gray or brown muzzle
Coat color	Brown with white trimmings, conspicuous white ventral strip from front to back	Gray with black trimmings, dark chest, white belly
Antlers	Single branches from the main beam with well-developed brow tines and relatively short back tines, narrow tip-to-tip spread	Dichotomous branching (forked) with poorly developed brow tines and long back tines, wide tip-to-tip spread
Skull	Shallow lacrimal pit, narrow orbit width	Deep lacrimal pit, wide orbit width
Incisors	Small, narrow	Large, wide
Running gait	Low leaps and bounds	High vertical bounds

mule deer female fawns do not breed (Wishart, pers. comm.). Does of white-tailed deer have higher fetal rates than mule deer females, with rates of 2.08 fetuses per white-tail older than one year and 1.10 per pregnant fawn (Wishart, pers. comm.). Mean gestation period is 200 days [range 187 to 222 days (Wishart, pers. comm.)]. Inadequate nutrition will delay gestation (Verme 1965).

White-tailed deer and mule deer have overlapping ranges throughout much of Alberta and hybrids have been observed (Wishart 1980). Although Kramer (1973) reported such hybrids to be fertile, Wishart et al. (1988) found F1 females to be fertile, but F1 males were infertile. Wishart (pers. comm.) found that a few 3/4 bred males are fertile, and others are at best subfertile (e.g., a 3/4 white-tailed deer backcross hybrid exhibited normal spermatogenesis and sperm, but failed to sire offspring). White-tailed deer X mule deer hybrids in Alberta appear to associate mostly with mule deer (Wishart 1980); thus, the loss of reproductive potential through "wasted" hybrids may be more of a concern to small or isolated mule deer populations than to white-tailed deer.

2.1.4 Mortality

2.1.4.1 Climate

The duration of snow cover and low temperatures (particularly in the months of November, March and April) is critical to survival of white-tailed deer in Alberta (Hall 1973, Wishart pers. comm.). If green forage is still lacking by mid-April, the result is reduced fawn survival (Wishart 1984). Prolonged drought may also negatively affect white-tailed deer populations, particularly in southern Alberta. Competition with domestic livestock for both food and cover is intensified during prolonged drought; the quality and quantity of these resources is reduced, and their spatial restriction to riparian situations is accentuated, as well.

2.1.4.2 Predators

The impact of predators such as black and grizzly bears (Ursus americanus, U. arctos), bobcat (Lynx rufus), Canada lynx (L. canadensis), cougar (Felis concolor), coyote (Canis latrans), gray wolf (C. lupus) and dogs on white-tailed deer populations is not well understood. Although coyotes and dogs can cause severe losses under certain winter conditions, many of the deer lost may be predisposed to predation by disease and/or malnutrition (Runge and Wobeser 1975).

2.1.4.3 Parasites and Diseases

A serious outbreak of epizootic hemorrhagic disease (EHD), a viral disease, occurred in southeastern Alberta in 1962 and was responsible for the known deaths of 440 white-tailed deer (Chalmers et al. 1964). Outbreaks of EHD have not been reported since then.

White-tailed deer have a variety of endoparasites and ectoparasites. Sarcocystis sp., a protozoan parasite, was found in 58 percent of adult and 25 percent of fawn white-tailed deer necropsied during a Camp Wainwright deer study (Mahrt and Colwell 1980). Stock (1978) found gastrointestinal helminths, including Dictyocaulus viviparus (thread lungworm), Trichuris spp. (whipworm), and Cysticercus tenuicollis (bladder worm), in white-tailed deer in Alberta. Among ectoparasites, chewing lice (Tricholipeurus spp.) have been found on white-tailed deer but are not believed to have much effect on populations (Samuel et al. 1980). Wishart (pers. comm.) indicated larval bot flies (Cephenemyia spp.) were frequently observed in white-tailed deer in Camp Wainwright.

This section is concluded with mention of meningeal worm, Parelaphostrongylus tenuis, which is a nematode **not** known to occur in Alberta. P. tenuis is commonly carried by white-tailed deer in eastern North America, and is tolerated by them. However, in other cervids, the worm causes neurologic disease that may be expressed with staggers and blindness, and usually ends in death (Anderson 1972; Hibler 1981). Although P. tenuis has not been recorded in Alberta, two closely related muscle worms, P. andersoni and P. odocoilei, have been found in white-tailed deer and mule deer, respectively, in

western Canada (Pybus and Samuel 1981, 1984). Spread of P. tenuis into Alberta could have drastic consequences for Alberta's cervid populations (Barbehenn 1969). The presence of P. tenuis in white-tailed deer in eastern North America reduces competition with other cervids because resistance of other species to P. tenuis is low. The introduction of P. tenuis into Alberta would alter any sympatric relationships between white-tailed deer and other cervids (see also Section 2.1.4.4).

2.1.4.4 Competition With Other Ungulates

White-tailed deer coexist with mule deer, elk (Cervus elaphus), moose (Alces alces) and cattle to varying degrees throughout Alberta. Kramer (1973) reported no competition, either through active avoidance or exclusion, in a study of white-tailed deer and mule deer in Cypress Hills, Alberta. Any shifts in range or numbers of deer were considered the result of habitat changes, differential hunting mortality or both, but not of competition. Potential for competition for food does exist, however, as shown by considerable dietary overlap between white-tailed deer and mule deer in Camp Wainwright (Rhude and Hall 1977).

Kramer (1973) inferred, both through observations and relevant literature, that white-tailed deer were less tolerant of cattle than mule deer. However, the opening up of forested areas for pasture/cropland can create habitat for white-tailed deer. Nevertheless, heavy domestic livestock grazing pressure can reduce deer food species to about 10 percent of that expected under light-to-moderate grazing pressure (Jaques 1980), so habitat quality can vary greatly.

In a study of cervid distribution in Elk Island National Park, Cairns (1976) noted almost total overlap between elk and white-tailed deer use of habitat types (97 percent in winter, 94 percent in summer). However, local distribution and densities of white-tailed deer were inversely related to those of elk. Elk appeared to be excluding white-tailed deer.

2.1.4.5 Accidents

White-tailed deer are killed in various accidents, including entanglement in fences and collisions with vehicles; total losses are not known, however. In 1980, a total of 2992 automobile accidents involving collisions with wild and domestic animals was reported throughout Alberta (Sanderson 1983). In the county of Strathcona, a special quota hunt was instituted in 1984 to reduce the deer herd, partially in response to a rising number of deer-vehicle accidents (Folinsbee 1985). The hunt is considered to have helped stabilize the situation (J. Folinsbee, pers. comm., Nov. 1993).

2.1.4.6 Hunting

The previous five mortality factors can be regarded as "natural mortality," since there is no intent by humans to remove deer from the population. In contrast, hunting involves the intentional removal of white-tailed deer from the population. The regulation of hunting harvests is a primary focus of other sections of this plan.

2.1.5 Habitat Requirements and Annual Movements

2.1.5.1 Food

White-tailed deer have a stomach structure that has evolved to digest high-quality feed composed of both woody and herbaceous forage (Chaplin 1987). Rumen contents of white-tailed deer killed during the winters of 1966-1975 in Camp Wainwright averaged (by volume) 60 percent browse, 26 percent forbs, 6 percent grasses and 8 percent unidentifiable matter (Rhude and Hall 1977). Snowberry (Symphoricarpos albus), aspen (Populus tremuloides) and rose (Rosa spp.) composed two-thirds of the browse category, and silverberry (Elaeagnus commutata), saskatoon (Amelanchier alnifolia), choke cherry (Prunus virginiana), creeping juniper (Juniperus horizontalis), willow (Salix spp.) and common bearberry (Arctostaphylos uva-ursi) made up the remainder. The important forbs included asters (Aster spp.), peavines (Lathyrus spp.) and horsetails (Equisetum spp.). In

agricultural areas, the volume of alfalfa (Medicago sativa) in white-tailed deer rumens equaled that of native legumes (Treichel and Hall 1975-1977). White-tailed deer will also eat other agricultural crops such as winter wheat (Triticum spp.), fall rye (Secale cereale), oats (Avena sativa), barley (Hordeum spp.) and garden produce. In spring, grasses and forbs provide important sources of protein and carotene (Wishart 1984).

2.1.5.2 Cover

Cover provides white-tailed deer with security from disturbance, predation and adverse weather. Both Webb (1967) and Wishart (1984) stressed the importance of aspen clumps for providing cover (particularly overhead cover) and feeding areas for white-tailed deer, whereas Cairns (1976) reported white-tailed deer using coniferous shelterbelts during winter. The interspersed cover with feeding areas is important for white-tailed deer, particularly at the northern extent of their range, where the depth and duration of snow cover can be important limiting factors (Wishart 1984).

Suitable cover types vary throughout the province. In prairie Alberta, white-tailed deer use wooded river valleys and coulees and, during winter in irrigation districts, large stands of common cattail (Typha latifolia). In parkland and in northern mixedwood areas, aspen clumps interspersed with farmland provide important cover year-round. White-tailed deer also use river valleys, sandhills and steep glacial moraines. Telfer (1978) reported that white-tailed deer were restricted to steep south-facing slopes of major drainages during winter in boreal mixedwood areas of western Alberta.

2.1.5.3 Movements

White-tailed deer move to winter cover in response to colder temperatures and snow cover; distance traveled is inversely related to severity of winter (Wishart 1984). Snow depths greater than 7.6 cm can cause white-tailed deer to shift from feeding on forbs to woody browse (Telfer 1978). Although white-tailed deer have the lightest

foot loading of cervids in Alberta, snow depths in excess of 51 cm will immobilize deer (Kelsall and Telfer 1971). White-tailed deer in Alberta do not "yard up" but disperse to suitable micro-environments with good access to areas that "green up" quickly in spring (Wishart 1984). In prairie and parkland Alberta, deer will move into the major drainages of the Red Deer, Bow and South Saskatchewan rivers in winter (Fish and Wildlife 1989a).

2.2 Historical Status, Use and Management of White-tailed Deer in Alberta

2.2.1 Historical Status of White-tailed Deer Populations and Habitats

2.2.1.1 Populations

Both fossil evidence and anecdotal accounts establish the long-standing presence of white-tailed deer in Alberta. Fossil remains of white-tailed deer (which date back to 1600 B.C.) have been found in the foothills northwest of Calgary (Wilson and Hills 1984). Further, Dwyer (1969) and Webb (1967) cited several fur traders, explorers and naturalists who reported white-tailed deer in Alberta in the 18th and 19th centuries. The size of the white-tailed deer population was likely smaller than today's, as a result of competition from bison (Bison bison), moose and elk (Wishart 1984). By the turn of the century, white-tailed deer numbers had been reduced by a series of severe winters and heavy hunting pressure; the 1909 Annual Report considered white-tailed deer to be practically extinct in Alberta (Webb 1967).

After 1909, white-tailed deer populations increased, slowly at first and then rapidly in the 1940s and 1950s (Webb 1967). Several factors influenced this increase. Competition with elk and bison had been eliminated; moreover, the climate followed a general warming trend. Increased settlement had provided new food sources, such as alfalfa, and had created new habitat in northern areas, because clearing provided interspersion of forest and cropland. Probably the most important factor was the invasion and re-establishment of aspen after a series of years of heavy precipitation and effective fire suppression (Webb 1967; Wishart 1984). White-tailed deer expanded into the Peace River country in the early 1940s and into the southwestern portion of the Northwest Territories by the mid-1960s (Scotter 1974). Webb (1959) stated that white-tailed deer were the "deer of the future" and "would take the brunt of big game hunting within a few years."

Estimates of white-tailed deer populations were not possible until the first systematic surveys for deer were completed in the

mid-1950s. Webb (1959) estimated 90 000 white-tailed deer occurred in Alberta, with more white-tailed deer than mule deer in the eastern parklands. In the mid-1970s, Rippin (1979) used survey data to make a provincial estimate of 138 130 white-tailed deer; greatest concentrations were in southern and central Alberta. However, such population estimates were hampered by problems associated with collection and interpretation of survey data.

White-tailed deer benefited from a series of relatively mild winters from the mid-1970s to 1983-84. Preseason population estimates totalled 143 000 in 1987, following a severe winter (1984-85) and drought. Since then, white-tail numbers have increased again, following another series of mild winters (Skinner and Todd 1988; McFetridge 1990a, 1990b, 1991, 1992). Current (1991) populations of white-tailed deer are detailed in Section 2.3.2.

2.2.1.2 Habitat

Agricultural and industrial developments can mean, and have meant net increases in white-tailed deer habitat in Alberta. The proliferation of aspen and other shrubs in the prairies and parklands, the creation of cattail marshes in southern Alberta, the introduction of alfalfa and cereal crops and the opening up of boreal mixedwood forests have all provided white-tailed deer with increased opportunities (Webb 1967; Wishart 1984). The relatively secretive nature of white-tailed deer and their effective use of cover has allowed white-tailed deer to successfully coexist with a certain degree of agriculture (Kramer 1971). However, intensive agricultural and industrial use can also reduce habitat quality or eliminate cover through high levels of grazing, clearing of aspen copses and clear-cutting large tracts of forest (Jaques 1980; Glasgow 1982).

2.2.2 Historical Uses and Harvest Management of White-tailed Deer in Alberta

2.2.2.1 Demand for Consumptive and Nonconsumptive Use

White-tailed deer provided some food and material for Natives, explorers and settlers in Alberta. Undoubtedly, relatively more

white-tailed deer were taken in the late 1800s as numbers of bison and elk declined. The value of white-tailed deer for both consumptive and nonconsumptive enjoyment has risen considerably during the last three decades.

Sales of big game and white-tailed deer hunting licences increased steadily after 1907 as the hunter population grew (Table 2). Licence sales before 1955 represent a minimum level of total demand because subsistence hunting and poaching were commonplace in some portions of the province (Fish and Wildlife Division 1989a). Resident white-tailed deer licence sales increased 3.5-fold from 1965 to 1990 (Table 3).

Non-resident white-tailed deer licence sales in Alberta have increased nearly nine-fold from 1965 to 1990 (Table 2). The increased interest in white-tailed deer by non-resident hunters is a result of active promotion of white-tailed deer hunting opportunities in Alberta by guides and outfitters, as well as Alberta's reputation for producing large trophy bucks.

2.2.2.2 White-tailed Deer Hunting Seasons and Bag Limits

Historically, hunting seasons and bag limits for white-tailed deer have been used to control the harvest. More recently, seasons have been arranged to occur after fall harvests of agricultural crops and before the onset of severe winter conditions. The more recent approach is intended to reduce hunter/landowner conflicts and to reduce winter stress on the deer herd.

The first restriction on season length occurred in 1882 when the Game Ordinances of the Northwest Territories prohibited the hunting of big game, including white-tailed deer, between February 1 and September 1 each year. There was no mention of bag limits at that time. An 1893 Game Ordinance said that the season was closed from February 1 to October 1 and that hunters were limited to six head of each species; no limit applied when the purpose was food for hunters

Table 2. Resident and non-resident licence sales for white-tailed deer hunting in Alberta from 1907 to 1990.

Year	Resident Big Game	Resident White-tailed Deer	Non-resident Big Game/ White-tailed Deer
1907 ^a	446	N/A ^b	N/A ^b
1910	1 997	N/A	N/A
1915	912	N/A	N/A
1921 ^a	1 138	N/A	N/A
1925	5 734	N/A	N/A
1930	8 266	N/A	N/A
1935	5 948	N/A	N/A
1941 ^a	6 785	N/A	169
1945	9 881	N/A	188
1951 ^a	14 340	N/A	192
1955	24 858	N/A	217
1960	62 116	1 772	282
1965	N/A ^b	23 736 ^c	92
1970	N/A	37 146	21
1975	N/A	31 871	60
1980	N/A	66 625	298
1985	N/A	80 660	678
1990	N/A	83 187	823

^a Not able to locate reports for 1905, 1920, 1940 and 1950 so the next nearest available year was used.

^b N/A means "not applicable" under the first two columns and "not available" under column three.

^c A resident big game licence was required to hunt white-tailed deer up to and including 1959. There were both white-tailed deer and big game licences during 1960-1964; one deer was allowed with each licence. From 1965 onward, a white-tailed deer licence was required and the big game licence was dropped. The big game licence also applied to moose, elk, caribou and mule deer, so it was not exclusive to white-tailed deer.

and their families. In 1899, bag limits on members of the deer family were three of each species. Sunday hunting was prohibited in 1903, as was the taking of females or young. By 1913 the bag limit had been reduced to one male deer of either species during a province-wide six-week season.

This pattern (one male deer of either species, standard season province-wide) continued (with minor variations in dates) until 1929, when the first type of zoning began; at that time, the deer season was closed east of Highway 2 and south of the North Saskatchewan River. The closure remained until 1948 when the season was again opened province-wide, but the bag limit became more restricted, since only one moose or one elk or one deer could be taken. The closure east of Highway 2 and south of the North Saskatchewan River returned in 1950 and 1951. In 1952, part of the closed area was opened again. The deer season was closed province-wide during 1953 and 1954. Bag limits continued at "one only" of the remaining members of the deer family.

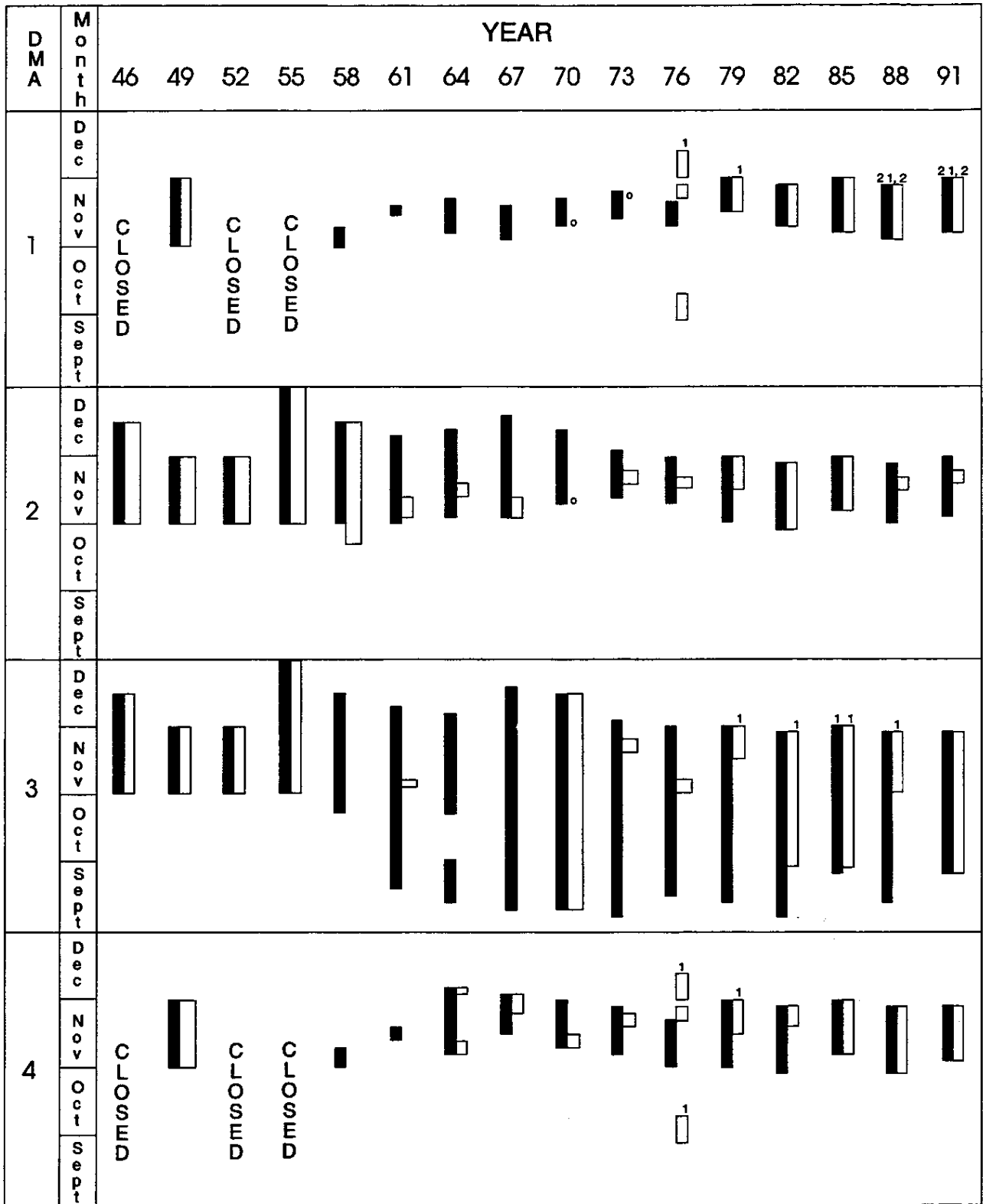
The deer season reopened in 1955; dates, open areas and bag limits were similar to those in 1951. The season has not been closed province-wide since. The first wildlife management biologists were hired in the early 1950s, and they recognized different ecological zones and the relative vulnerability of game in different areas. Big Game Zones (BGZs) were developed to reflect both ecological zones and species vulnerability to hunting. There were 6 BGZs in 1956, 10 in 1957 and 22 during 1958-1963. Seasons were quite variable between zones. In 1964, Wildlife Management Units (WMUs) were created and used to set seasons (there were 157 WMUs in 1992). The BGZs reappeared (but based on WMU boundaries) in 1967 (n=13) and 1968 (n=14). There have been 15 or 16 BGZs since 1968; six major shifts in zone boundaries have occurred since then. Zones and WMUs were used to manage the deer herds on a more local basis by controlling the harvest in a particular area, as needed. Because BGZs were designed for all big game species and many did not apply to white-tailed deer, nine Deer Management Areas (DMAs) were developed for this plan, to focus on the management of white-tailed deer (Figure 1). Deer Management Areas

(DMAs) are groups of WMUs that have similar white-tailed deer population characteristics and similar levels of recreational use¹. The DMAs also reflect both wildlife habitat and general land use patterns. The DMAs are introduced here as a basis for describing historical hunting seasons. The DMAs are described in detail in Section 2.3.2.

¹ In this plan, Deer Management Areas are based on WMUs that were in place in 1992.

Seasons for white-tailed deer for every third year between 1946 and 1991 are shown in Figure 2. In cases where there was more than one season in the DMA, the longer season was illustrated. Some of the more significant highlights of the period are as follows:

- 1949 - Season was open for both sexes throughout province.
- 1955 - The last year the season was closed for white-tailed deer in southern and central Alberta.
- 1960-1964 - Special white-tailed deer tag was provided for holders of a resident big game licence. Provisions varied from restricting hunters to a zone or zones to following general white-tailed deer season dates.
- 1965 - Resident big game licence was discontinued - replaced by white-tailed deer licence.
- 1966 - Special Camp Wainwright Deer Season was started, allowing extra white-tailed deer to be taken.
- 1970 - A one-day hunt for antlerless white-tailed deer was held in southern Alberta.
- 1970-1971 - Hunters could buy a MED licence, good for a moose, elk or deer.
- 1973 - A one-day hunt for antlerless white-tailed deer was held in southern Alberta.
- 1976 - Split season for antlerless white-tailed deer in southern and central Alberta. Special authorizations for antlered and/or antlerless white-tailed deer were instituted in some areas of the province, whereas other areas had general seasons for all age and sex classes.
- 1984 - Strathcona County Hunt began for white-tailed deer.
- 1988 - Thursday to Saturday hunting-only began in DMA 1.
- 1990- Antlerless seasons in DMAs 6 and 8 were shortened from four weeks to one week.



LEGEND

- | | | | |
|-----|---|---|---------------------------|
| DMA | Deer Management Area | o | One-day antlerless season |
| 1 | Hunting only with an authorization or special licence | ■ | Antlered season |
| 2 | Season open only on Thursday, Friday and Saturday | □ | Antlerless season |

Figure 2. White-tailed deer hunting seasons, 1946-1991. [In DMAs where there was more than one season, the longer season was used.]

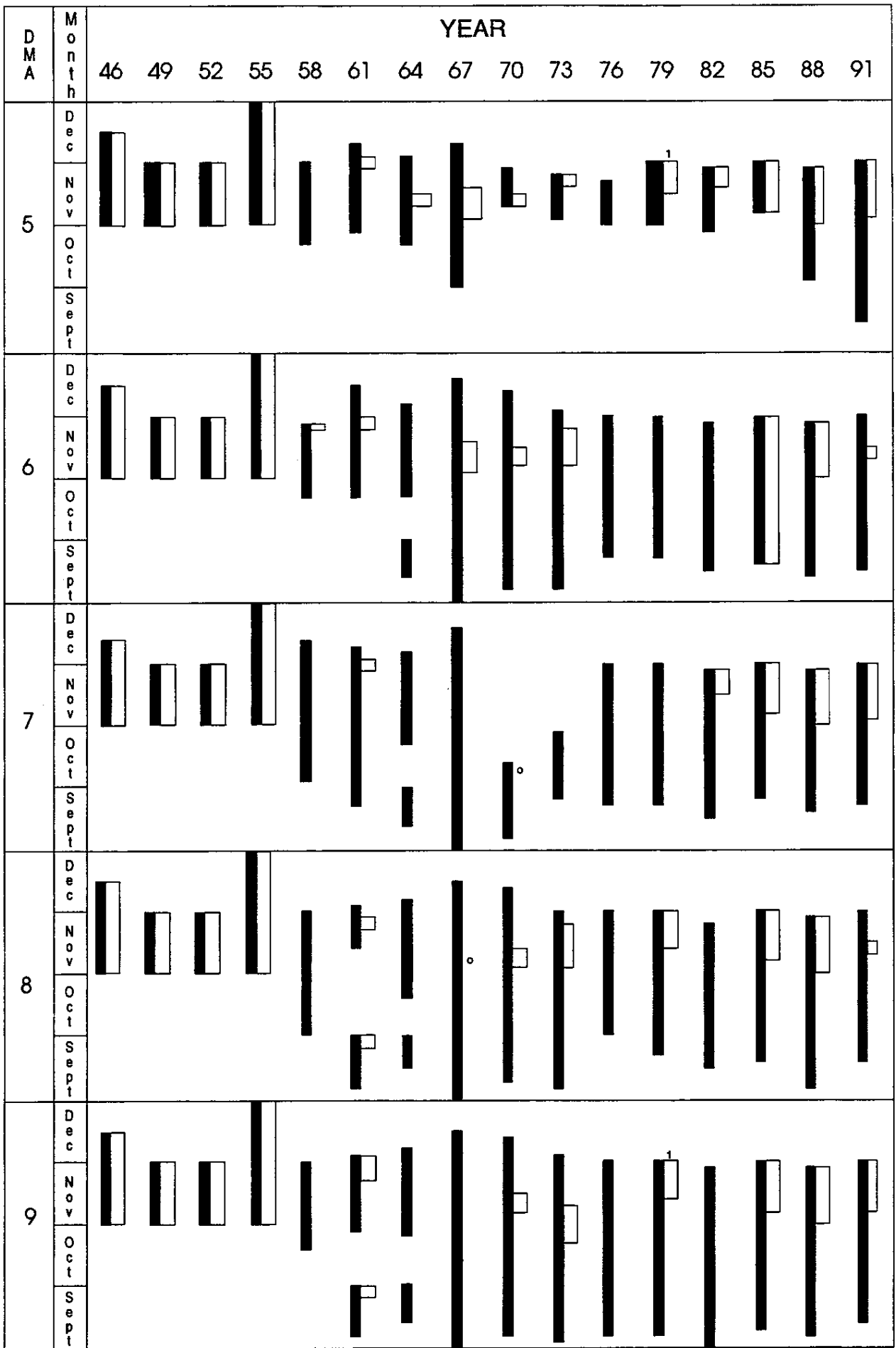


Figure 2. (continued)

2.2.2.3 White-tailed Deer Harvests

Until 1963, harvest records for the two deer species were combined. Recorded white-tailed deer harvests have generally increased since 1963 (Table 3). In 1963, bucks comprised 94 percent of the kill (Alberta Lands and Forests 1964) compared to 73 percent in 1991 (Fish and Wildlife Division 1990). High levels of harvest and hunter success since 1979 reflect the higher deer population levels in recent years.

2.2.3 The History of White-tailed Deer Management in Alberta

2.2.3.1 Managing Losses of Deer

Management consists of knowing how many animals there are in the herd and where they are, understanding the factors that control natality and mortality (climate, weather, predation, disease, competition, habitat quality, hunting), and manipulating those factors, where possible, to provide the desired results.

There were few extensive, quantitative counts of deer before the mid-1950s. Early population estimates were based on isolated counts and the subjective impressions of departmental staff and members of the public, who provided trend assessments over the years. The only factors that were managed were predation and hunting. There were no predator control programs aimed exclusively at increasing deer populations; nevertheless, predators were trapped, shot and poisoned to control health hazards such as rabies and to reduce livestock depredation (Gurba and Neave 1979). Todd and Giesbrecht (1979) recorded very high coyote harvests during the 1920s, 1930s and 1940s, (nearly 57 000 coyote pelts were marketed in Alberta in 1925-26). There are no data on the effect of these programs on white-tailed deer, but some deer populations likely benefited.

Harvests of white-tailed deer have been controlled historically by season lengths, bag limits, sex restrictions and zoning. Seasons were closed in areas of the province if populations were judged to be too low to withstand hunting pressure (Figure 3). As previously discussed (page 18), an extra white-tailed deer tag was available for resident

Table 3. Harvest statistics for resident white-tailed deer hunters in Alberta from 1963 to 1991.

Year	Number Harvested ^a	Hunter Success (%)	Source
1963	2 996	43	Check stations; questionnaire
1966	6 320	23	Check stations; questionnaire
1974	4 356	21	Questionnaire
1976	7 660	28	Questionnaire
1978	13 006	22	Questionnaire; incisor bar data
1979	28 768	43	Questionnaire; incisor bar data
1984	24 542	32	Questionnaire
1985	20 210	25	Questionnaire ^b
1986	24 846	34	Questionnaire
1987	22 891	28	Questionnaire
1988	27 769	33	Questionnaire
1989	28 331	33	Questionnaire
1990	26 596	32	Questionnaire
1991	29 887	42	Questionnaire

^a From 1978 on, harvest includes deer taken under authorizations and special licences.

^b 1985 marked the first telephone questionnaire; all questionnaires since 1985 have been telephone questionnaires.

big game hunters during 1960-1964.

To control hunter numbers and white-tail harvests, more recent efforts have included authorizations and special licences. Authorizations for white-tailed deer were first used in 1976; they allowed additional opportunities to hunt, but did not increase the bag limit. Special licences, such as the Camp Wainwright Deer Hunt and the Strathcona County Deer Hunt, provide additional hunting opportunities and increase the bag limit. The method used most recently to control white-tailed deer hunters is the three-day (Thursday to Saturday) hunting season in DMA 1. This method is intended to manage hunter harvest and reduce disturbance to landowners without significantly reducing hunting opportunities on privately owned land in the prairie region.

2.2.3.2 Hunter Harvest and Population Inventory

Harvest data (location, date and age/sex of kill) and population inventories are used to monitor changes in the white-tail population over time. Harvest data can be collected through licence returns, questionnaires, check stations and collection of animal parts, such as jaws (for aging) and reproductive organs (for determining potential fawn production). Population inventory can be done directly, by observing the animals through ground counts or aerial surveys, or indirectly, by counting pellet groups or assessing browse conditions.

A compulsory licence return was used during 1907-1955 to determine harvest, but the usefulness of the information was limited; there was little effort to ensure compliance and no measurement of subsistence hunting or poaching. In the 1950s and early 1960s, questionnaire data were combined with information collected at check stations. Check stations provided biologists with opportunities to collect accurate harvest information and jaws for age determination (and occasionally reproductive tracts) and to obtain measurements of animals. Subsequently, the tremendous increase in both hunter numbers and road access rendered check stations impractical, except for special hunts with limited access and/or small geographic areas (e.g., Camp Wainwright). Jaws of white-tailed deer have been collected with varying degrees of intensity since 1977 (Treichel 1977-1987). Hunters

were also asked to complete a questionnaire printed on the jaw envelope before they submitted the jaw.

Questionnaire surveys have been used since the 1940s to collect harvest data. The most recent survey technique has been the annual telephone survey, which was instituted in 1985 (Fish and Wildlife Division 1988a, 1988b, 1989b, 1990, 1991, 1992). Volunteers who belong to hunter and other organizations interview randomly selected hunters shortly after the season. A percentage of hunters with general white-tailed deer licences and white-tailed deer authorizations are sampled as part of the survey effort. Early versions of questionnaires suffered from small sample sizes; in 1984 (last year of a mail-out questionnaire), only 8 percent of resident hunters who held a general white-tailed deer hunting licence were sampled (Fish and Wildlife Division 1987). In comparison, volunteers contacted 20 percent of residents holding white-tailed deer licences in 1990 (Fish and Wildlife Division 1991).

In Alberta, there are not enough staff to obtain sufficient information through widespread use of indirect indices to estimate white-tailed deer populations (Fish and Wildlife Division 1989a). Although methods such as night-lighting have been used in Alberta (Gunson 1978), the main inventory method for deer has been aerial surveys. Aerial survey techniques are constantly being refined (e.g., stratifying survey blocks according to habitat capability for deer) in order to improve accuracy and precision. Survey data can be coupled with questionnaire results to develop population models. However, portions of DMAs 3, 5, 6, 7, 8 and 9 are covered by coniferous forests, which make aerial surveys impractical. Increasing hunter pressure will necessitate the development of other inventory methods in these DMAs.

2.2.3.3 Habitat Protection and Development

Habitat has long been recognized as the key to a healthy deer herd. Nevertheless, efforts at habitat retention and development became more focused after the creation, in 1971, of a Wildlife Habitat Unit within Alberta Fish and Wildlife Division.

Protection efforts have slowly expanded from 1971 to the present;

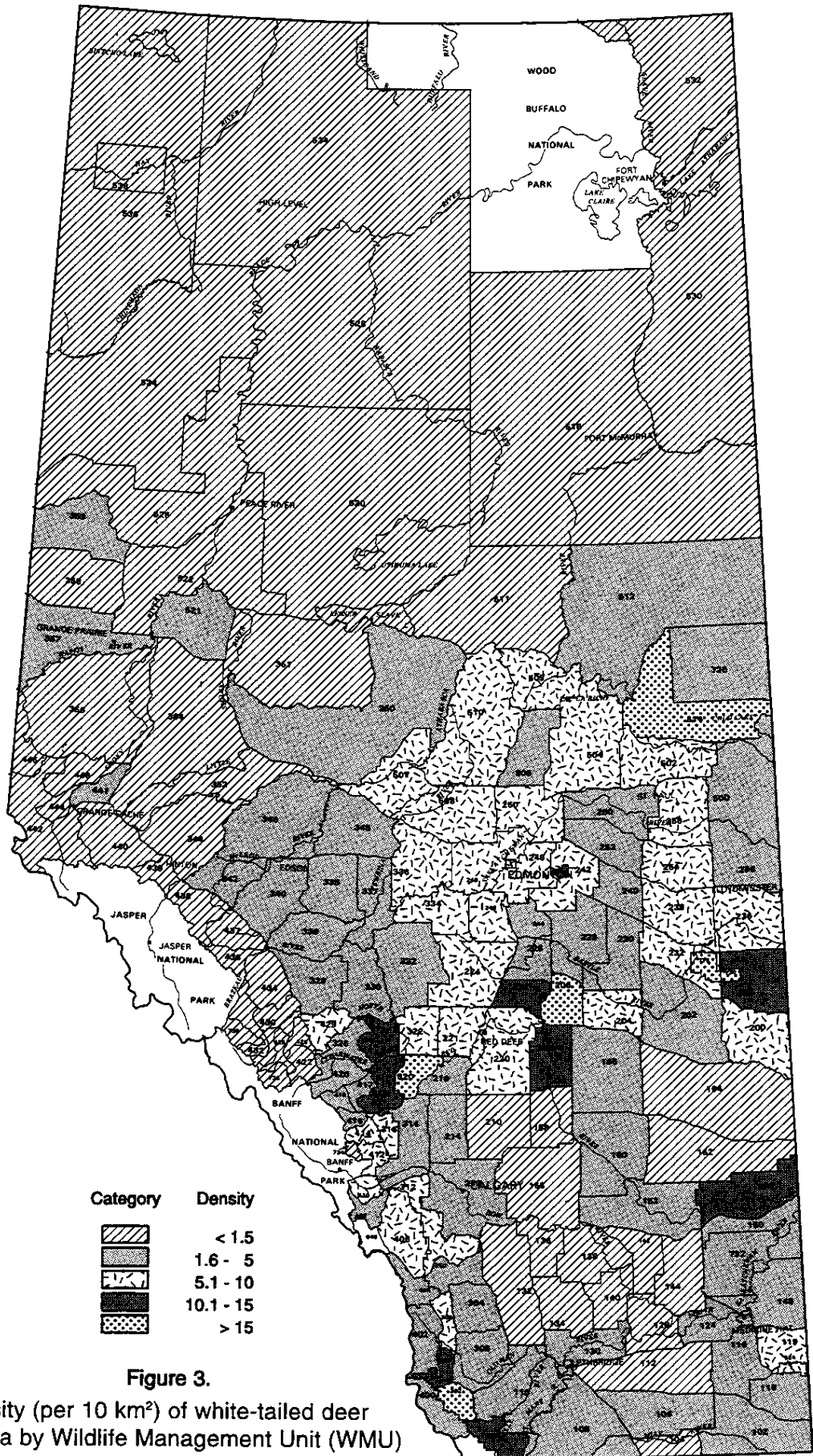
Natural Resources Service now has input into all major land surface and water development activities in the province, both through long-range planning (e.g., Regional Planning Commission plans for private lands and integrated resource plans for public lands) and day-to-day referrals. There has also been formal recognition of the need for a comprehensive, province-wide habitat inventory: such an inventory was coordinated by the Wildlife Habitat Inventory Unit during 1981-1988. The inventory unit completed a 1:1 000 000 map scale inventory and current habitat suitability assessment for white-tailed deer and refined the process for the 1:250 000 map scale. Regional wildlife biologists have also been conducting deer habitat inventory and assessment programs since the early 1970s.

In 1973, the "Buck for Wildlife" fund for habitat development was initiated, beginning at \$1 from each resource development stamp sale and increasing over the years to \$11.54 in 1993. This fund has been used to rehabilitate and enhance wildlife habitat generally. Although few projects have been developed specifically for deer, local deer herds have benefited from more than 150 projects, which encompassed about 45 000 ha.

2.3 Current Status, Use and Management of White-tailed Deer in Alberta

2.3.1 Current Status of White-tailed Deer Populations and Habitats

White-tailed deer occur in every WMU in Alberta today, although their distribution is patchy and densities are low in some of the northernmost WMUs (Figure 3). Estimates of white-tailed deer densities and populations (Appendix I) are, of course, based on both objective and subjective information sources. Population estimates for white-tailed deer in DMAs 1, 2 and 4 are based on recent aerial surveys, habitat capability maps or both. Aerial surveys have been completed for 42 of the 71 WMUs in these areas; (the precision goal for most aerial surveys is plus or minus 30 percent) the remaining 29 WMUs have not been surveyed because of poor quality habitat, heavy coniferous cover or difficult survey conditions. However, habitat








Category	Density
	< 1.5
	1.6 - 5
	5.1 - 10
	10.1 - 15
	> 15

Figure 3.
 Density (per 10 km²) of white-tailed deer
 in Alberta by Wildlife Management Unit (WMU)
 in September 1991.

capability maps have been completed for 14 of these 29 WMUs. Deer population estimates for Camp Wainwright, Canadian Forces Base Suffield and Cypress Hills Provincial Park are based on aerial surveys.

For DMAs 3, 5, 6, 7, 8 and 9, data collected during moose and elk surveys in 33 of the 77 WMUs provide some information on distribution and local densities of white-tailed deer. Poor visibility (resulting from extensive coniferous cover and rugged terrain) precludes aerial deer surveys in most of these WMUs. Population estimates are based on assumed deer densities applied to habitat capability maps derived principally for other species (like moose and elk), as well as harvest information.

The estimated white-tailed deer population in Alberta in September 1992 was 170 970, about 4 percent higher than the 1980 estimate of 165 000 (Fish and Wildlife Division 1984--a winter estimate of 118 000 was adjusted to a September estimate of 165 000). These two figures belie stability. In actual fact, the population decreased in the mid-1980s as a result of several years of dry conditions in southern Alberta, a severe winter (1984-85) and intentional population reductions (by hunting) to reduce crop damage and keep populations in line with the habitat capability at that time. However, populations increased in most parts of Alberta from the mid-1980s to the early 1990s.

2.3.2 Current Status of Land Use, Land Ownership and White-tailed Deer Habitat

2.3.2.1 Deer Management Area 1

The DMA is located in southeastern Alberta and is largely composed of grassland habitats (Figures 1, 4). Most land (73 percent) in this DMA is privately owned (Table 4). Predominant land uses are livestock grazing and production of forage and cereal crops, and some specialty crops such as corn and sugar beets. The DMA includes 13 irrigation districts.

Table 4. Characteristics of the nine Deer Management Areas (DMAs) in Alberta with respect to size and status of white-tailed deer populations^a and habitats.

DMA	Total Area in km ²	Proportion of Land Privately Owned	White-tailed Deer	
			Numbers	%
1 ^b	81 975 (14) ^c	73	20 350	14
2	12 080 (2)	84	8 100	5
3	7 205 (1)	14	3 000	2
4 ^d	70 235 (12)	92	48 200	32
5	49 315 (8)	40	30 600	20
6	58 490 (10)	11	13 900	9
7	28 400 (5)	5	4 100	3
8	24 045 (4)	47	6 750	5
9 ^e	254 915 (44)	6	15 200	10
Total	586 660 (100)	32	150 200	100

^a Population estimates are for September 1991 (population and density estimates are detailed in Appendix I for individual WMUs).

^b Includes Cypress Hills Provincial Park (WMU 624) and Canadian Forces Base Suffield (WMU 732).

^c Percent of total provincial area given in parentheses.

^d Includes Camp Wainwright (WMUs 728, 730).

^e Includes Primrose Lake Air Weapons Range (WMU 726).

The DMA contained an estimated 20 350 white-tailed deer, in September 1991, some 14 percent of the provincial population (Table 4). White-tailed deer occupy a variety of microhabitats within DMA 1, including shrubby areas along major river valleys and coulees, shelterbelts and willow-cattail complexes associated with farmlands. In the uncultivated grassland areas, relatively moist microclimates in riparian or hilly areas allow the establishment of shrubs that provide winter food and cover. Deer benefit from chinooks in most of this DMA; the chinooks clear off snow cover and allow the deer access to the forage. Year-round quality of deer foods can be quite variable, given extensive periods of dry weather. Competition with livestock is also likely to increase because cattle switch to browse in the absence of adequate amounts of grasses and forbs.

Overall, the white-tailed deer density in this DMA is moderately low (2.5/10 km²--Table 5). The population is stable and productivity of the herd is high. Vehicular access and hunting pressure are both high overall. The habitat in the DMA is decreasing (Table 5). White-tailed deer habitat associated with irrigation is vulnerable to upgrading of irrigation systems, such as when canals are cement-lined or underground pipes are used. These losses of wildlife habitat have been continuing at a rate of 2-5 percent annually (Fitch, pers. comm.). Cover in less arable areas is more secure, although conversion of native grasses and shrubs to forage and other crops is ongoing. White-tailed deer are more tolerant of disturbance than mule deer in this open country and will use cover near farms.

2.3.2.2 Deer Management Area 2

The DMA comprises fescue grassland, aspen parkland and mixedwood habitats (Figures 1, 4); it stretches from Calgary south to the Alberta-Montana border and is situated between DMA 1 to the east and the alpine and subalpine habitats of DMA 3 to the west. Most (84 percent) of DMA 2 is privately owned (Table 4). Agricultural use is dominated by cultivated cropland in the eastern part and livestock grazing in the west.

The DMA contained an estimated 8100 white-tailed deer in September 1991, some 5 percent of the provincial population (Table 4). White-tailed deer populations in the DMA are greatest in the west, with fewer deer along the eastern edge (Figure 3). Overall, the density of white-tailed deer in this DMA is high (Table 5). The population is stable and productivity of the herd is high. Hunting pressure is classified as high, whereas vehicular access is moderate. Access in the eastern and northern part of DMA 2 is reasonably good; access to western portions is effectively controlled by large landholdings and few roads.

White-tailed deer use habitats associated with non-arable and riparian areas, as well as shelter belts and aspen bluffs associated with farm land. Tree and shrub cover is reasonably stable, although intensive grazing by cattle, at times, can and does reduce the suitability of the cover for white-tailed deer.

2.3.2.3 Deer Management Area 3

The DMA consists of the alpine and subalpine habitats of southwestern Alberta (Figures 1, 4). A large majority of the DMA is publicly owned (Table 4), and coniferous forest is the dominant form of vegetation. Major land uses include timber harvesting, livestock grazing and outdoor recreation.

The DMA contained an estimated 3000 white-tails in September 1991 (2 percent of provincial population--Table 4), of which most are restricted to river and creek valleys, and lower elevation slopes.

Overall, the white-tailed deer density in the DMA is moderately high (4.2/10 km²--Table 5). The population is stable and productivity is low, which are population characteristics associated with moderate vehicular access and moderate hunting pressure. The habitat trend is classified as stable (Table 5); small timber operations at times improve conditions for white-tailed deer here, but fire control programs have allowed coniferous forests to expand.

Table 5. Further characteristics of the nine Deer Management Areas (DMA) in Alberta, with respect to white-tailed deer populations and limiting factors.

DMA	White-tailed deer					
	Density (deer/ 10km ²)	Trend ^a	Productivity ^b	Vehicle Access ^c	Hunting Pressure ^d	Habitat Trend ^a
1	2.5	S	H	H	H	D
2	6.7	S	H	M	H	S
3	4.2	S	L	M	M	S
4	6.9	S	H	H	H	D
5	6.2	I	H	M	H	I
6	2.4	I	M	M	M	C ^e
7	1.4	S	L	M	L	C
8	2.8	S	M	H	M	C
9	0.6	S	L	L	L	S

^a S=stable, I=increasing, D=decreasing.

^b Productivity refers to the harvestable surplus of antlerless animals as a percentage of the total estimated population in the Deer Management Area. High (H) is 7%-12% of the population, moderate (M), is 3%-6% and low (L) is 0%-2%.

^c Vehicular access reflects the degree of development of roads and other usable surface access (such as seismic lines) to white-tailed deer habitat. High (H) means a road grid and/or other access is developed in most townships in the area, moderate (M) means about half the area has access and low (L) means most of area is lacking access.

^d Hunting pressure refers to the number of hunter days spent in the Deer Management Area during one hunting season. High (H) is more than 30 000 hunter days, moderate (M) is 10 000 to 30 000 hunter days and low (L) is fewer than 10 000 hunter days.

^e C=changing (overall amount stable, but distribution within DMA changing).

2.3.2.4 Deer Management Area 4

The DMA is largely composed of aspen parkland in central eastern Alberta (Figures 1, 4). A very large majority of the DMA is privately owned (92 percent--Table 4). This DMA is a mosaic of cultivated land, livestock pasture and aspen clumps. Soil quality controls the level of cultivation; areas of high quality soil (e.g., WMU 240, Vegreville-Holden) are highly cultivated and have few deer, whereas areas with poorer quality soil (e.g., WMU 224 Rimbey-Falun-Bentley) have more cover and thus more deer (Figure 3).

The DMA contained an estimated 48 200 white-tailed deer in September 1991 (32 percent of the provincial population--Table 4). Overall, the white-tail density here is high (6.9/10 km²--Table 5). Herd productivity, vehicular access and hunting pressure are all classified as high, and the white-tail population trend is considered to be stable, although the habitat base is perceived to be declining (Table 5). Food and cover for white-tailed deer are extensive, but are rapidly disappearing as a result of clearing and heavy livestock grazing (Fish and Wildlife Division 1989a). Both Jaques (1980) and Rippin (1981) reported the ongoing loss of aspen cover in central Alberta. If aspen in the county of Red Deer continues to be cleared at the rate of clearing experienced from 1970-1977, complete tree removal would be reached by 2007 (Jaques 1980). Heavy livestock grazing was found on 60 percent of areas sampled and effectively reduced primary deer browse to about 10 percent of what could be expected with optimal deer browsing (Jaques 1980).

Although basic food and cover are present, security for the deer is poor in DMA 4 because of a high degree of road development and the small size of many habitat blocks. Harassment, deer-vehicle collisions and legal and illegal harvest are high. As a result, white-tailed deer numbers may be below actual carrying capacity of the habitat in some areas. Finally, overwinter losses are high in some severe winters.

2.3.2.5 Deer Management Area 5

Deer Management Area 5 consists of boreal mixedwood forest (Figures 1, 4) that, in some areas, has been considerably altered by agriculture and forestry operations. The land base is 40 percent privately owned (Table 4). This DMA is a mosaic of poplar clumps, muskeg, spruce stands, mixed poplar/spruce clumps and clearings of pasture-hay, cropland or timber operations. Agricultural land use is greatest in the portion of DMA 5 that borders DMA 4. White-tailed deer historically have benefited from the westward and northward expansion of agriculture and have expanded into new areas.

In September 1991, the DMA contained an estimated 30 600 white-tailed deer, which is 20 percent of the provincial population (Table 4). The white-tailed deer density is high here, too (overall estimate of 6.2/10 km²) and thought to be increasing (Table 5). Both hunting pressure and herd productivity are high in the DMA, and vehicular access is classified as moderate (Table 5).

White-tailed deer habitat in DMA 5 is classified as increasing (Table 5). Grazing developments, forestry operations and oil and gas developments have variously improved forage supplies by opening up closed forest stands. On the other hand, though, the clearing of large areas has diminished habitat quality in some areas, as can be seen on some provincial grazing reserves. Conversion of unimproved pasture to cropland or improved pasture also reduces quality of cover. Net gains in cover are more common to the west, bordering DMAs 6 and 9; net losses in cover are more common to the east, adjoining DMA 4.

2.3.2.6 Deer Management Area 6

The DMA is situated in west-central Alberta (Figure 1) and comprises boreal foothills and boreal uplands habitats (Figure 4). It is dominated by coniferous and mixedwood forests. Only 11 percent of this area is privately owned (Table 5). The main land uses are recreation, timber harvesting and oil and gas development, with limited agricultural activity.

In September 1991, the DMA contained an estimated 13 900 white-tailed deer, which is 9 percent of the provincial population

(Table 4). Overall, the white-tailed deer density in the DMA is moderately low (2.4/10 km²--Table 5). The areas with relatively higher densities of white-tailed deer are found in the southern and northern portions of the DMA, adjacent to existing agricultural development. Telfer (1978) reported white-tailed deer using the main river valleys, such as the North Saskatchewan, Athabasca, Brazeau, Smoky and Little Smoky rivers.

The white-tailed deer population in the DMA is thought to be increasing (Table 5). Herd productivity, vehicular access and hunting pressure are all classified as moderate. The habitat trend is classified as "changing" (Table 5), although it is probably stable overall, with losses from clear-cutting large blocks of forest being offset by net gains through clearing of small cut blocks, cutlines and wellsites. However, these developments mean increased access.

2.3.2.7 Deer Management Area 7

The DMA is composed of the alpine, subalpine, boreal uplands and montane habitats that flank Banff and Jasper national parks and extend through the Grande Cache area (Figure 1, 4). Coniferous and mixedwood forests predominate. The montane area contains the best white-tailed deer habitat. Major land uses include forestry, mining and recreation, with only 10 percent of the land being privately owned (Table 6).

Only 3 percent of Alberta's white-tailed deer occurred in this area in September 1991 (Table 4). Overall, white-tailed deer density in the DMA is quite low (estimated 1.4/10 km²--Table 5). The population is perceived to be stable. Productivity and hunting pressure are both low, whereas vehicular access is moderate. However, access development that does occur tends to be concentrated in valley bottoms, areas of better deer habitat.

The habitat trend is classified as changing (Table 5). Timber operations and mining/oil and gas developments are opening up large forested tracts, yet decades of effective fire control have allowed forests to reach climax stages in many other areas. Snow levels can be high in some years and wolf predation may be a locally significant mortality factor.

2.3.2.8 Deer Management Area 8

The DMA is composed of a patchwork of boreal mixedwoods, boreal foothills and agricultural developments, which occurs near Grande Prairie and Peace River (Figures 1, 4). About half of the land area is privately owned (Table 4); much of the public land is allocated to livestock grazing, timber harvests and oil and gas developments. There are seven provincial grazing reserves in this DMA.

The DMA contained an estimated 6750 white-tails in September 1991 (5 percent of provincial population--Table 4) and the population is thought to be stable (Table 5). Overall, the white-tail density is moderately low (2.8/10 km²); herd productivity and hunting pressure are both moderate, and vehicular access is high (Table 5). Severe winters constitute an important limiting factor for white-tailed deer in this area.

The habitat trend is stable (but changing) with some cover being created by agricultural expansion and timber operations. Riparian areas, such as the Peace and Smoky rivers, have not been significantly altered (Alberta Fish and Wildlife Division 1989a).

2.3.2.9 Deer Management Area 9

This vast DMA (44 percent of provincial land base--Table 4) is composed of boreal mixedwood, boreal foothills, boreal northlands and boreal subarctic ecoregions (Figures 1,4). A large majority (94 percent) of the land area is publicly owned. Land uses include a small amount of agriculture in the Fort Vermilion - High Level - Carcajou area, timber harvesting and oil sand extraction near Fort McMurray.

This area contained an estimated 15 200 white-tailed deer in September 1991 (10 percent of provincial population--Table 4). Overall, the white-tailed deer density is very low (0.6/10 km²--Table 5), although locally higher densities occur in and along the Peace and Athabasca river valleys. The white-tail population is thought to be stable. Hunting pressure and vehicular access are both classified as low (Table 5), as is herd productivity (a function of severe climatic limitation).

Habitat conditions are currently stable. However, major habitat changes will occur as timber harvesting (associated with new pulp mills) proceeds. White-tailed deer populations will likely expand into cutover areas during milder winters, but long-term success will be limited by winter conditions.

2.3.3 Current Uses of White-tailed Deer in Alberta

Current uses of white-tailed deer in Alberta include recreational hunting, subsistence hunting, aesthetic enjoyment, scientific research, education and commerce (e.g., guiding, game farming).

2.3.3.1 Subsistence and Recreational Hunting

Only those who qualify for a subsistence licence and Treaty Indians may hunt white-tailed deer for subsistence purposes in Alberta. The goal of subsistence hunting is to harvest an animal for food. Recreational hunting is defined as having the experience of hunting as the main goal, with harvesting an animal as a bonus. Among recreational hunters, there is a wide spectrum of individuals with varying satisfaction levels and preferences for various tactics and equipment. Readers who are principally interested in characteristics, activities and opinions of white-tailed deer hunters are referred to another report (Todd and McFetridge 1993a).

Hunting Opportunities

Several opportunities were available to resident hunters interested in white-tailed deer, as follows (Table 6):

1. Areas with few restrictions - hunters could hunt antlered and antlerless white-tailed deer during relatively long hunting seasons in DMAs 2, 4-9 and part of DMA 3 (bag limit 1).
2. Areas with reduced seasons and antlerless draws - in DMA 1 the general season was three days per week, Thursday to Saturday, during each of the four weeks, in order to reduce disturbance

to landowners. The general licence was good for bucks only with an antlerless authorization required to hunt does and fawns.

3. Areas with antlered and antlerless authorizations - hunters had to possess an authorization to hunt antlered or antlerless white-tailed deer in WMUs 404, 406 and 408 (Kananaskis Country). This requirement provides a quality hunt for those hunters drawn, but excludes the general licence hunter.
4. Special hunts - hunters could apply for the Camp Wainwright Deer Hunt and take advantage of the Strathcona Deer Hunt and the WMU 212/248 antlerless deer hunt for additional opportunities to hunt antlered and antlerless white-tailed deer. Those individuals drawn for the Camp Wainwright hunt enjoy a high-quality hunt and the opportunity to take two white-tailed deer, whereas the Strathcona White-tailed Deer Licence and the Antlerless (WMU 212 and 248) Deer Licence are available to any resident hunter and provide an opportunity to take two deer with each licence.
5. Archery-only seasons allowed bowhunters to take either antlered or antlerless white-tailed deer and included three archery-only WMUs (212, 248 and 410). These seasons also enabled hunting during periods before general seasons in other areas.

Non-resident hunters were limited to holding only an Antlered White-tailed Deer Licence (to accompany a resident) or an Antlered White-tailed Deer Special Licence (to accompany an outfitter-guide). Non-residents accompanying residents were also eligible to apply for an Antlered White-tailed Deer Authorization.

Table 6. Hunting seasons for white-tailed deer in Alberta in 1990.

Deer Management Area	Antlered		Antlerless	
	Archery	General	Archery	General
1 ^a	S4-N7	N8-D1 ^b	S4-N7	N8-D1 ^b
2 ^c	S4-N3	N5-D1	S4-N3	N12-N17
3 ^d	S4-S22	S24-N30 ^b	S4-S22	S24-N30 ^b
3 ^e	S4-S22	S24-D1	S4-S22	N12-N17
4 ^c	S4-N3	N5-D1	S4-N3	N12-N17 ^f
5	S4-N3	N5-D1	S4-N3	N12-N17 ^f
6	A27-S16	S17-D1	A27-S16	N12-N17
7	A27-S23	S24-D1	A27-S16	N5-D1
8	A27-S16	S17-D1	A27-S16	N12-N17
9	A27-S9	S10-D1	A27-S9	N5-D1
Archery-only ^g	S4-D1	Closed	S4-D1	Closed

^a Applies only to Thursday, Friday and Saturday.

^b Applies only to the hunter with the applicable authorization.

^c Does not apply to Wildlife Management Units (WMUs) 212 and 248.

^d Applies to WMUs 404, 406 and 408.

^e Applies to WMUs 400 and 402.

^f The season in portions of this Deer Management Area is N5-D1.

^g Applies to WMUs 212, 248 and 410.

Numbers, Distribution and Success of White-tailed Deer Hunters

For the 1990 season, 81 331 white-tailed deer hunting licences were purchased (a decline of 2 percent from 1985) and 85 050 tags were issued (an increase of 2 percent from 1985) (Table 7).

Resident Hunters

A recent survey of resident big game hunters indicated that the white-tailed deer was highly sought-after (second only to moose--Todd and McFetridge 1993b). In 1990, Albertans purchased 212 585 general big game hunting licences, of which 38 percent were white-tailed deer hunting licences. Of all resident white-tailed deer licences sold, 94 percent were general licences; the other 6 percent went to hunters for Camp Wainwright, Strathcona and antlerless deer hunts (Table 7). The number of white-tailed deer tags issued is greater than licences sold because hunters in the last three categories were issued two tags. Albertans were also given extra opportunities to hunt white-tailed deer in certain areas (e.g., Kananaskis Country) under an authorization. Although provided with additional hunting areas, those hunters drawn for authorizations are still eligible for only the single tag issued under the general licence, so the bag limit is still one deer.

Resident hunters were much more likely to purchase a white-tailed deer licence in combination with another licence than on its own (Table 8). For those residents who did buy another big game licence in addition to a white-tailed deer licence, the most common combination was with a moose licence. The next most popular combinations were white-tailed deer, mule deer and moose hunting licences and white-tailed deer and mule deer hunting licences.

The distribution of Albertans buying white-tailed deer licences varies from the distribution of the Alberta population and hunters generally (i.e., those buying wildlife certificates) (Table 9).

Table 7. Summary of white-tailed deer (WTD) hunting licences and authorizations issued in Alberta in 1985 and 1990.

Licence/Authorization Type	Year	
	1985	1990
Resident WTD Licence	80 532	76 750
Non-resident WTD Licence	288	257
Non-resident Alien WTD Licence	395	605
Antlered WTD Authorization ^a	451	182
Antlerless WTD Authorization ^a	249	2 576
Strathcona County WTD Licence	795	941 ^b
Camp Wainwright Deer Licence ^c	774 ^b	860
Antlerless Deer Licence ^d	Not Available	1 918 ^b
Total Licences	82 784	81 331
Total Authorizations	700	2 758
Total Tags Issued	83 558	85 050

^a Authorizations expand opportunity by allowing a hunter with a general licence to hunt in additional Wildlife Management Units (WMUs) but the hunter still has only one tag.

^b Two tags issued per licence.

^c Two tags issued per licence and good for any age/sex white-tailed deer and antlered mule deer.

^d Licence allows hunter to take antlerless white-tailed deer or antlerless mule deer in WMUs 212 and 248.

Table 8. Licence combinations held by resident hunters who purchased at least one of the white-tailed deer (WTD), mule deer, moose or elk general licences in 1990.

Licence/ combination	General Licences Purchased	
	Number of Hunters	Percent of Hunters
WTD Only	22 801	23
WTD and Mule Deer	11 834	12
WTD and Moose	14 869	15
WTD and Elk	2 389	2
WTD, Mule Deer and Moose	12 533	13
WTD, Mule Deer and Elk	6 520	6
WTD, Moose and Elk	4 638	5
WTD and Other Big Game ^a	866	1
Big Game Excluding WTD ^b	22 507	23
Total	98 957	100

^a Other big game includes bighorn sheep, antelope, black bear, grizzly bear and cougar.

^b Any combination of big game licences including mule deer, moose and elk, but excluding white-tailed deer.

Table 9. White-tailed deer licence sales in 1990 by residence code in comparison to wildlife certificate sales and the total number of people residing in the code areas.

Residence Code	Percent of Provincial Human Population ^a	Wildlife Certificate			White-tailed Deer Licences		
		Number Sold	Percent Total	Percent Population ^b	Number Sold	Percent Total	Percent Population ^b
1	25	21 910	18	4	15 044	19	3
2	2	2 838	2	6	1 785	2	4
3	26	17 399	14	3	9 498	12	2
4	2	2 304	2	4	1 282	2	2
5	7	9 449	8	6	5 788	7	4
6	14	23 109	19	7	16 193	20	5
7	9	14 307	11	7	12 078	15	6
8	8	17 702	14	10	11 079	14	6
9	4	11 302	9	14	4 847	6	6
10	2	3 221	3	6	2 284	3	4
TOTAL	100	123 541	100	5	79 878 ^c	100	4

^a Percent of human population in Alberta in 1981 (total = 2 262 563), the most recent broken down by resident code.

^b Percent of Alberta population in that residence code area that purchased the certificate or licence.

^c Total does not include 591 licences of unknown residence code.

Residents of rural Alberta, including smaller centers (<10 000), represented by residence codes (RC) 5, 6, 7, 8, 9 and 10 (Figure 5) are more likely to hunt white-tailed deer, as seen by licence sales (Table 9). Albertans in the Athabasca-St. Paul (RC 7), Edson-High Level (RC 8) and Peace River areas (RC 9) are most likely to hunt white-tailed deer, whereas only two percent of Calgary and Lethbridge (RC 3 and 4) residents purchased white-tailed deer licences. The percentages of adults who hunt would be higher, given that census statistics include children as well as adults.

In 1990, an estimated 86 percent of those buying a white-tailed deer licence actually hunted, averaging 7.5 days in the field (Table 10). Overall success was 32 percent and hunters averaged 20 days hunting per deer taken. The largest numbers of hunter recreation days were recorded in DMAs 4, 5 and 6. The estimate for DMA 6 is likely inflated, because much of the hunting effort would be principally for elk and moose, with white-tailed deer as a secondary goal. The greatest harvests occurred in DMAs 4 and 5, but DMAs 1, 2, 6 and 8 also contributed significant harvests.

Treaty Indians in Alberta can hunt without a licence under their treaty rights. The most recent estimate (1989) of the Indian population in Alberta was 57 590 (Indian and Northern Affairs Canada, pers. comm.). However, there is no information on how many of these people hunt and what their efforts, success and harvest are for white-tailed deer. Moose and elk are preferred targets because of their larger size, but deer are also taken when available.

Non-resident Hunters

The number of non-resident and non-resident alien hunters has increased significantly from 115 and 83, respectively, in 1980 to 257 and 605 in 1990. Non-resident licences represented one percent of all white-tailed deer licences sold in 1990 (Table 7). In 1990, non-residents and non-resident aliens were required to be accompanied by a Class A, B or C guide to hunt white-tailed deer in Alberta. Non-resident and non-resident alien white-tailed deer hunters accompanying commercial guides (Class A and B) spent 3900 days hunting, or 6.4 days per hunter and took an estimated 295 white-tails,

Table 10. Resident white-tailed deer hunter recreation days, harvest and hunter success by Deer Management Area in 1990 (Fish and Wildlife Division 1991).

Deer Management Area	Number of Hunter Recreation Days Provided	Mean Hunter Days	Number of Deer Harvested		Hunter Success (%)	Hunter Days per Deer Harvested
			Antlered	Antlerless		
1	27 846	3.0	2 734	866	40	7.7
2	36 393	6.2	1 239	355	23	22.8
3	13 055	6.4	203	70	15	47.8
4	118 085	5.7	6 595	2 313	39	13.3
5	100 197	6.0	4 440	1 550	36	16.7
6	114 931	6.4	2 402	426	16	40.6
7	14 154	5.0	440	80	18	27.2
8	40 031	7.1	1 144	182	24	30.2
9	32 345	6.1	760	138	17	36.0
Total	497 037	7.5	19 957	5 980	32	19.2

for a success rate of 48 percent. Data regarding non-residents accompanied by Class C guides (about 245 hunters) were not collected, but would likely be similar to data for resident hunters.

Crippling Losses and Illegal Harvest

Crippling losses from hunting have not been quantified in Alberta, although the Fish and Wildlife Division (1989a) reported that a survey of the literature showed average losses of 23 and 27 percent of reported kill in either-sex and buck-only seasons, respectively. If similar crippling rates occur in Alberta, approximately 6000 white-tailed deer were lost to crippling in 1990.

The size of the illegal harvest of white-tailed deer has not been directly measured in Alberta; a violations-simulation study by Boxall and Smith (1987) indicated that the illegal kill may be about half the legal harvest of deer taken by licensed recreational hunters.

2.3.3.2 Nonconsumptive Uses

Aesthetic Enjoyment

The demand for nonconsumptive wildlife recreational activities, such as viewing, photography and study, is great in Alberta (Phillips et al. 1977; Filion et al. 1989). If estimates developed by Phillips et al. (1977) concerning numbers of Albertans involved in nonconsumptive wildlife activities are applied to 1991, an estimated 2 million Albertans spent 23 million recreation days in the nonconsumptive enjoyment of wildlife in Alberta. The enjoyment of deer would make up a significant portion of this based on estimates from Phillips et al. (1977) that wildlife enjoyment accounted for 40 percent of nonconsumptive activities assessed, and deer were the most commonly listed in the "liked to see" category.

More recently, Filion et al. (1989) divided nonconsumptive wildlife use into activities around one's home, trips specifically planned around wildlife-related activities, and enjoyment of wildlife during trips for other purposes. In 1987, 68 percent of Albertans were involved with some wildlife-related activity around their residences, 22 percent actually planned trips or outings that were

primarily designed for encountering wildlife and 57 percent encountered wildlife during other trips or outings. Using figures from the 1987 census converted to the 1991 population, Albertans engaging in wildlife-related activities around their homes, planning trips to view wildlife, or enjoying wildlife seen on other trips would amount to 1.7 million, 0.6 million and 1.4 million Albertans, respectively. White-tailed deer would be an important species in Alberta for those viewing wildlife.

This recreational pursuit of wildlife will grow, as an estimated 95 percent of Albertans (90 percent nation-wide) are active in one or more wildlife pursuits (Filion et al. 1988). An anticipated 25 percent increase in Canada's population from 1981 to 2001 will increase the number of people active in both consumptive and nonconsumptive wildlife activities (Filion et al. 1988). Although an aging population may result in proportionally fewer hunters in Alberta by 2001 (Boxall and Smith 1986), the number of hunters is expected to rise by 14 percent whereas nonconsumptive wildlifers will rise by 25 percent (Filion et al. 1988).

Scientific Research and Educational Uses

White-tailed deer research has been and continues to be conducted by a variety of agencies such as universities, Natural Resources Service, the Canadian Wildlife Service and private individuals. Past studies have focused on behavior, habitat use, productivity, parasites and disease, and competition and hybridization with mule deer. Some of these studies are ongoing.

Deer are an important component of wildlife-related educational materials (e.g., "Project Wild"), particularly in dealing with subjects such as population regulation and habitat requirements.

2.3.3.3 Commercial Uses

Commercial uses of white-tailed deer consist of supporting outfitters and guides who service hunters seeking trophy males and keeping white-tailed deer in zoos and game farms for public viewing and sale of breeding stock. The number of white-tailed deer hunters who were guided by commercial outfitter/guides in 1990 was 615.

Significant licence sale increases indicate that commercial guides outfitters have actively advertised for clients, particularly non-resident aliens, through magazines and hunting "trade" shows throughout the United States. The majority of non-resident aliens are Americans in pursuit of large trophy bucks.

As of September 1991, there were 175 licensed big game farms in Alberta, of which 39 held a total of 409 white-tailed deer. Big game farm operators can only obtain deer from other licensed big game farms, licensed or permitted trapping operations and orphaned fawns as available from Natural Resources Service. Importing white-tailed deer is prohibited, given the real danger of bringing in white-tailed deer infected with meningeal worm.

Publicly owned zoos and wildlife parks display white-tailed deer in Alberta. As well, the 60 commercial trail ride operations in the Eastern Slopes use white-tailed deer as part of the wildlife-viewing opportunities provided.

2.3.4 The Value of White-tailed Deer to Albertans

This section will outline both the positive benefits and costs associated with white-tailed deer populations in Alberta.

2.3.4.1 White-tailed Deer Hunting

Both Phillips et al. (1977) and Fillion et al. (1989) studied the economic values of big game hunting in Alberta. Phillips et al. (1977) estimated average costs for Albertans hunting big game in 1975 and separated these costs into licence fees, capital costs (e.g., guns, vehicles and special gear) and variable costs (e.g., ammunition, travel, lodging, food, rentals and meat cutting). An extramarket benefit (i.e., the amount that hunters said they would pay over and above current expenses) was also estimated. As neither study separated white-tailed deer from other big game, all calculations in this document assume that white-tailed deer represent 40 percent of big game values, based on licence sales in 1990.

Phillips et al. (1977) estimated licence fees, capital costs and variable costs to total \$352.89 per year for resident big game hunters in 1975 (Table 11). Adjusted to 1990 dollars and reduced to include only white-tailed deer hunting, these fees and costs would total an estimated \$918 per year. Filion et al. (1989), in a 1987 study, found that Alberta hunters spent an average of \$683 per year, somewhat lower than the adjusted estimate based on Phillips et al. (1977). However, Filion et al. (1989) included bird hunters, who would have lowered the average since bird hunters spend less money than big game hunters (Phillips et al. 1977).

In 1990, resident white-tailed deer hunters spent, on average, \$354 per active hunter for an estimated total of \$25.4 million (Table 11). The value of meat is estimated to be an additional \$4.2 million and the extramarket value (assuming no change in hunters' opinions of big game hunting in Alberta) would be \$14.1 million. Grand total value for resident white-tailed deer hunting in 1990 is almost \$44 million (Table 11).

Non-resident contributions would be less; although, in 1990, 863 non-residents spent \$100 000 in licence fees. Commercial outfitter-guides provided hunts for 614 of the 863 hunters. Assuming clients spent an average of \$500/day and hunted for six days, these non-residents brought about \$1.8 million into the Alberta economy. Much of this expenditure benefits smaller local economies, particularly in east-central Alberta.

2.3.4.2 Nonconsumptive Use of White-tailed Deer

It is very difficult to obtain dollar values for nonconsumptive use of wildlife because this activity is often associated with many other things we do. Furthermore, nonconsumptive use is not usually species-specific, so it would be difficult to assign a value to a particular animal. Both Phillips et al. (1977) and Filion et al. (1989) calculated values for nonconsumptive use. Phillips et al. (1977) provided only an extramarket value of \$3 per participant per day for all wildlife or a total of \$50 035 800 that, when adjusted to 1990 using changes in the consumer price index, would be \$130 million. Deer were first in a list of animals that people most like to see.

Table 11. Estimated monetary value of resident white-tailed deer hunting in Alberta in 1990.

Value Category	Value Estimate per Active Resident Big Game Hunter in 1975 (dollars) ^a	Value for White-tailed Deer in 1990	
		Per Active Hunter (dollars) ^b	Provincial Total (dollars in millions)
Licence	9.56	15.00 ^c	1.25
Capital	189.97	187.69	13.36
Variable	153.36	151.52	10.78
Meat	N/A ^d	58.85 ^d	4.19
Extra market	200.85	198.43	14.12
Total	553.74	611.49	43.7

^a Data from Phillips et al. (1977)

^b There were 71 173 active white-tailed deer hunters out of a total of 83 187 licences purchased. The active number was used for all calculations except for the "licence" value category, for which the total number of licences was used.

^c Actual licence cost was used. For all other calculations in this column the 1975 figure was adjusted to 1990 using a consumer price index change of 2.6 and multiplying by 38 percent (the percentage of big game licences represented by white-tailed deer).

^d Phillips et al. (1977) did not provide meat value. The calculation for this study assumes an average carcass weight of 45 kg at a cost of \$3.50/kg. The 1990 harvest estimate is 26 596 white-tailed deer.

The Filion et al. (1989) study determined expenditures for trips where the primary intent was nonconsumptive wildlife use. Twenty-two percent of Albertans participated in these types of trips and spent \$771 per year for equipment, supplies and services. Adjusted to 1990 this would be \$873 per participant per year or a total of \$480 million. Forty-five percent of Canadian encounters (no data specifically for Alberta) involved large mammals (Filion et al. 1989). Data were not given for white-tailed deer, but if they are assumed to make up about 20 percent of the large mammal encounters, then expenditures attributed to them would be \$43 million. Values for "other" nonconsumptive activities were not calculated for Alberta, but would be about \$35 million for white-tailed deer, if similar to the national percentages where primary nonconsumptive trips accounted for 43 percent of expenditures, hunting was 22 percent and other activities, 35 percent.

Although the accuracy of these estimates is assuredly questionable, it is obvious that nonconsumptive uses of white-tailed deer, both alone and in conjunction with other wildlife, provide an important stimulus to the Alberta economy. The total value of hunting and nonconsumptive use of white-tailed deer appears to be about \$124 million annually.

2.3.4.3 White-tailed Deer Damage in Alberta

Deer cause damage (in approximate decreasing order of importance) to stacked hay or greenfeed during winter, hay fields, swaths left over winter, shrubs and trees (ornamental, fruit-producing and shelterbelts), winter crops, pasture, cereal grains in summer and fall, gardens, seed crops, stored grain, single hay bales left in the field and fences. Deer are also involved in vehicle collisions.

The average number of deer damage complaints annually, during 1982 to 1991 (both species), was 332 (Table 12). Damage by white-tailed deer averaged slightly higher than mule deer during this period, but over 35 percent of damage claims did not specify which deer species was involved. Crop damage complaints accounted for 67 percent of all complaints, whereas tree and garden complaints were 11 and 22 percent,

Table 12. Number of deer damage complaints by damage class in Alberta during 1982-1991^a.

Year ^b	White-tailed Deer			Mule Deer			Unclassified Deer			Total Deer		
	T ^c	G ^d	C ^e	T	G	C	T	G	C	T	G	C
1982-83	2	7	30	6	16	31	12	25	61	20	48	122
1983-84	5	8	42	8	21	53	7	41	96	20	70	191
1984-85	13	13	274	37	37	226	24	41	261	74	91	761
1985-86	4	20	78	7	30	80	14	37	134	25	87	292
1986-87	8	10	59	7	17	31	4	30	54	19	57	144
1987-88	6	4	20	8	18	12	8	31	26	22	53	58
1988-89	16	15	85	5	7	67	15	23	64	36	45	216
1989-90	19	29	59	6	6	56	14	34	48	39	69	163
1990-91	43	32	111	17	32	93	18	40	64	78	104	268
Total	116	138	758	101	184	649	116	302	808	333	624	2215
Mean	13	15	84	11	20	72	13	34	90	37	69	246

^a Data source - District Occurrence Reports, Alberta Fish and Wildlife Division.

^b Year is April 1 to March 31.

^c T stands for the tree damage class.

^d G stands for the garden damage class.

^e C stands for the crop damage class and includes standing, swathed, combined, stooked, stacked and other (e.g., bales in the field).

Table 13. Number of deer-related crop damage complaints by crop category in Alberta during 1982-1991^a.

Deer Species	Crop category						Total
	Standing	Swathed	Combined	Stooked	Stacked	Other	
White-tailed	70	118	19	18	405	128	758
Mule	90	32	16	8	431	72	649
Unclassified	94	144	38	20	369	143	808
Total Deer	254	294	73	46	1205	343	2215
Mean ^b	28	33	8	5	134	38	246

^a Data source - District Occurrence Reports, Alberta Fish and Wildlife Division.

^b Refers to the average number of complaints annually from 1982 to 1991.

respectively. Among crop damage complaints, damage to stacked crops (hay) accounted for 54 percent of all complaints, followed by standing and swathed crops, which accounted for 12 and 13 percent, respectively (Table 13).

When white-tailed deer damage complaints are examined according to administrative regions (Table 14), the Southern, Central and Northeast Regions have borne most of the complaints (with 25, 33 and 37 percent, respectively, of all damage complaints during 1982 to 1991). These three regions have most of the white-tailed deer in the province, as well as the bulk of Alberta's agricultural developments.

Damage to stored, baled and stacked crops as well as trees, shrubs and gardens is not eligible for compensation. Losses to hay fields and pasture are very difficult to measure. Landowners often do not report deer damage to crops. Consequently, it is difficult to make estimates of total crop losses. Nonetheless, owners of damaged field crops and swathed crops are eligible to receive compensation payments through the Wildlife Damage Fund. The acreage damaged, compensation paid and actual crop value for the years 1980 to 1990 are outlined in Table 15. Statistics for crop damages caused by deer (as paid from that fund) during 1980-1990 provided an annual average of 1368 ha damaged, \$122 150 compensation paid and an actual value of damaged crops of \$209 544 (Table 15). Wig (1980) estimated loss to feed stacks at \$778 per complaint for deer. This represents an additional average annual loss of \$104 252.

Statistics from Alberta insurance companies indicated that there were 2992 automobile accidents in 1980 that involved collisions with wild or domestic animals, resulting in \$3 million in vehicle damage and 147 human injuries but no fatalities (Sanderson 1983). Seventy-eight percent involved wild animals, but there is no breakdown by species. Deer would likely have been involved in a high percentage of the wild animal collisions. Recent statistics are not available but higher deer populations and increased levels of traffic would suggest there would be significantly more collisions today. Nevertheless, available information indicates that the average annual damage caused by deer is in the \$1 million to \$3 million range in

Table 14. Distribution of white-tailed deer damage complaints in Alberta during 1982-1991 by administrative region^a.

Damage Complaint Class/Category	Fish and Wildlife Administrative Region											
	Southern		Central		Eastern Slopes		Peace River		Northeast		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Tree	39	15	48	14	2	5	6	13	21	6	116	11
Garden	45	18	64	19	7	18	3	7	19	6	138	14
Crop-Standing	13	5	22	7	2	5	5	11	28	8	70	7
Crop-Swathed	3	1	18	5	5	13	8	17	84	25	118	12
Crop-Combined	3	1	7	2	0	0	1	2	8	2	19	2
Crop-Stooked	0	0	2	1	0	0	2	4	14	4	18	2
Crop-Stacked	134	52	141	42	18	45	9	20	103	31	405	40
Crop-Other	19	7	34	10	6	15	12	26	59	18	128	13
Total	256	100	336	100	40	100	46	100	336	100	1012	100
Mean ^b	28	25	37	33	4	4	5	5	37	33	111	100

^a Data source - District Occurrence Reports, Alberta Fish and Wildlife Division.

^b Refers to the average number of complaints annually from 1982 to 1991.

Table 15. Number of hectares of crops^a damaged by deer, compensation paid for this damage by Alberta Hail and Crop Insurance Corporation and actual value of the damaged crops in Alberta from 1980-1990^b.

Crop Year ^c	Area of Crops Damaged (ha)	Total Compensation Paid for Damage (\$)	Actual Dollar Value of the Damaged Crops (\$)
1980	407	24 738	51 265
1981	113	6 608	17 663
1982	382	23 717	50 211
1983	93	8 287	15 306
1984	4 059	367 419	602 744
1985	5 758	567 952	882 299
1986	1 540	151 857	296 194
1987	163	6 696	27 620
1988	444	21 474	93 909
1989	1 682	134 608	212 583
1990	410	30 294	55 189
Total	15 051	1 343 650	2 304 983
Mean	1 368	122 150	209 544

^a Crops in this table include only standing and swathed crops (which are eligible for compensation) and do not include combined, stoked, stacked or other crops or garden or tree produce (which are not eligible for compensation).

^b Data source - Alberta Hail and Crop Insurance Corporation.

^c Crop year in this table is the period January 1 to December 31.

Alberta, which is very small compared to their estimated economic benefit of \$124 million annually.

2.3.5 Current Management Programs for White-tailed Deer in Alberta

The Fish and Wildlife Policy for Alberta sets a general goal of maintaining the current population and habitat for white-tailed deer (Fish and Wildlife Division 1982). The present management program is designed to meet this goal, to maintain hunting opportunity, to enhance hunter-landowner relations and to minimize damage caused by white-tailed deer.

2.3.5.1 White-tailed Deer Population Inventory

Inventories (surveys) of white-tailed deer populations can determine numbers, densities, distribution, use of different habitats, age/sex ratios and productivity. Annual inventories are ideal in Alberta, where the climate can cause significant fluctuations in numbers from year to year and where populations are intensely hunted in some areas. The basic geographic unit for deer surveys is the WMU. Extensive surveys of WMUs are used for reconnaissance purposes in order to locate smaller areas for regular intensive monitoring. The intensive surveys focus on selected areas of stratified habitat.

There are many techniques available for deer population inventories, including track counts, pellet counts, browse surveys, night-lighting, counts from a vehicle, aerial surveys and extrapolation of hunter harvest data. All methods have both strong and weak points. The techniques that come closest to meeting the needs in Alberta are aerial surveys and harvest questionnaires.

Aerial surveys produce usable information over large geographic areas where manpower and funding are limited, but they do have drawbacks. The technique works well where deer are highly visible--in open prairie and deciduous-dominated forested habitats. Even in these habitats, though, it is likely that some of the deer are missed, depending on cover density. Aerial surveys can only be used effectively in DMAs 1, 2, 4 and parts of 5 and 8; the other DMAs have

too much coniferous forest that greatly impedes visibility. Another drawback is that aerial surveys generally must be conducted during the winter, so there is little information about deer distribution and habitat use in other seasons.

A survey approach was put together in July 1985 as the "Provincial Survey Format for Mule Deer and White-tailed Deer" (Appendix II). The survey format includes both deer species because of the significant range overlap in Alberta. Surveys were prioritized and WMUs were placed on a rotation system based on information needs, visibility limitations and cost considerations.

The following is a summary of the 1985 deer survey format for Alberta. Winter aerial deer surveys will not be conducted in DMAs 3, 6, 7, 9 and most of 5 and 8 because WMUs in these DMAs have too much coniferous cover, do not make a significant contribution to recreational deer hunting in Alberta, or populations are not presently experiencing high levels of hunting pressure.

Twenty-nine of the 30 WMUs in DMA 1 are scheduled for aerial deer surveys. Eight of the 29 will be surveyed every third year, and the remaining 21 will be surveyed every second year. Eight of the nine WMUs in DMA 2 are scheduled for aerial surveys. Two of the eight will be flown every third year, and the other six will be covered every second year. Only 20 of the 34 WMUs in DMA 4 are scheduled for aerial deer surveys. Two of the 20 (Camp Wainwright) will be flown annually, whereas the rest will be flown every third year. The rotational survey is designed to sample several WMUs in the prairie and parkland cover types each year and cover all the better deer habitat at least once every three years.

The aerial surveys are designed as follows: in DMA 1 (prairie), to census permanent blocks of known area that are located within good deer habitat; in DMA 2 (foothills), to census permanent known-area blocks in some WMUs and random stratified square-mile quadrats in other WMUs; in DMA 4 (parkland), to census random, stratified square-mile quadrats. These surveys all require the deer habitats in these WMUs to be mapped and evaluated for capability and the areas of the various habitat types to be measured. Current surveys are

designed at a sampling intensity that will provide population estimates for the WMU at a precision level of plus or minus 30 percent.

Since 1985, the Southern, Central and Northeast Regions have generally followed this format. However, reduced funding for aerial surveys has extended the period of rotation for some WMUs, particularly those considered lower in priority. Very mild winter weather in some years in the prairie/parkland area has also forced cancellation of surveys in some years.

Although not part of the deer survey format, rotational surveys for moose and elk in DMAs 5 and 8 do provide useful information on deer populations. There are also periodic surveys done for special projects such as the Strathcona County Deer Hunt.

Although not presently conducted, early spring aerial surveys may be possible in some parts of DMA 3, such as WMUs 400 and 402. Deer will venture out of heavy cover onto open slopes to feed on grasses during "green-up." This survey timing is used in Montana (L. Gudmundson, pers. comm.).

2.3.5.2 White-tailed Deer Habitat Inventory

Mapping and assessment of white-tailed deer habitats is being done at several different levels in Alberta. Current habitat suitability was classified as best, moderate, poor or inadequate on a 1:1 000 000 scale Ecological Landscape Classification (ELC) Map that depicts 12 climatic regions and 278 ecological subregions (Pedocan 1984). Provincially, there were 60 787 km² of "best" (10 percent of Alberta), 82 763 km² of "moderate" (14 percent), 288 903 km² of "poor" (47 percent) and 176 120 km² of inadequate habitat (29 percent). Mean summer densities for these four classes were respectively estimated to be 1.0 deer, 0.4 deer, 0.1 deer and 0.0 deer per km² (giving a provincial total of 122 782 white-tailed deer--Fish and Wildlife Division 1985). This habitat classification scale is useful only at a provincial overview level.

This 1:1 000 000 ELC-type landscape map has been tested at the 1:250 000 scale for two map sheets (Rocky Mountain House [RMH]-83B and Wapiti-83L) in Alberta. The 278 habitat subregions were subdivided

into "wildlife habitat districts"--there were 258 wildlife habitat districts (WHDs) on the RMH mapsheet and only 106 on Wapiti, where mapping detail was reduced. Current habitat suitability was assessed for white-tailed deer on these map sheets. This scale is useful for planning at the WMU level but is still inadequate for dealing with deer populations from a stratified survey or habitat protection/development point of view. Subsequently, a second approach was developed in the mid-1980s. Rather than ELC-type maps, a base map representing current vegetation cover was developed at a scale of 1:100 000 using satellite imagery and recent air photos. The vegetation map was then classified into four strata based on different current densities of deer so it could be used to conduct stratified aerial surveys. Although not strictly a deer capability map in the ELC sense, these maps are very representative of current deer habitat use and capability. In the Southern Region, all of the prairie and foothill WMUs have been mapped using this approach.

Other habitat mapping efforts in the 1980s concentrated on the quarter-section to one section level, a scale that approximates home range sizes for deer. Such maps are very effective in establishing stratified habitat survey blocks and for habitat protection/development efforts. In the Central and Northeast Fish and Wildlife Regions, deer habitat mapping and assessment have been completed at this scale for 50 of the 62 WMUs in their jurisdictions (refer to Appendix III for an outline of techniques used). The remaining 12 WMUs, all in the Northeast Region, are in boreal habitats that are classified as low priority for deer. However, information gathered during moose habitat assessment may be useful for a preliminary assessment of deer habitat in these WMUs. For example, recent moose surveys in WMU 514 have shown white-tailed deer using muskeg and boreal coniferous forest up to 32 km from the closest agriculture (B. Rippin, pers. comm.). Deer habitat has been assessed using this scale for all of DMAs 2 and 4 and parts of DMA 5. The best habitat in the rest of the DMAs in the province was identified under an older system of "Wildlife Key Area" mapping, which will now be discussed briefly.

The "Wildlife Key Area Maps" began development in 1972 and have been updated several times since then. These maps identified "key"

deer range, which included the "best" deer habitat, especially important winter ranges. The designated key areas did not include much of what the current system would identify as "moderate" or "poor" habitat. The key area maps were intended to identify the most important habitat for land use planning and habitat protection purposes. This information was provided to many government agencies and the public and became the basis for the Agency's involvement in the Land Use Referral process in government. The major limitation of this system was and is its failure to include lower quality but important deer habitat that, in many areas, supports most of the deer population because there is very little or no "best" habitat present. The new system, presented in the previous paragraph was intended to replace the Wildlife Key Area Maps for deer in DMAs 1, 2 and 4 and part of 5 and 8, but Key Area Maps will remain in DMAs 3, 6, 7, 9 and the rest of 5 and 8 until a more suitable system for deer habitat in these areas is found.

The habitat inventory discussed up to this point has dealt mainly with programs that determine how much habitat exists and where it occurs. This approach reveals very little about the quality of the habitat (i.e., the ability of habitat to provide food and cover for the deer). Isolated studies have examined cover and browse (food) quality in Alberta, but there is no systematic and quantitative assessment of deer habitat quality, annually or otherwise. Regional staff periodically conduct limited spot checks of browse quality in response to events such as hard winters, drought or suspected overpopulation. Jaques (1980) examined 259 sites in the aspen parkland of Red Deer County and found that about 60 percent of these sites were only poor to fair for deer, as a result of intensive livestock use. This impact is one of the reasons deer populations are often lower than expected when only the quantity of deer habitat is assessed rather than quantity and quality.

2.3.5.3 White-tailed Deer Habitat Protection and Development

The approaches to habitat protection differ for public as opposed to private land. Nevertheless, the intent is to retain existing

quantities and qualities of habitat in both cases. On public land, important deer habitat has been identified through habitat assessment; Fish and Wildlife management interest has been declared through the Wildlife Key Area Maps and the public land reservation system.

Through the referral process, the Fish and Wildlife managers make recommendations that result in habitat retention, reduce the impacts of various land uses or mitigate habitat losses resulting from the land uses. The land uses in question include activities associated with seismic lines, wellsites, pipelines, power lines, coal mines, water impoundments, cutblocks in timber harvesting, roads, clearing for cropland, more intensified grazing, urbanization, industrial plant sites and high-density outdoor recreation developments.

During the last decade, the government developed a process through which large blocks of public land are allocated to different land uses through integrated resource plans (IRPs). White-tailed deer and other wildlife needs are identified and discussed during the planning process, with a view to incorporating these needs in the IRP. There are often conflicting needs for the land base, so the long-term stability of wildlife populations will require enhancement/mitigative strategies to offset habitat losses to other land uses.

There are also smaller parcels of public land where wildlife values are part of the planning process, such as the Range Improvement Program administered by the Public Land Management Branch and timber harvesting plans worked out between Land and Forest Service and timber companies. Wildlife concerns also form part of the input for major projects such as the Dickson Dam managed by Alberta Environmental Protection and the Oldman River Dam managed by Alberta Public Works, Supply and Services.

The approach for habitat protection on private land occurs through planning and dealing directly with private landowners. The planning level inputs were made into the regional planning commission plans and at the county, municipal district, improvement district and special area levels in the 1970s and early 1980s. Generally, the plans identified important wildlife areas, including white-tailed deer range, and stressed their importance to local people, although there

were no land use bylaws that specifically protected habitat solely for wildlife.

Dealing directly with landowners focuses efforts on four areas. The first area involves the provision of information on the habitat requirements of deer and techniques to attract them. The second area involves assistance in the prevention of deer damage. The third area is the promotion of better hunter-landowner relations through hunter training, the Use Respect Program and enforcement of trespass laws. The fourth area is the provision of direct incentives to retain and/or improve wildlife habitat by providing cooperators with recognition items (such as signs, hats, pins or crests), cash payments, tax relief and developments such as fencing, watering sites and stream crossings to improve livestock management. To this end, a pilot program was initiated in the county of Red Deer in 1986 by Alberta Fish and Wildlife Division and Wildlife Habitat Canada to provide various financial incentives to landowners to retain wildlife habitat on their lands. The program expanded to include the counties of Red Deer and Minburn, and the Eastern and Bow River irrigation districts. The program was completed in 1990 and has retained 16 252 ha (40 158 ac.) of wildlife habitat, with 278 landowner agreements. The early success of the Landowner Habitat Program resulted in the establishment of the Riparian Habitat Project, which offered incentives to landowners to retain habitats along the Battle River during 1988-1991. This latter program resulted in 65 landowner agreements and 4185 ha (10 341 ac.) of habitats retained. The white-tailed deer is one of the many species that are benefiting from these programs.

Habitat development projects that either directly or indirectly enhance white-tailed deer habitats have occurred in all DMAs. Some projects have been aimed at increasing the carrying capacity of the range by increasing the food component (and in some cases cover as well), whereas others have had indirect benefits for white-tailed deer. For example, white-tailed deer have benefited from creation of large cattail marsh complexes in southern Alberta. Habitat development projects are funded by Buck for Wildlife donations and are administered by Natural Resources Service, but volunteer efforts by

groups like the Alberta Fish and Game Association increase the success of this program. Habitat enhancement efforts must expand in the future to keep pace with anticipated losses of habitat and lowering of habitat quality in some areas, particularly in the parkland (B. Rippin, pers. comm.).

However, development projects will represent only a small fraction of the habitat needed to maintain white-tailed deer populations. The bulk of the habitat must be retained and managed through habitat protection and integrated resource planning and management.

2.3.5.4 White-tailed Deer Population Management and Recreational Hunting

The current white-tailed deer population goal is to maintain the present herd. A secondary goal is to examine the feasibility of increasing white-tailed deer numbers in DMA 2, 4 and 5 (where hunting interest is high) and in DMAs 6 and parts of 8 and 9 where white-tailed deer have increased in numbers in recent years. These increases are probably a result of a series of mild winters, timber harvesting and/or agricultural development in mixedwood forests. White-tailed deer are limited by habitat quality and quantity, weather severity, competition with domestic and wild ungulates, predation, parasites and diseases, accidents and hunting. Although effects of these factors can be manipulated with varying degrees of success by management, current effort is directed toward hunting, since it has replaced much of the mortality attributed to the other factors. This section deals with the management and allocation of hunting opportunities for white-tailed deer in Alberta and Section 2.3.5.7 will deal with the other mortality factors.

The current system, which allocates white-tailed deer recreational hunting opportunities, attempts to provide hunters with opportunities to enjoy deer hunting, obtain deer meat and hunt for trophy white-tailed deer bucks, but also attempts to minimize hunter-landowner conflicts and (through the use of hunting harvests) minimize deer property damage by maintaining populations at acceptable levels.

Several general principles have been applied to the setting of white-tailed deer seasons. There are common opening and closing dates over wide areas to provide hunting opportunity and to disperse hunters. Antlered white-tailed deer seasons are usually longer than hunting seasons for antlerless white-tailed deer (Table 6); in 1990 general season lengths were 27-82 and 3-27 days for antlered and antlerless white-tailed deer, respectively. The antlerless deer general season usually opens after the season opening for antlered deer. Seasons are longest (83 days for males and 27 days for female white-tailed deer) in DMA 9 where white-tailed deer are less vulnerable, escape cover is abundant and hunting pressure is low. Seasons become progressively shorter as hunting pressure increases (e.g., 75 days in parts of DMAs 6 and 8 and 60 days in DMAs 3 and 7). The shortest seasons for male white-tailed deer are in DMAs 1, 2, 4 and 5 (12 to 24 days) where deer are vulnerable (escape cover is limited), hunting pressure is heavy and the majority of hunting is on privately owned land.

Deer hunting seasons usually start after nonconsumptive recreational uses decline in mid-September and before the stresses of winter begin in mid-December. Limited-entry draws such as authorizations are used to control harvests and/or the numbers of hunters. Authorizations were used in DMAs 1 and 3 in 1990. "Archery-only" seasons have been established in recognition of the different hunting technique used by bowhunters. "Archery-only" seasons occur before regular rifle-hunting seasons in all DMAs.

2.3.5.5 Recreational Goals for White-tailed Deer Hunting

Deer Management Areas 1, 2 and 4

Hunting pressure and harvests are both high for white-tailed deer in these traditional white-tailed deer hunting areas (Tables 5, 10). Information on populations and habitat is good, but escape cover is limited and 82 percent of the land base is privately owned. The goal is to provide recreational opportunity through a sustained yield, to maintain deer numbers at levels acceptable to landowners (i.e., control damage) and to maintain good hunter-landowner relationships.

In DMA 1, the seasons for both antlered and antlerless white-tailed deer were aligned with seasons for mule deer. Harvest, hunter numbers and landowner disturbance were managed using a 12-day season (Thursday to Saturday only; November 8 to December 1 in 1990) for antlered deer and a limited-entry draw (authorizations) for antlerless deer. Although the shortened season reduced landowner disturbance, there were a few complaints regarding reduction of hunting opportunities and a shift of hunting pressure to surrounding areas.

The antlered white-tailed deer season in DMAs 2 and 4 was 24 days, whereas the antlerless season was considerably shorter (6 days) in DMA 2 and 24 days in DMA 4. Shortened antlerless white-tailed deer seasons in DMAs 5 and 6 and shortened seasons in DMA 1 in 1988 caused some hunters to shift to DMA 4. The ongoing loss of habitat in DMA 4 also increases white-tailed deer vulnerability. These factors will be monitored to ensure harvest goals are not exceeded and determine whether adjustments are required.

Deer Management Area 3 - The DMA contains Kananaskis Country (K-Country) and WMUs 400 and 402. White-tailed deer are vulnerable in this area because they are found near roads, campsites and other developments and along valley slopes. The antlered white-tailed deer season is 60 days in length, but hunter numbers and hunting pressure are controlled in K-Country by use of authorizations. The antlerless white-tailed deer season harvest is also controlled by the use of authorizations in K-Country, and by a 6-day season in WMUs 400 and 402.

Deer Management Area 5 - The DMA contains both settled agricultural and mixedwood forest areas. Population and habitat information are limited but data are currently being collected. Hunting pressure is high (Table 5) but vulnerability varies from high in settled areas (particularly in the south), to low along the northern and western portions. The antlered white-tailed deer season is 24 days, but the antlerless season varies from 6 days in the southern portion to 24

days elsewhere. The impact of shortening the antlerless season in the south and shifting hunting pressure to DMA 4 is being assessed.

Deer Management Areas 6, 7, 8 and 9 - Accurate population estimates for white-tailed deer in DMAs 6, 7, 8 and 9 are not possible because habitat suitability for white-tailed deer has not been mapped and population inventory is currently impracticable. Information from trappers and hunters and sightings during moose surveys indicate that white-tailed deer are pushing westward and northward. Not all sightings are associated with agricultural or timber operations; approximately 400 white-tailed deer were seen in muskeg and coniferous forest habitats during a moose survey of WMU 519 in 1989 (Gunderson 1989).

The goal in these DMAs is to provide relatively high levels of recreational opportunity with long seasons for antlered white-tailed deer (60-72 days) and shorter seasons for antlerless white-tailed deer (6-24 days). Escape cover is abundant and hunting pressure is relatively low, except for the southern portion of DMA 6 where pressure is moderate to high, and in parts of DMA 8. There was considerable resistance to antlerless white-tailed deer seasons in DMA 8, but continued healthy populations have dispelled most concerns. The white-tailed deer populations in these DMAs appear capable of sustaining current levels of harvest and hunting pressure.

2.3.5.6 Harvest Goals for White-tailed Deer Hunting

Harvest goals (expressed in terms of percentage of the preseason population), range from 5 to 10 percent for antlered white-tailed deer and 6 to 12 percent for antlerless deer (Table 16). These rates are designed to maintain current populations.

There are two main strategies for controlling the harvest of antlered white-tailed deer (bucks)--season length and use of limited-entry draws. In DMA 1, a short 12-day season has been used since 1988. In other DMAs, varying season lengths were used to control the harvest. Long seasons are used in areas of abundant escape cover and relatively light hunting pressure, such as DMAs 6, 7,

Table 16. Hunting season lengths and harvest goals (% of preseason population) for white-tailed deer by Deer Management Area in 1990.

Deer Management Area	Season Length(Days) ^a		Harvest Goals (% of Preseason Population)	
	Antlered	Antlerless	Antlered	Antlerless
1	12	12 ^b	10	12
2	24	6	10	12
3	60 ^b	6-60 ^b	5	6
4	24	24	10	12
5	24	6-24	10	12
6	66	6-24	10	6
7	60	24	10	6
8	66	24	10	6
9	72	24	10	6

^a Range given if more than one season length in Deer Management Area (DMA).

^b Numbers of hunters are controlled by an authorization draw. In DMA 3, authorizations were required only in Kananaskis Country (WMUs 404, 406, 408).

8 and 9. Hunting in these latter DMAs is not limiting white-tail populations, because winter weather ultimately controls numbers and distribution. In Kananaskis Country, a limited-entry draw is used. Population estimates are not precise and thus permit numbers are conservatively set to ensure a low harvest, yet allow some opportunity and a high quality hunt for those drawn.

The harvest management strategies for antlerless white-tailed deer consist of seasons that are usually shorter than buck seasons or involve the use of authorizations/special licences to control the harvest of females and fawns. Abundant populations allow antlerless seasons in DMA 4 and in a portion of DMA 5 to be the same as bucks. The high productivity of white-tailed deer allows for antlerless harvest rates of 12 percent in DMAs 1, 2, 4 and 5, but rates of 6 percent are used throughout the rest of the province where populations are subjected to more severe climatic conditions and population estimates are of unknown accuracy.

The Harvest Information System for White-tailed Deer - Systematic population inventories are conducted only in DMAs 1, 2, 4 and a small part of 5. Habitat inventories are continuing in DMAs 1, 2, 4 and part of 5 but are not yet complete. It is essential with an incomplete database like this that the harvest data collection system provides annual information at the WMU level. Harvest data can provide information on the population age and sex structure as well as information on whether the harvest rate is too high or too low in relation to the harvest goal. Past harvest data have been insufficient at the WMU level.

The telephone survey of hunter harvests (Fish and Wildlife Division 1988a, 1988b, 1989b, 1990, 1991, 1992) provided sufficiently precise data for some WMUs but not for others. The data collected were most useful at the DMA level and provided information on hunter effort (recreation days), number of deer harvested and hunter harvest success rates. This information is used in conjunction with population inventory data to determine whether harvest goals are achieved, to make adjustments in the harvest and to redirect hunter effort, as necessary, in the subsequent hunting seasons. In the

absence of population inventory data, the information can also be used to estimate numbers of deer in the population.

The age data obtained through incisor bar collections are part of the harvest information because questionnaires, by themselves, do not provide information on the population age structure. Age composition of the harvested population provides information on the population as a whole in respect to productivity and the effect of current harvest regimes, even though there are biases in the jaw samples (e.g., hunters select certain animals or are directed to certain animals by regulations). Lumping of data at the DMA level is often necessary to obtain sufficient sample sizes. This lumping means the information will not be accurate for some WMUs, but this inaccuracy is acceptable for white-tailed deer where harvests are controlled primarily at the DMA level. Incisor bars have not been collected for white-tailed deer in recent years, because the provincial population is doing very well and other species such as moose and elk have a higher priority.

2.3.5.7 White-tailed Deer Population Management and Non-hunting Mortality

Non-hunting mortality factors that limit the white-tailed deer population are habitat quantity and quality, weather severity, competition with other wild and domestic ungulates for food and cover, predation, parasites and diseases, and accidents.

Habitat - The amount and quality of habitat and annual variations in weather severity ultimately determine annual natality, survival and recruitment. Habitat inventory, retention and development programs have been covered previously in Sections 2.3.5.2 and 2.3.5.3.

Weather Severity - Weather severity is monitored in a general way during the critical winter months. The Natural Resources Service has responded to severe winters in a few local areas during some years and in a widespread fashion during the winter of 1984/85 by providing emergency winter feed. This latter program cost \$334 000, involved assistance of about 400 volunteers and reached 7000 of the estimated 190 000 deer (both mule and white-tailed). The traditional approach

has been to regard winter mortality as a natural, annual event and to intervene only under severe emergency conditions (Gurba and Neave 1979). The use of winter feeding sites to intercept deer and prevent damage of stored livestock forage is one of the techniques used by the Natural Resources Service. These feeding sites supplement natural foods and may reduce overwinter mortality in the immediate vicinities of the sites.

Competition - Competition is occurring with domestic sheep, cattle and horses, as well as other wild ungulates (mule deer, moose, elk, bison), but the overall impact on white-tailed deer is not well documented. Some of these competitive interactions have been studied in Alberta (Rhude and Hall 1977; Jaques 1980; Berg 1983). Jaques (1980) showed that intensive livestock grazing greatly reduced the quality of white-tailed deer habitat in Red Deer County. The Natural Resources Service is currently working on programs to minimize competition with domestic livestock for the benefit of white-tailed deer (e.g., forage allotments for both cattle and wild ungulates like white-tailed deer in integrated resource plans). White-tailed deer populations in DMA 1 are being harvested at a much higher rate than mule deer, to ensure they do not take over mule deer range.

Predation - Wolves, coyotes, cougars, Canada lynx and bobcats are known to prey upon white-tailed deer. Although the impacts of such predation have been shown to be significant in other parts of North America, the effects on deer populations have not been well documented in Alberta. White-tailed deer are known to be an important prey species for wolves in some parts of the foothills and mountains; it is conceivable that wolves may constitute an important limiting factor in these places. There are no programs presently in place to reduce predators specifically to increase white-tailed deer populations. However, hunting, trapping and agricultural pest control practices (e.g., wolf control in agricultural fringe areas and coyote control on domestic livestock ranges throughout Alberta) probably benefit white-tailed deer in various parts of the province.

Parasites and Diseases - Parasites and diseases of white-tailed deer are monitored by the Natural Resources Service, universities (particularly the University of Alberta, Department of Biological Sciences) and the Provincial Veterinary Laboratories at Airdrie, Edmonton, Fairview, and Lethbridge. The only disease documented to affect large numbers of deer was epizootic hemorrhagic disease, which was associated with 18 mule deer and 440 white-tailed deer found dead in southeastern Alberta in 1962 (Chalmers et al. 1964). The cumulative effect of the various parasites and diseases on deer is not documented in Alberta. Parelaphostrongylus tenuis, a brainworm parasite of white-tailed deer in eastern North America, has not been detected in Alberta (M. Pybus, pers. comm.). Although this parasite does not cause serious problems in white-tailed deer, it can significantly increase mortality in mule deer, caribou and moose through neurologic disease. Efforts such as prohibiting importation of ungulates to Alberta are aimed at preventing this parasite/disease from reaching Alberta.

Accidental Deaths - Deaths resulting from vehicle collisions are being monitored in a few areas of the province. Reflectors that are supposed to stop deer from jumping onto roadways at night are currently being tested in the Southern Region. High-pitched whistle devices (to keep deer away from roads) are being used by some trucking companies and individuals, but there is no systematic monitoring of the results. Fencing and underpasses have been built along parts of the Trans-Canada Highway in Banff National Park to reduce vehicle collisions.

The new, smooth, concrete-lined irrigation canals in southern Alberta are being monitored because deer have a very difficult time escaping once they have fallen into the canals.

2.3.5.8 Management of Damage Caused by White-tailed Deer Populations

The section on economics (Section 2.3.4) discussed the incidence of white-tailed deer damage to personal property such as gardens, shrubs, field crops, stored grains and stored livestock forage (stacked feed). The Natural Resources Service uses three major

strategies to deal with damage caused by white-tailed deer.

The first strategy involves controlling the damage by increasing the hunting harvest in the areas of most severe damage. This strategy reduces the problem but does not eliminate it and everybody has a different idea about "how many" deer is a good number to have in any particular locality. This approach is ineffective where there are large blocks of land closed to hunting (e.g., provincial and federal parks, C.F.B. Suffield and private land with no access), from which deer regularly move onto adjacent lands and cause damage.

The second strategy involves preventing the deer from getting to the products that are being damaged. Four different approaches are currently in use. Scaring devices (cannons, shell-crackers, repellants such as Blood Meal, Hinder, Deer-Away, Skoot) are used as short-term deterrents to solve small problems or problems anticipated to be of short duration. Effectiveness is highly variable. Fencing (both temporary snow fence that is portable and easily moved and permanently installed paige wire) is used to protect stored products such as haystacks and garden patches and shrubs. This prevention method is very effective. A third approach (used when other efforts fail) is intercept feeding; this approach stops the deer before they reach the damage site (e.g., haystack) by providing high-quality food at a feeding site between the bedding area and damage location. This approach may increase winter survival and production but may develop a herd habituated to artificial rather than natural foods. The cost of maintaining such an artificially fed herd is very high so the preferred methods are to discourage the damage and keep the deer on natural forage. Another effective approach that has had limited application (e.g., BuffaloLake Buck for Wildlife Project) is to enhance the habitat and provide an attractive wintering area with food and cover so the deer are not inclined to use feed stored on adjacent private lands.

The third strategy involves compensation for the damage. Presently, landowners sustaining damage to standing or swathed crops are paid for a percentage of the crop value up to a maximum amount per acre. Compensation provides some short-term relief for the landowner,

but many situations are not covered (e.g., haystacks, grain piles, gardens, shrubs, orchards) and it does not truly solve the problem. The intention is to use compensation for short-term relief until better control and/or prevention techniques can be put in place.

2.4 Management Issues and Future Implications

There have been major advances in the knowledge of white-tailed deer populations in Alberta over the past 30 years. During the same period, the consumptive interest in the resource has more than tripled and exceeds the supply in some areas. Intensified use of the Alberta landscape for agriculture, industry, recreation and urban development has significantly increased competition for the land base that constitutes white-tailed deer habitat. Several major management issues must be addressed if white-tailed deer populations are to be maintained, so that consumptive and nonconsumptive needs of the public can be met in the future.

2.4.1 Recreational Hunting

White-tailed deer numbers will fluctuate widely as mortality varies in response to winter severity. The harvest must be managed to take advantage of high populations and surpluses, and at the same time to protect the population in vulnerable habitats and during periods of low numbers. Three important considerations in determining the management regime are hunting opportunity, hunting quality and hunter access to patented land.

Reduction of hiding cover (habitat loss) and steadily increasing numbers of white-tailed deer hunters have increased the potential for overharvest in many areas, and higher hunter densities have decreased the quality of hunts. Landowners have also had to deal with higher levels of disturbance from increasing numbers of hunters. Increasing numbers of non-resident hunters and a shift of hunting effort from mule deer to white-tailed deer (resulting from implementation of the male mule deer draw) will create further pressure on the resource. Increased hunting pressure will result in deer population reductions

and a much younger age structure (i.e., fewer large bucks, more dissatisfied "trophy" hunters). Increased landowner disturbance will result in access to private lands being reduced, which will further increase hunting pressure in areas where access remains open. Increased non-resident use will result in resident dissatisfaction with allocation of the resource.

Varying season lengths, licence combinations and limited-entry draws will be required to manage the harvest at acceptable levels. These same approaches will be required to manage hunter densities to maintain a reasonable quality of hunting experience and to minimize disturbance of landowners. Separating hunting time periods for different species and time-slotting (e.g., Camp Wainwright) may also assist in improving the quality of the hunt by reducing hunter density in any one time period. New techniques must be found to take advantage of high populations and keep damage from exceeding acceptable levels.

2.4.2 Habitat Retention and Enhancement

White-tailed deer habitat inventories (mapping and assessment of suitability) are unacceptably imprecise. Initial emphasis should be on completion of suitable inventories in the prairie, parkland, foothills, Peace River and agricultural fringe regions followed by the forest reserves, which would likely be done in conjunction with other species. Adequate habitat inventories will then allow more accurate goal setting for habitat and populations at the WMU-level and will provide a better focus for habitat retention and enhancement programs.

Over 75 percent of the white-tailed deer population resides on privately owned and leased public land in the prairie, parkland, foothills, Peace River and agricultural fringe regions. Retention of white-tailed deer habitat in these regions is essential. Particularly critical are the parkland and agricultural fringes where white-tailed deer habitat has declined significantly in the last three decades. Habitat enhancement can mitigate small habitat losses and provide for modest population increases, but the long-term existence of white-tailed deer will depend on the habitat retention program.

A third focus should be on the provision of additional habitat through habitat enhancement to mitigate losses to other land uses and provide for a modest deer population increase to meet future needs. Mitigative efforts should occur wherever the need is identified, but enhancement for population increases should occur in the parkland and Peace River regions.

2.4.3 Population Management

More precise information on white-tailed deer population sizes, distribution, age/sex structure and productivity is required. In the prairie, parkland, foothills and agricultural fringe regions, this information is required at the WMU-level; in the rest of the province, the DMA level will suffice. This information will enable more precise population management and an increase in overall recreational opportunity. Second, the location and magnitude of illegal harvest must be determined; illegal harvest may be an important limiting factor in some areas. The parkland and agricultural fringe are priority areas for these determinations. Third, estimation of the size of white-tailed deer harvests by Natives is required, particularly in the more southerly DMAs.

2.4.4 Protection of Property

Deer damage on private land is currently addressed through programs that reduce deer numbers (e.g., hunter harvest levels are adjusted to reduce damage), prevent the damage (e.g., scaring devices, temporary and permanent fencing, intercept feeding sites) and compensate losses by paying for damage to standing and swathed crops in the field. However, damage losses are still extensive in some years. Expansion of the compensation program to crops presently not covered and use of non-monetary compensation (e.g., range improvement to benefit both deer and domestic livestock) may encourage private landowners to retain deer habitat and allow recreational use of the resource in the future.

2.4.5 The Future

Failure to address these four major management issues will result in the long-term decline of white-tailed deer habitat, populations and both consumptive and nonconsumptive recreational opportunities. The "Management Plan" that follows incorporates the desirable features of the current management program and addresses the management issues outlined here. It is intended to reflect the needs for white-tailed deer management over the next eight years.

3.0 MANAGEMENT PLAN

3.1 Policy Framework

The Fish and Wildlife Policy for Alberta (1982) established Wildlife Policy goals for the administration of wildlife resources in Alberta. Some of these goals provide a framework for the formation of specific white-tailed deer management plan goals. Particularly germane policy goals are set out under five general categories.

1. Resource Protection

"1) ... The primary consideration of the Government is to ensure that wildlife populations are protected from severe decline and that viable populations are maintained."

2. Resource Allocation

"2)...(a) The wildlife resource, as a Crown resource, will be utilized in a manner which contributes the most benefit to the citizens of Alberta."

"2)...(e) Wildlife will be allocated through a defined process whereby specific resources are deployed to specified uses in order to achieve stated public benefits."

"11) The Division may allocate live wildlife for various uses such as game farming, game ranching, education or science and zoological displays, in conformity with other aspects of the Wildlife Policy."

"17) Wildlife must be allocated among different primary users in response to government policy. Until such time as supply and demand can be better rationalized, the following interim allocation guidelines will prevail in order of priority:

...(b) Resident recreational use of game will have precedence over non-resident use. Wildlife stocks not fully allocated or utilized to higher priority uses may be allocated commercially to non-residents."

"18) The allocation of wildlife stocks to the different primary uses does not imply that other uses cannot occur within areas where such uses are entitled."

3. Recreational Use

"8) A variety of wildlife recreational opportunities, in addition to hunting, will be available for the benefit and enjoyment of Albertans."

"21) A variety of hunting opportunities will be available for the recreational benefit and enjoyment of Albertans...."

4. Commercial Use

"22) The Division will encourage an environment that promotes the growth of the tourist industry. It is important to clarify that the Division is not providing wildlife use opportunities such as hunting, viewing and photography to non-residents for their recreational enjoyment per se, but rather the Division will promote use opportunities to tourists for the economic benefit of Albertans, recognizing also that some reciprocal hunting opportunities may be provided to residents of other jurisdictions."

5. Protection of Private Property

"4) The Government, through the Division, will assist in preventing or controlling wildlife from damaging property and endangering human life."

"5) Responsibility for damage in any form caused by wildlife will be shared in relationship to what people can reasonably do for themselves and to the amount of any additional damage beyond that which would normally be expected to occur in an area."

3.2 Management Goals and Objectives

3.2.1 Resource Allocation

Goal: To maximize benefits to Albertans through the optimum allocation of the white-tailed deer resource.

Objectives:

- a) Provide various recreational hunting opportunities to 125 570 residents that result in a harvest of 35 350 white-tailed deer annually by the year 2002.
- b) Provide a variety of opportunities to 1.5 million Albertans to spend 80 million days on directly related nonconsumptive wildlife* activities.
- c) Provide an opportunity for Treaty Indians (in accordance with Paragraph 12 of the Natural Resources Transfer Agreement) and other Albertans (in accordance with the provisions of a subsistence hunting licence) to meet their subsistence food needs.
- d) Provide an economic return to outfitters, guides and other Albertans that supply goods and services by furnishing the opportunity for non-resident hunters to hunt male white-tailed deer.
- e) Provide an opportunity for big game farmers to possess and propagate white-tailed deer.
- f) Promote and encourage scientific and educational activity that will enhance our knowledge of white-tailed deer and thus improve management capabilities.

*"Nonconsumptive" goals and objectives are not developed by species; this objective includes all wildlife species involved in nonconsumptive activities, not just white-tailed deer.

3.2.2 Recreational Use

Goal: To maximize the recreational benefits and enjoyment to Albertans from the white-tailed deer resource through the provision of a variety of types and amounts of recreational opportunities.

Subgoals:

1. To provide the maximum opportunity to hunt male white-tailed deer in a quality hunting situation where hunter densities will not exceed 2/km² of deer habitat and there will be a chance to shoot a large buck (with 4 points or more per antler).
2. To provide the maximum opportunity to hunt antlerless white-tailed deer.
3. To provide the maximum opportunity to hunt male white-tailed deer in a very high-quality hunting situation where hunter densities will not exceed 1/2 km² of deer habitat, and there will be a chance to shoot a large buck.
4. To provide the maximum opportunity to hunt white-tailed deer with a bow and arrow.
5. To provide a variety of opportunities for directly related nonconsumptive wildlife* activities (viewing, photographing, studying, feeding, habitat improvements) to all Albertans.

Objectives:

- a) Provide the opportunity for 75 880 residents to hunt 415 540 days and harvest 17 180 male white-tailed deer. This opportunity will include the following:
 - i) The opportunity for 1130 of the 75 880 residents to hunt 6800 days in a high-quality hunting area and

*"Nonconsumptive" goals and objectives are not developed by species so this objective includes all wildlife species involved in nonconsumptive activities, not just white-tailed deer.

- harvest 170 male white-tailed deer of which 45 will be large bucks (4 points or better).
- ii) The opportunity for 5400 of the 75 880 residents to hunt 44 000 days with bow and arrow and harvest 700 male white-tailed deer in bowhunting-only areas (where other hunting methods are not used) and the rest of the province during a bowhunting-only time period that normally precedes the regular season when all legal weapons can be used.
 - b) Provide the opportunity to 49 680 residents to hunt 272 070 days and harvest 18 170 antlerless white-tailed deer. This will include:
 - The opportunity for 4600 of the 49 680 residents to hunt 40 000 days with bow and arrow and harvest 600 antlerless white-tailed deer in bowhunting-only areas and the rest of the province during a bowhunting-only time period.
 - c) Provide the opportunity for 1.5 million Albertans to spend 80 million days on directly related nonconsumptive wildlife* activities.

3.2.3 Commercial Use

Goal: To provide the maximum opportunity for Albertans to benefit economically from the commercial use of the white-tailed deer resource.

Objective:

Provide an opportunity for outfitters, guides and other Albertans providing goods and services to benefit economically from non-resident hunting of male

*"Nonconsumptive" goals and objectives are not developed by species so this objective includes all wildlife species involved in nonconsumptive activities, not just white-tailed deer.

white-tailed deer. The number of white-tailed deer allocated to the non-resident harvest will be outlined in the Non-resident Big Game Outfitting and Guiding Policy.

3.2.4 Subsistence Use

Goal: To provide an opportunity for Treaty Indians (in accordance with Paragraph 12 of the Natural Resources Transfer Agreement) and other Albertans (in accordance with the provisions of a subsistence hunting licence) to meet their subsistence food needs.

3.2.5 Science and Education

Goal: To promote and encourage scientific and educational activities that will enhance our knowledge of white-tailed deer and thus improve management capabilities.

3.2.6 Protection of Property

Goal: To minimize property damage caused by white-tailed deer.

Objective:

Keep the average annual damage (based on a five-year running mean) caused by white-tailed deer to an amount below \$150 000 and provide additional assistance to property owners when damage is excessive.

3.2.7 Populations and Habitats

Goal: To ensure that white-tailed deer populations and habitats are managed to meet the resource requirements of the recreational and economic goals and

objectives.

Objectives:

- a) Maintain the average preseason white-tailed deer population (keeping in mind that annual numbers may fluctuate above and below this mean because of environmental factors such as winter weather) at 173 425 deer (Table 17), up slightly from the 1992 estimate of 170 970 (Table 18).
- b) Provide sufficient habitat, 86 715 km² of summer range and 30 560 km² of winter range, to support a summering population of 173 425 white-tailed deer and wintering population of 122 350 white-tailed deer (Table 19).

3.3 Management Strategies

3.3.1 Population Management

The white-tailed deer population will be managed, through a variety of harvest regimes, to provide recreational hunting opportunities, an opportunity for widespread nonconsumptive enjoyment, and an opportunity for Albertans to benefit from guiding non-resident white-tailed deer hunters.

3.3.1.1 Male Harvest Regime

Males (bucks) will be harvested using two strategies:

Maximum sustained yield - The harvest is set at 10 percent of the estimated preseason population. This approach results in a harvest of 50 percent of the antlered males, leaving a reasonable mix in age structures after the hunting season.

Restricted male harvest - The harvest is set at 5 percent of the estimated preseason population. This level results in a harvest of 24 percent of the antlered males, creating an increased chance for a larger "trophy" buck to be harvested.

Table 17. White-tailed deer population, recreation and harvest goals for 2002.

Deer Management Area	2002 Preseason Population Goal	2002 Hunter Recreation Goals (in days)		2002 Harvest Goals		
		Per Hunter	Total	Antlered (bucks)	Antlerless (does/fawns)	Total
1	22 050	3.5	34 731	2 205	2 646	4 851
2	9 100	4.5	36 855	910	1 092	2 002
3	3 220	6	12 234	161	193	354
4	59 605	5	208 618	5 961	7 153	13 114
5	38 665	5	135 330	3 867	4 640	8 507
6	12 650	7	85 596	1 265	759	2 024
7	4 515	5.5	24 008	452	271	723
8	10 500	7.5	55 125	1 050	630	1 680
9	13 120	7.5	95 120	1 312	787	2 099
Total	173 425	5	687 617	17 183	18 171	35 354

Table 18. White-tailed deer population estimates for 1992 and number of hunter recreation days and harvest for 1991.

Deer Management Area	1992 Preseason Population Estimate	1991 Hunter Recreation Days		1991 Harvest	
		Per Hunter	Total	Antlered (bucks)	Antlerless (does/fawns)
1	21 732	2.8	28 610	2 981	1 486
2	10 550	7.8	48 209	1 254	572
3	3 520	6.3	10 711	257	64
4	57 080	6.3	139 471	7 151	2 959
5	38 511	5.6	74 784	4 359	1 716
6	12 534	7.0	90 926	2 652	568
7	4 523	5.7	9 516	226	92
8	9 800	9.5	41 700	1 139	208
9	12 720	7.2	49 374	1 810	393
Total	170 970	8.1	493 301	21 829	8 058

Table 19. Population and habitat goals for white-tailed deer in Alberta for the year 2002.

Deer Management Area	2002 Summer Population Goal	2002 Winter Population Goal ^a	Area of habitat	
			Summer Range ^b (km ²)	Winter Range ^c (km ²)
1	22 050	15 545	11 025	3 885
2	9 100	6 515	4 550	1 605
3	3 220	2 270	1 610	565
4	59 605	42 020	29 805	10 505
5	38 665	27 255	19 330	6 815
6	12 650	8 915	6 325	2 230
7	4 515	3 180	2 260	795
8	10 500	7 400	5 250	1 850
9	13 120	9 250	6 560	2 310
Total	173 425	122 350	86 715	30 560

^a Set at a number halfway between the 2002 postseason population goal and the expected spring population as determined by the population model in Appendix IV.

^b It was assumed that the average density on summer range is two white-tailed deer per km².

^c It was assumed that the average density on winter range is four white-tailed deer per km².

3.3.1.2 Antlerless Harvest Regime

Antlerless animals will be harvested using three strategies:

Maximum sustained yield - The harvest is set at 12 percent of the estimated preseason population. This level results in a harvest of 18 percent of the yearling and adult females and 11 percent of the fawns. This strategy is employed in the most productive habitats where other mortality factors such as winter weather and predation are thought to be less severe. The harvest rate may be adjusted upward or downward to achieve population reduction or growth to meet population goals. Upward adjustments will be limited by a maximum allowable hunter density of two hunters/km² of deer habitat to minimize landowner disturbance and maintain a quality hunting experience. Further population reductions would require additional time periods to hunt. Downward adjustments in the harvest rate will be 3 percent for every 10 percent drop (below the goal level) in the preseason population estimate. Consequently, there will be an antlerless season closure when the preseason population is below 60 percent of the desired preseason population goal.

Restricted antlerless harvest - The harvest is set at 6 percent of the preseason population. This level results in a harvest of 9 percent of the yearling and adult females and 6 percent of the fawns. This strategy is employed in reasonably productive habitats where other mortality factors are thought to be more severe and population/habitat inventory data are not precise. Upward adjustments will be limited the same as the previous strategy. The harvest rate will stay at 6 percent as long as the preseason population is greater than 70 percent of the desired goal. The rate will be reduced to 3 percent if the preseason population is between 60 and 70 percent of the desired goal. The antlerless season will be closed if the preseason population falls below 60 percent of the desired goal.

No harvest of antlerless animals - This strategy will be used in areas of moderate to low productivity where other mortality factors are thought to be taking the annual increment and population/habitat data are imprecise. There are currently no WMUs in this category.

The harvest regimes are derived from the population model presented in Appendix IV and are based on certain assumptions that require more testing in the future.

3.3.2 Licensing and Use Management

3.3.2.1 Recreational Hunting of Antlered White-tailed Deer

Males will be hunted using two strategies:

General white-tailed deer licence - It will be valid in any area where there is an open season and no requirement for a special licence.

This licence will provide one tag that can be used for antlered deer (buck) or an antlerless deer (does and fawns). If yearlings begin to increase as a percentage of the male harvest in these areas and exceed 60 percent of the male harvest for two years or the male harvest exceeds the harvest goal by 15 percent or more for two years, then an authorization or special licence should be used.

Antlered white-tailed deer authorization or special licence - It will be used in all WMUs where there would be an overharvest of males or a very unbalanced sex ratio under a general licence, or it is desirable to control hunter density to provide a high-quality hunt. Hunters will be selected using a draw. A draw-priority system is currently in place to ensure an equitable distribution of opportunity among all interested hunters. The demand for this licence could be reduced by having it as one of a list of special licences (e.g., place it in with moose and elk special licences).

3.3.2.2 Recreational Hunting of Antlerless White-tailed Deer

Antlerless white-tailed deer will be hunted using two strategies:

General white-tailed deer licence - It will be valid in any area where there is an open season and no requirement for a special licence.

This licence will provide one tag that can be used for antlered deer (buck) or an antlerless deer (does and fawns). If yearlings increase as a proportion of the antlerless harvest in these areas and exceed 30 percent for two years, or the harvest exceeds the harvest goal by 10 percent or more for two years, then an authorization or special

licence should be used.

Antlerless white-tailed deer authorization or special licence - It will be used in all WMUs where the harvestable surplus of females and fawns is vulnerable to overharvest under a general licence. Hunters will be selected using a draw. A draw priority system is currently in place to ensure an equitable distribution of opportunity among all interested hunters.

3.3.2.3 White-tailed Deer Licence Combinations

A hunter may have a general white-tailed deer licence and an antlered white-tailed deer authorization as well as an antlerless white-tailed deer special licence in the same year. Archers will be subject to shorter seasons or a draw when their harvest is estimated to exceed 10 percent of the annual harvest in the WMU.

3.3.2.4 Outfitting and Guiding

There will be a requirement for non-residents to be accompanied by a licensed guide to hunt white-tailed deer throughout Alberta. The number of non-resident licences available will be outlined in the Non-resident Big Game Outfitters and Guiding Policy.

The provision of a widely distributed white-tailed deer population will also benefit the tourist industry in general, even though there is no specific attempt to service this industry.

3.3.2.5 Game Farming

Game farms are regulated by the Department of Agriculture, Food and Rural Development. The Natural Resources Service will work with the regulatory agency to ensure proper husbandry and containment of deer.

3.3.2.6 Nonconsumptive Use

The entire white-tailed deer population is available for nonconsumptive use at any time even though some animals have been allocated for consumptive use and will be removed during the hunting season. The main strategy therefore is to enhance the opportunity for

the public to interact with the white-tailed deer herd. This strategy will be accomplished by the following effort:

- 1) maintain a widely distributed and visible white-tailed deer population.
- 2) enhance specific habitats near or in urban centres and major recreation developments to concentrate white-tailed deer for viewing.
- 3) maintain existing areas where white-tailed deer are not harvested (e.g., parks, wildlife sanctuaries), and
- 4) enlist the help of the public in specific management programs for white-tailed deer such as habitat enhancement, deer damage prevention, population and habitat inventory and more general programs such as "Use Respect."

3.3.3 Hunting Seasons

Hunting seasons will start after summer nonconsumptive outdoor recreation uses have decreased in early September and close before the onset of severe winter stress in mid-December. Opening and closing dates will be common over large areas to disperse hunting pressure. There will be a province-wide general "archery-only" season prior to the regular season. Seasons will be the longest (up to 80 days) where the deer are least vulnerable and hunting pressure is relatively low. Seasons will decrease in length, as vulnerability and hunting pressure increase, with the shortest seasons (12 to 24 days) occurring where hunting pressure is high, the deer are very vulnerable and most of the deer hunting is concentrated on private land. The shorter seasons will occur in November. Season length is not sufficient to control the harvest of white-tailed deer in some areas of Alberta so a draw (authorization or special licence) must be used. A draw controls the harvest, maintains a reasonable hunter density from a hunting-quality point of view and protects landowners from extremely high hunter densities that would occur during an open general season.

A zone for archery-only hunting of white-tailed deer will be maintained, particularly in areas where numbers of deer and

recreational demand are high but the use of high-powered rifles is not advisable because of the high density of residential dwellings.

The Camp Wainwright deer season will be continued with one 3-day primitive weapons hunt and four 3-day rifle seasons and will continue to be a limited-entry hunt with a special licence and hunter selection through a draw.

It may be necessary, periodically, to declare special seasons, licences or both (e.g., quota licences, Strathcona deer, Archery antlerless deer in 212 and 248) to deal with special management problems.

3.3.4 Anticipated Hunter Success Rates

Hunter success depends on a series of interrelated factors including weather, deer density, how "available" the animals are (i.e., road and trail access, visibility in the vegetation and/or terrain, permission to hunt on private land), animal behavior (i.e., rutting or not) and the length and timing of the season (i.e., presence or absence of deciduous leaf cover). Deer populations and seasons will be managed so that hunters can expect a range of 15 to 40 percent success when hunting bucks and a range of 20 to 60 percent success when hunting antlerless animals.

3.3.5 Extension

3.3.5.1 Hunter Education

The Alberta Conservation and Hunter Education program should continue to address its broad spectrum of topics such as hunting ethics, wildlife identification and management, firearm use and safety, field hunting and game handling techniques, and survival/first aid techniques. When dealing with white-tailed deer, the emphasis should be on firearm safety in settled areas, respect for private property, the field recognition of differences between mule deer and white-tailed deer, the humane kill of the animal, the proper care and handling of the carcass, and an explanation of the management goals, objectives and strategies for white-tailed deer in Alberta. The

latter will require an expansion of the current "wildlife management" section to the species' level. Ongoing programs such as "Use Respect" that annually provide emphasis on certain aspects of the Hunter Education program should be continued. A summary of the management goals, objectives and strategies for white-tailed deer should be available to the public at all times, as well as an annual summary of the preceding year's hunter harvest and effort.

3.3.5.2 Nonconsumptive Use

Public awareness of the white-tailed deer resource will be increased by providing:

- 1) written material on the natural history and management of white-tailed deer in Alberta;
- 2) a white-tailed deer viewing guide (to be incorporated with a number of other wildlife species in a more comprehensive guide).

3.3.6 Habitat Management

Habitat sufficient to meet the provincial and local goals will be provided as a result of retention programs on private and public land and by increasing the carrying capacity of some habitat to mitigate habitat losses. Increasing the capacity of other habitat will be necessary in some areas to meet future goals.

3.3.6.1 Habitat Retention

The steps involved in a habitat retention program are completion of habitat inventory and establishment of habitat retention goals for each WMU, integration of the habitat retention goals for white-tailed deer with other wildlife species and other uses of the land base, and application of specific retention goals on small parcels of private and public land.

Inventory - Habitat inventory and habitat retention goals must be established for each WMU. Inventory will be covered in Section 3.3.10.2, which follows. Habitat retention goals by DMA are outlined

in Table 19, but habitat inventories must be completed before specific goals can be set for each WMU.

Integration - Habitat retention goals for white-tailed deer must be integrated with other wildlife species and other uses of the land base. Integration is accomplished through participation in regional and local planning on private land (e.g., regional planning commission plans and local municipality land use plans and bylaws) and public land (e.g., integrated resource plans and river basin plans).

Application - Specific retention goals must be applied to small parcels of private and public land. On private land, this application must occur through land use plans and agreements with individual landowners. The agreements will recognize the landowner for retaining important white-tailed deer habitat and provide some form of reward for doing so. If Class 1 or 2 white-tailed deer habitat on private land is threatened and cannot be protected through agreement (i.e., the landowner does not want to participate in the retention program and has indicated a desire to remove the habitat) and there is little chance of mitigating the loss, then purchase should be considered.

Integration of habitat retention goals on public land occurs through the government land use referral process. Referrals may result in a standard condition to protect habitat or individual recommendations for each referral regarding habitat retention during land use activities such as timber harvesting, agricultural expansion and intensification, oil and gas exploration and development, transmission line and transportation corridor development, recreational development, mining exploration and development, thermal power generation development, development of dams for flow regulation and hydropower and urban expansion. Guidelines to maintain quality white-tailed deer habitat generally involve restrictions on the type and level of use, restrictions on the location or time period of use, and controls on the type of public access to the development site. If the important habitat for white-tailed deer has not been identified in a planning document the referral agencies use, then it should be flagged with an appropriate agency reservation. If referrals are not successful in retaining habitat, then the loss should be mitigated by means of habitat enhancement in another location.

3.3.6.2 Habitat Enhancement

Habitat enhancement--increasing the carrying capacity of a unit of land--may take place on private or public land but the latter would have priority. The highest priority for habitat enhancement for white-tailed deer should be parcels of public land in areas where habitat loss is occurring on private land and where crop damage is severe on private land. The next priority should be public land in WMUs where the goal is to increase the deer population by 2002. The greatest potential for habitat enhancement exists in areas of the foothills and forest fringe where a mosaic of irregular agricultural development and cooperative forage enhancement programs would benefit both deer and livestock. The best mix of food and cover types in combination with slope and aspect will vary depending on the ecoregion of the province. Site-specific plans will have to be developed for each enhancement project by applying local knowledge and extracting the appropriate food and cover needs for the area out of the habitat requirements summary prepared by Nietfeld et al. (1985).

3.3.7 Predator Management

Since wolves, bears, coyotes, cougars, lynx and bobcat are known to take white-tailed deer, the first step should be to determine the impact of predators on the white-tailed deer population. The priorities for examining this question should be bobcats and coyotes in the prairie ecoregion (DMA 1), coyotes in the parkland and foothills (DMAs 2 and 4), cougars in the foothills (DMA 3) and wolves in parts of the boreal mixedwood, foothills and uplands (DMAs 5, 6, 8). Until the impact of predators is better understood, there will be no predator management program designed specifically to benefit white-tailed deer.

3.3.8 Other Mortality Factors

3.3.8.1 Winter Mortality

The length of winter, depth of snow and number of days with very cold temperatures have a profound effect on survival and spring fawn production. These climatic parameters should be monitored to produce a winter severity index. If a significant winter die-off is anticipated, adjustments to the subsequent year's hunting season will be considered.

3.3.8.2 Parasites and Disease

Parasites and diseases are not known to cause significant mortality in Alberta white-tailed deer, but monitoring should be continued by examining carcasses submitted by landowners and district and regional staff. Regional staff should seek the assistance of the disease/parasite specialist of the Wildlife Management Division, as well as university and Provincial Veterinary Laboratory staff who specialize in the identification and diagnosis of parasites and diseases of wildlife.

3.3.8.3 Accidental Deaths

Accidental deaths for white-tailed deer in Alberta probably number in the hundreds or even thousands, but the deaths are widely dispersed; this makes management solutions impractical. The one aspect that should be monitored is deaths caused by vehicle collisions. The success of warning reflectors and high-pitched whistle devices should be investigated. The small number of collisions in most localities limits the practicality of fences and underpasses, but they may become desirable in the future as traffic increases through important deer habitats. Likewise, special consideration of deer-vehicle collisions may be required in or near some urban areas, where deer numbers and human traffic are both concentrated.

3.3.8.4 Treaty Indian Harvest

The harvest by Treaty Indians (in accordance with Paragraph 12 of

the Natural Resources Transfer Act) is not known. It would be useful to document this harvest because it may be locally important, but there is currently no practical method to obtain this information.

3.3.8.5 Illegal Harvest

The illegal harvest likely numbers in the thousands. Effort should be directed at getting better information on the illegal harvest and should concentrate initially in the aspen parkland and boreal fringe where the problem is likely most significant. Current levels of enforcement should be maintained until the magnitude of the problem and specific locations are identified. Specific enforcement and extension strategies will be developed to deal with the problem areas as they are identified.

3.3.9 Protection of Private Property

The Natural Resources Service will operate a damage prevention, control and compensation program to minimize damage to crops, pasture, stored grain and forage, orchards, gardens and shelterbelts on private land.

3.3.9.1 Prevention

The prevention component involves four different approaches: Scaring devices - Scaring devices (cannons, shell-crackers, microwave-detector scarers) or repellants (bloodmeal, commercial repellants such as Hinder, Deer-Away, Skoot) may be used to keep deer away. Effectiveness varies considerably between areas and herds of deer, but it is not a long-term solution.

Fencing - Fencing may be permanent (2.1 m paige wire) or temporary (1.2-1.5 m snow fences) to keep deer out. This approach is very effective but has relatively high initial costs and can only be used on relatively small areas such as feedstacks.

Intercepting - Deer may be intercepted before they get to the damage site by being provided with a high-quality food alternative at a feeding site. This approach is also effective and may have the added benefit of increasing overwinter survival.

Luring - Deer may be lured away from the damage site by providing alternate forage sites on public land or leased land where the habitat has been enhanced to produce an attractive food source. This method has worked well elsewhere but has had limited application in Alberta to date.

3.3.9.2 Control

The control component has three possible approaches:

Hunting - Hunting may be used to maintain herds at levels acceptable to landowners. In many instances there have been season extensions, two tags or extra quota licences specifically designed to reduce deer herds. Landowners need to be involved in the season/permit-setting process for this to be effective. Moreover, it is most effective when used in combination with prevention techniques.

Trapping and relocating - This approach has not been used recently for deer in Alberta; it provides only temporary relief and is very expensive.

Kill permits - Kill permits may be issued to remove offending animals. This approach will be used only as an absolute last resort (when no other solution is feasible).

3.3.9.3 Compensation

The compensation component is the payment of a percentage of the crop value to compensate for crop losses. Present coverage includes only standing or swathed crops, but not stacked or stored crops, orchards, nurseries or gardens. Compensation does provide relief for the landowner but does not resolve the depredation problem and should be considered only until a proper prevention (e.g., fencing) and/or control (e.g., increased harvest) solution is employed. It should be used as a long-term solution only where the natural habitat is deficient and preventive measures are not feasible. However, if the compensation was to take the form of on-farm habitat enhancement

(e.g., watering site development and fencing to implement rest-rotational grazing), which benefits the deer and causes no loss to livestock, this practice would be a desirable long-term solution to resolve the deer problem.

3.3.10 Population and Habitat Inventory

Population inventory provides information, on distribution, density, age/sex ratios, productivity and condition of animals, that is essential to meet the resource management and allocation goals for this species. Habitat inventory provides the necessary information on food and cover--two of the major factors that influence distribution, density, productivity and condition of animals in the population.

3.3.10.1 Population Inventory

Population inventory involves direct methods where the deer are actually observed (e.g., aerial survey) and indirect methods (e.g., jaw collection, harvest questionnaires). Direct methods can provide all the necessary population information but are often impractical because of cost or poor visibility of animals in dense cover types. Indirect methods supplement direct methods or replace them in areas where direct methods are not feasible, but their usefulness is limited. They can provide information on distribution and age/sex ratios but only crude estimates of population size.

Aerial Surveys - Aerial surveys are the only practical direct population inventory method to use in Alberta, because of the vast geographic area, dispersion of deer, limited manpower and suitability of the vegetation and terrain to survey. The three types of aerial surveys needed for deer in Alberta are line transects, blocks and stratified quadrats or areas.

Line transects are used for reconnaissance surveys where the intent is to assess the habitat and deer distribution to determine the most suitable long-term survey method. Line transects are also used as the primary survey method, if habitat is not yet mapped and

stratified or the interspersion of vegetation types does not allow the use of block or stratified quadrats. Blocks are used when the habitat occurs in irregular localized patterns of similar vegetation types (e.g., prairie rivers). Stratified quadrats are the preferred method if the habitat has been mapped and stratified and the vegetation and terrain allow the identification and location of suitable square-mile quadrats or other defined areas.

The priority for aerial surveys is based on the importance of a WMU for white-tailed deer and the feasibility and reliability of the survey. The WMU is the focus for habitat and population inventory. In the identified high priority WMUs, the surveys should be flown biennially (using a helicopter) with sampling of a sufficient intensity to produce a population estimate accurate to the plus or minus 20 percent level of precision. Helicopters are essential for all surveys where age/sex data are collected or where the terrain or technique make the use of fixed-wing aircraft unsafe. However, if the terrain is suitable, fixed-wing aircraft are suitable for reconnaissance surveys or late season (January 15-March 31) surveys when age/sex data are not reliable. The WMUs not in the high-priority category should be flown once every five years to maintain information on distribution and numbers of deer. These surveys should be flown in conjunction with the five-year habitat inventory updates, wherever possible.

Jaw Collection - Jaws should be collected periodically from hunter kills throughout the province, with highest priority given to areas where aerial survey is not feasible.

Harvest Questionnaire - Although the main reason for harvest surveys is to determine hunter effort and annual harvest, they also aid in determining animal distribution and trends in age/sex ratios, especially when done in conjunction with jaw collections. Enforcement staff should record data on kills checked in the field to act as a comparison for data collected in the questionnaires.

3.3.10.2 Habitat Inventory

Habitat inventory allows habitat stratification, which is used as

the basis for population inventory, provides a local focus for habitat retention and enhancement programs, and provides information on expected populations. Expected population data can be compared to observed population data and used to estimate populations in areas where population data are not available or to develop management prescriptions to bring observed populations closer to expected levels.

Habitat inventory should be conducted province-wide at a scale that focuses on the home range (about 2 km²) of the animal. This inventory will require identification of deer food and cover types, as well as important landforms in the size range of 5 to 10 ha, and mapping at generalized scale of 0.5 to 1.0 km², using the habitat mapping and assessment technique developed by the Wildlife Inventory Unit. The priority for conducting inventory would be based on the need to set up a population monitoring program, recreational contribution of the WMU in a provincial context, security (rate of loss) of the habitat, and level of need in areas where population inventory is not feasible. The habitat inventory should be updated every five years, or more often if land use is changing rapidly.

3.3.11 Summary of Goals, Strategies and Implementation Priorities by Deer Management Area

The strategies for the recreational hunting harvest regime, types of licences, hunting seasons, anticipated hunter success rates and number of licences available in each DMA are outlined in Table 20. These strategies should be reviewed annually. Implementation will hinge on derivation of population goals at the WMU-level. The nonconsumptive use strategies of providing public information, enhancing viewing opportunities and involving people in management activities will occur in all DMAs but will be quite limited in DMAs 3, 7 and 9. Non-residents will require a guide in all DMAs. Big game farming will be restricted to private land.

The habitat retention program will be applied to private and public lands in all DMAs but is particularly important in DMAs 1, 2, 4, 5, 6 and 8, which either provide significant levels of recreation

Table 20. The proposed harvest regime, licence types, hunting seasons, anticipated hunter success rates and numbers of licences available for recreational white-tailed deer hunting in Alberta.

Deer Management Area	Type of Deer Hunted	Harvest Goal (% of Preseason Population)		Licence Type ^a	Season		Anticipated Hunter Success Rate (%)	Number of Licences Available
					Maximum Length (Days)	Time (Month)		
1	Buck	10	General	24	November	40	5 513	
	Doe/fawn	12	Special	24	November	60	4 410 ^b	
2	Buck	10	General	24	November	20	4 550	
	Doe/fawn	12	General	24	November	30	3 640	
3	Buck	5	Special	65	Sept.-Nov.	15	1 073 ^b	
	Doe/fawn	6	Special	24	Sept.-Nov.	20	966 ^b	
4	Buck	10	General	24	November	25	23 842	
	Doe/fawn	12	General	24	November	40	17 882	
5	Buck	10	General	24	November	25	15 466	
	Doe/fawn	12	General	24	November	40	11 600	
6	Buck	10	General	72	Sept.-Nov.	15	8 433	
	Doe/fawn	6	General	24	November	20	3 795	
7	Buck	10	General	65	Sept.-Nov.	15	3 010	
	Doe/fawn	6	General	24	November	20	1 355	
8	Buck	10	General	72	Sept.-Nov.	20	5 250	
	Doe/fawn	6	General	24	November	30	2 100	
9	Buck	10	General	80	Sept.-Nov.	15	8 747	
	Doe/fawn	6	General	24	November	20	3 936	
Totals	Buck	10				23	75 884	
	Doe/Fawn	10				37	49 684	
	All Ages/Sexes	20				28	125 568	

^a This represents the most liberal licence that would be used. Some Wildlife Management Units (WMUs) may need to be switched from general to special in the future.

^b All WMUs in Deer Management Area 3 have special licences except WMUs 400 and 402, which have general licences.

(DMAs 4, 5 and 6) or the habitat is localized and limited (1, 2, 4 and parts of 8). The habitat enhancement program will occur in a mitigative context in all DMAs and is important to meet the modest population increases that are planned in DMAs 1, 4, 5, 6, 8 and 9 (in that order of priority).

The predator management strategy is to obtain more information on the impact of coyotes and bobcats in DMA 1, coyotes in DMAs 2 and 4, cougars in DMA 3 and wolves and bears in DMA 5, 6 and 7. Parasites and diseases will be monitored in all DMAs, as carcasses are submitted by the public and Natural Resources Service staff, but there will be no systematic collections for that purpose. Accidental deaths (particularly from vehicle collisions) will be monitored and the effectiveness of new warning devices will be tested. The extent and locations of significant illegal harvests must be determined before appropriate enforcement and extension efforts can be implemented. Initial efforts to determine the extent of the illegal harvest problem should concentrate in DMAs 4 and 5.

Private property, mainly DMAs 1, 2, 4, 5 and 8, will be protected from white-tailed deer damage through prevention, control and compensation programs. Prevention will include scaring, fencing, intercept feeding and habitat enhancement. Control will include use of hunting to limit the size of the population and, as a last resort, the relocation or killing of the offending animals. Compensation for specified types of damage will include monetary payments or habitat enhancement to benefit both the deer and domestic livestock with the intent to switch to a preventive technique in the future.

Population inventory strategies are summarized in Table 21. Aerial surveys will be flown every second year during the month of December (if possible) and using a helicopter. Line-transect surveys, not shown in Table 21, will be used for reconnaissance-level surveys, to set up blocks or stratified quadrats for the future. Habitat inventory is necessary in all DMAs with the highest priority in DMAs 1, 2 and 4. The next priorities in order of their importance would be DMAs 5, 3, 8, 6, 7 and 9.

Table 21. Strategies for white-tailed deer population assessment, and the types of data obtained.

Survey Type and Data Obtained	Applicable Management Area
Aerial survey type:	
Total block coverage	2, 4, 5, 8 ^a
Stratified quadrat	1
Jaw collections	All
Harvest questionnaire	All
Data Obtained:	
WMU Population Estimate, Density	1, 2, 4, 5, 8
Distribution	All
Age/Sex Ratio	All

^a Aerial surveys are feasible in only some of the Wildlife Management Units (WMUs) in Deer Management Areas 5 and 8, so density and population estimates would apply only to surveyed WMUs.

4.0 MANAGEMENT PLAN APPLICATION

4.1 Provincial Summary

The major challenges for white-tailed deer managers are to retain and develop sufficient habitat to meet population goals, maintain the population (after modest increases in some DMAs); maintain recreational opportunity, and maintain the quality of recreational hunting on private land and minimize damage to private property.

The preseason population goal for the year 2002 is 173 425 white-tailed deer (compared to the 1992 estimate of 170 970). Population increases will occur on public lands in the southern foothills, the parkland, the forest agricultural fringe, the Rocky/Edson/Whitecourt forests and the Peace River country (DMAs 1, 4, 5, 6, 8 and 9), through a combination of cooperative range improvement and timber harvesting programs and specific habitat development projects for white-tailed deer. Major efforts will be required to retain habitat on private land in the prairies, parkland and forest-agricultural fringe (DMAs 1, 2, 4 and 5), to ensure maintenance of current populations and to provide modest increases, where those are desired.

The interest in hunting white-tailed deer in the prairies (DMA 1) will continue to exceed the supply, necessitating control of both hunter numbers and distribution. A special licence for antlerless white-tailed deer (obtained through the draw system) will continue to provide a quality hunt with reduced hunter densities, maintain the deer herd at a sustained harvest level, reduce landowner disturbance by hunters, and direct hunters to areas where herd reduction (to reduce damage) is desired. A similar system will be used for bucks in Kananaskis Country and antlerless white-tailed deer throughout DMA 3. The system will ensure that everybody has a fair chance to hunt in these areas. During periods of low populations and in response to a steadily increasing demand, it may be necessary to expand the special licence system to other areas. It may also be necessary in future to restrict the combination of a white-tailed deer licence with other licences to ensure everyone has a reasonable opportunity to hunt.

Habitat retention programs on private land and range improvement/habitat development programs on adjacent public land in the prairie, parkland, southern foothills and forest agricultural fringe areas (DMAs 1, 2, 4, 5 and 8) will be successful only if deer damage is minimized. This minimization will require effective damage prevention and expanded damage compensation programs.

4.2 Regional Perspective

4.2.1 Southern Region

This region (Figure 6) has 12 percent of the provincial white-tailed deer population; hunting pressure is very high and the landscape is dominated by privately owned agricultural land. The population goal (2002, preseason) is 19 350 white-tailed deer (Table 22). This goal is 6 percent below 1992 population levels, which are higher than desired. Management emphasis will be directed toward the following:

1. Complete a habitat inventory and assessment for all WMUs in the region.
2. Identify specific goals for population and habitat retention and enhancement goals for all WMUs in the region, and develop strategies to achieve these goals.
3. Monitor populations and habitats to determine success in achieving population and habitat goals.
4. Continue the harvest regime, which includes female white-tailed deer on a special licence in the prairies.
5. Minimize deer damage on private land.
6. Cooperate with range managers and foresters to develop range management and timber harvesting programs to maintain habitat and increase the white-tailed deer herd in the foothills.
7. Develop cooperative land management programs to maintain white-tailed deer habitat on private land.
8. Monitor the effect of the mule deer licensing system on white-tailed deer throughout the region.

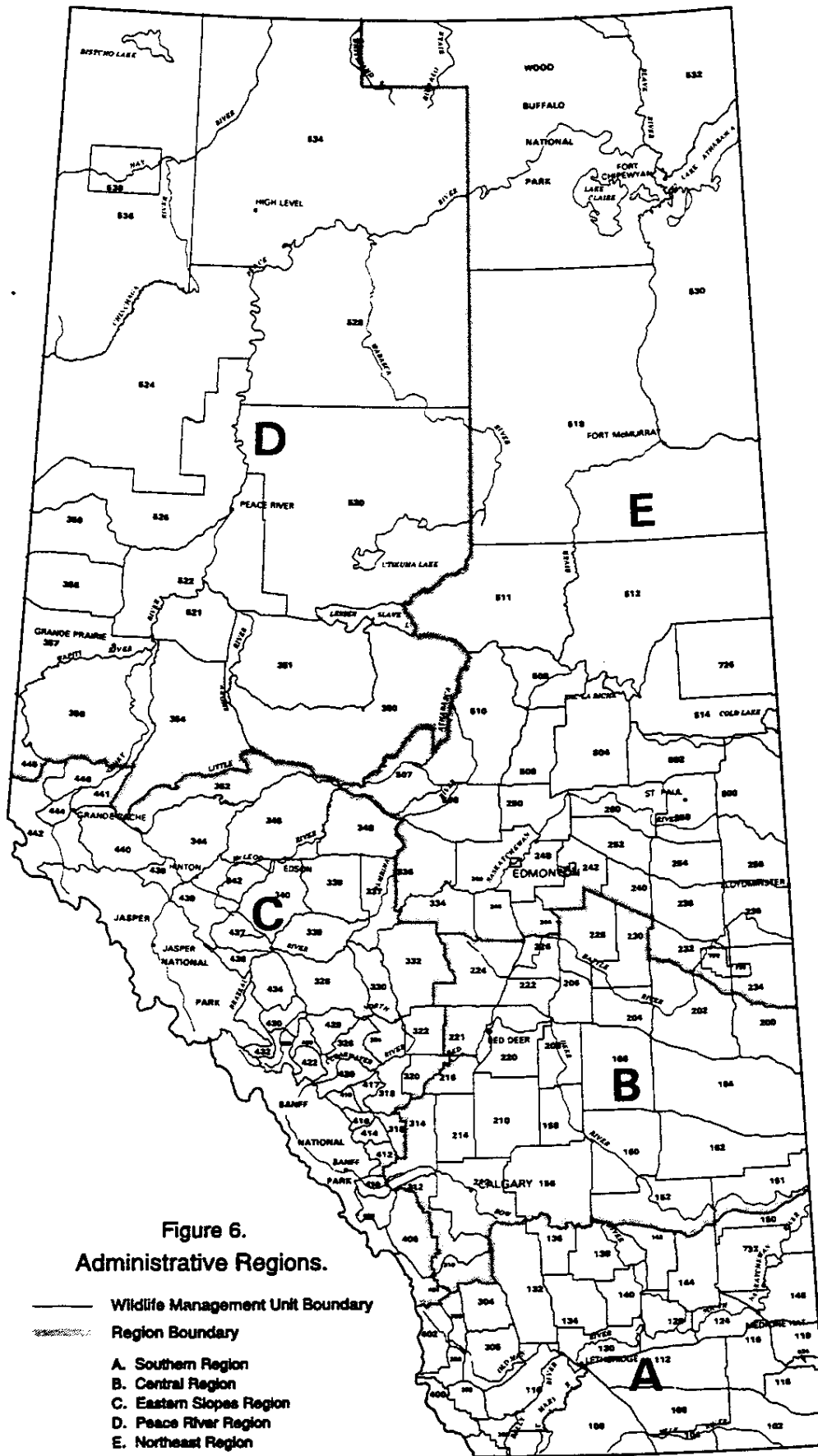


Table 22. White-tailed deer population goals (year 2002, preseason) by Deer Management Area and administrative region.

Region/Subregion	Deer Management Area										
	1	2	3	4	5	6	7	8	9	Total	
Southern	1992	12 000	7 200	1 300	0	0	0	0	0	0	20 500
	Change ^a	450	-1 300	-300	0	0	0	0	0	0	-1 150
	2002	12 450	5 900	1 000	0	0	0	0	0	0	19 350
Central	1992	9 732	3 350	0	20 350	1 480	0	0	0	0	34 912
	Change	-132	-150	0	2 525	120	0	0	0	0	2 363
	2002	9 600	3 200	0	22 875	1 600	0	0	0	0	37 275
Eastern Slopes Calgary	1992	0	0	2 220	0	3 935	1 175	3 060	0	0	10 390
	Change	0	0	0	0	0	0	0	0	0	0
	2002	0	0	2 220	0	3 935	1 175	3 060	0	0	10 390
Eastern Slopes Edson	1992	0	0	0	0	3 366	4 909	1 323	0	0	9 598
	Change	0	0	0	0	34	116	-8	0	0	142
	2002	0	0	0	0	3 400	5 025	1 315	0	0	9 740
Peace River	1992	0	0	0	0	0	6 450	140	9 800	1 450	17 840
	Change	0	0	0	0	0	0	0	700	400	1 100
	2002	0	0	0	0	0	6 450	140	10 500	1 850	18 940
Northeast	1992	0	0	0	36 730	29 730	0	0	0	11 270	77 730
	Change	0	0	0	0	0	0	0	0	0	0
	2002	0	0	0	36 730	29 730	0	0	0	11 270	77 730
Total	1992	21 732	10 550	3 520	57 080	38 511	12 534	4 523	9 800	12 720	170 970
	Change	318	-1 450	-300	2 525	154	116	-8	700	400	2 455
	2002	22 050	9 100	3 220	59 605	38 665	12 650	4 515	10 500	13 120	173 425

^a No sign in change column indicates an increase (minus sign denotes decrease).

4.2.2 Central Region

This region (Figure 6) has 20 percent of the provincial white-tailed deer population; hunting pressure is high, habitat is declining and the landscape is dominated by privately owned agricultural land. The population goal for summer 2002 (Table 22) is 37 275 white-tailed deer. The planned 8 percent increase in population levels by 2002 (Table 22) will occur mainly in the parkland area of the region. Management emphasis will be directed toward the following:

1. Identify specific goals for population and habitat retention and enhancement goals for all WMUs in the region, and develop strategies to achieve those goals.
2. Monitor populations and habitats to determine success in achieving population and habitat goals.
3. Continue to implement the harvest regime, which includes female white-tailed deer on a special licence in the prairies.
4. Minimize deer damage on private land.
5. Cooperate with range managers to develop range management and habitat development programs on public land to maintain or enhance habitat and increase white-tailed deer herds in specific locations.
6. Develop cooperative land management programs to maintain white-tailed deer habitat on private land.
7. Monitor the effect of the mule deer licencing system on white-tailed deer throughout the region.

4.2.3 Eastern Slopes Region

This region (Figure 6) has 12 percent of the provincial white-tailed deer population; hunting pressure is high but effort is often secondary to hunting for moose or elk, which are the primary targets for hunters here. Nonconsumptive use is also high. Forest maturation and encroachment have made much of the area unsuitable for white-tailed deer; moreover, predation may be a significant limiting factor in some locations. The population goal for 2002 (Table 22) is

20 130 white-tailed deer. The plan is to maintain the population through to 2002 (Table 22). Management emphasis will be directed toward the following:

1. Refine the identification of important white-tailed deer habitats, improve population estimates, and derive WMU-specific population goals.
2. Identify habitat enhancement goals and cooperate with foresters, range managers and the oil and gas industry to influence timber harvesting, agricultural and oil and gas exploration and development programs, so as to maintain or increase white-tailed deer habitats and populations in specified locations.
3. Monitor the effect on white-tailed deer of the male mule deer harvest regime (a special licence) in the eastern portion of this region.
4. Monitor the white-tailed deer harvest to determine its effect on the population.
5. Minimize deer damage on private land.

4.2.4 Peace River Region

This region (Figure 6) has 10 percent of the provincial white-tailed deer population; hunting pressure is moderate in the settled area and low elsewhere. The landscape is dominated by agriculture in the Peace River country, but has extensive forest cover elsewhere. White-tailed deer are reaching the northern limit of their range because of severe winter weather. The pre-season population goal for 2002 (Table 22) is 18 940 white-tailed deer. The planned 6 percent increase in population levels by 2002 (Table 22) will take place in the southern part of the region, in the boreal mixedwood and foothills. Management emphasis will be directed toward the following:

1. Refine the identification of white-tailed deer habitat, improve population estimates.
2. Identify goals for populations and habitat retention and enhancement goals for WMUs in the southern portion of the region, and develop strategies to achieve these goals.

3. Monitor populations (where feasible) and habitat in the south-central portion of the region to determine the success in maintaining or achieving population and habitat goals.
4. Cooperate with range managers, foresters and the oil and gas industry to develop range management, timber harvesting and oil and gas exploration and development programs to increase white-tailed deer habitats and populations in specified locations.
5. Minimize deer damage on private land.

4.2.5 Northeast Region

This region (Figure 6) has 46 percent of the provincial white-tailed deer population; habitat and populations are declining over the southern portion of the region. Hunting pressure is high in the better white-tailed deer habitat (southern portions of the region) and low in the northern portions. The southern landscape is dominated by privately owned agricultural land, whereas the northern portion has extensive forest, on which white-tailed deer are reaching the northern limit of their range because of severe winter weather. The population goal for 2002 (Table 22) is 77 730 white-tailed deer. The plan is to maintain the population through to 2002 (Table 22). Management emphasis will be directed toward the following:

1. Identify specific goals for populations and habitat retention and enhancement for WMUs in the southern portion of the region, and develop strategies to achieve these goals.
2. Monitor populations and habitats to determine success in achieving population and habitat goals.
3. Monitor the effect on white-tailed deer of the mule deer harvest regime (with both male and female mule deer on a special licence) in the southern portions of the region.
4. Cooperate with range managers, foresters and the oil and gas industry to develop range management, timber harvesting and oil and gas exploration and development programs on public

land, so as to increase white-tailed deer habitat in the forest-agricultural fringe.

5. Develop cooperative land management programs to maintain white-tailed deer habitat on private land.
6. Minimize deer damage on private land.

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APPENDIX I.

Estimated Populations and Densities of White-tailed Deer
by Wildlife Management Unit, September 1991.

Wildlife Management Unit (WMU)	Estimated September 1991 Population	Area of WMU (km ²)	Density of White-tailed Deer (Number Per 10 km ²)
102	700	3 413	2.05
104	500	1 008	4.96
106	250	3 052	0.82
108	1 500	4 503	3.33
110	1 500	3 597	4.17
112	200	3 790	0.53
116	1 000	2 109	4.74
118	450	1 709	2.63
119	900	1 312	6.86
124	400	1 472	2.72
128	200	1 835	1.09
130	600	1 870	3.21
132	300	3 783	0.79
134	100	1 971	0.51
136	100	1 340	0.75
138	100	2 320	0.43
140	100	1 556	0.64
142	200	1 513	1.32
144	100	2 493	0.40
148	600	2 937	2.04
150	400	1 938	2.06
151	3 530	2 883	12.24
152	1 842	3 790	4.86
156	400	4 402	0.91
158	140	1 777	0.79
160	800	3 958	2.02
162	350	4 752	0.74
164	970	7 679	1.26
166	1 250	4 198	2.98
200	2 352	2 741	8.58
202	1 547	4 595	3.37
204	1 358	1 731	7.85
206	2 028	1 299	15.61
208	2 028	1 846	10.99
210	140	3 493	0.40
212	1 400	3 602	3.89
214	350	1 846	1.90
216	400	1 052	3.80
220	2 255	2 701	8.35
221	840	1 647	5.10
222	1 260	1 071	11.76
224	1 855	3 284	5.65
226	525	1 258	4.17
228	925	2 739	3.38
230	980	2 327	4.21
232	1 540	1 803	8.54

.../Continued

Wildlife Management Unit (WMU)	Estimated September 1991 Population	Area of WMU (km ²)	Density of White-tailed Deer (Number Per 10 km ²)
234	2 980	2 594	11.49
236	2 920	3 067	9.52
238	1 550	2 762	5.61
240	280	1 398	2.00
242	1 500	2 055	7.30
244	330	927	3.56
246	830	1 429	5.81
248	3 600	4 089	8.80
250	1 200	2 306	5.20
252	900	1 993	4.52
254	1 200	2 156	5.57
256	1 000	2 711	3.69
258	2 260	2 669	8.47
260	1 200	2 484	4.83
300	1 350	1 110	12.16
302	1 500	714	21.01
304	750	1 531	4.90
305	450	2 123	2.12
306	600	571	10.51
308	500	648	7.72
310	310	1 069	2.90
312	1 230	1 805	6.81
314	1 050	2 173	4.83
316	345	576	5.99
318	1 254	1 154	10.87
320	1 652	899	18.38
322	1 086	1 340	8.10
324	1 200	1 064	11.28
326	450	924	4.87
328	542	2 889	1.88
330	298	1 468	2.03
332	871	3 487	2.50
334	1 710	1 929	8.86
336	2 340	2 639	8.87
337	548	1 998	2.74
338	487	2 562	1.90
339	325	2 101	1.55
340	433	2 582	1.68
342	344	1 507	2.28
344	542	3 636	1.49
346	1 042	5 220	2.00
348	1 354	2 989	4.53
350	3 000	13 041	2.30
351	1 200	8 842	1.36
352	256	3 449	0.74

.../Continued

Wildlife Management Unit (WMU)	Estimated September 1991 Population	Area of WMU (km ²)	Density of White-tailed Deer (Number Per 10 km ²)
354	1 250	8 590	1.46
356	1 000	8 768	1.14
357	1 200	4 306	2.79
358	500	3 775	1.32
359	500	3 306	1.51
400	500	1 201	4.16
402	300	1 344	2.23
404	312	861	3.62
406	1 476	2 062	7.16
408	220	683	3.22
410	210	412	5.10
412	322	520	6.19
414	242	436	5.55
416	131	291	4.50
417	152	432	3.52
418	151	345	4.38
420	282	1 075	2.62
422	52	615	0.85
426	66	686	0.96
428	58	419	1.38
429	722	1 031	7.00
430	50	801	0.62
432	20	852	0.23
434	46	1 457	0.32
436	30	582	0.52
437	73	1 087	0.67
438	205	1 585	1.29
439	60	670	0.90
440	109	2 431	0.45
441	205	806	2.54
442	50	2 961	0.17
444	77	524	1.47
445	15	1 150	0.13
446	125	1 203	1.04
500	2 000	4 645	4.31
502	2 340	2 988	7.83
504	2 580	5 030	5.13
506	1 090	2 194	4.97
507	1 690	2 774	6.09
508	2 500	3 229	7.74
509	2 060	2 541	8.11
510	4 950	6 450	7.67
511	1 350	9 858	1.37
512	4 790	15 788	3.03
514	9 240	5 327	17.35
518	2 000	42 894	0.47

.../Continued

Wildlife Management Unit (WMU)	Estimated September 1991 Population	Area of WMU (km ²)	Density of White-tailed Deer (Number Per 10 km ²)
520	750	30 968	0.24
521	500	3 178	1.57
522	1 000	8 684	1.15
524	350	21 455	0.16
526	1 200	10 778	1.11
528	150	27 194	0.06
530	280	21 717	0.13
532	50	9 984	0.05
534	150	38 187	0.04
536	50	28 742	0.02
538	0	2 282	0
624	150	214	7.01
726	2 000	5 291	3.78
728/730	3 000	453/157	49.18
732	500	2 635	1.90
936	150	100	15.00
648	NE ^a	527	NE
734	NE	153	NE
736	NE	425	NE
738	NE	452	NE
TOTAL	149 615	607 236	2.46

^a NE means no estimate available but densities would be expected to be less than 0.5/10 km².

APPENDIX II.

Provincial Survey Format for Mule Deer and White-tailed Deer,
July 1985.

PROVINCIAL SURVEY FORMAT
MULE DEER AND WHITE-TAILED DEER

PRIMARY MANAGEMENT UNITS

Primary Management Units (PMUs) have deer populations of similar density and productivity, hunting pressure and geographical and habitat features. Three deer PMUs have been identified (Map 1, Table 1) each of which encompasses several Big Game Zones. Harvest strategies are developed at the Big Game Zone level. Authorization hunts are administered at the Wildlife Management Unit (WMU) level and thus surveys are required within each WMU.

PMU A: Big Game Zones 7 (except 314), 8, 9 and portions of 10 and 12.

This PMU contains some of the highest densities of deer in the province as well as excellent habitat that contributes to high productivity.

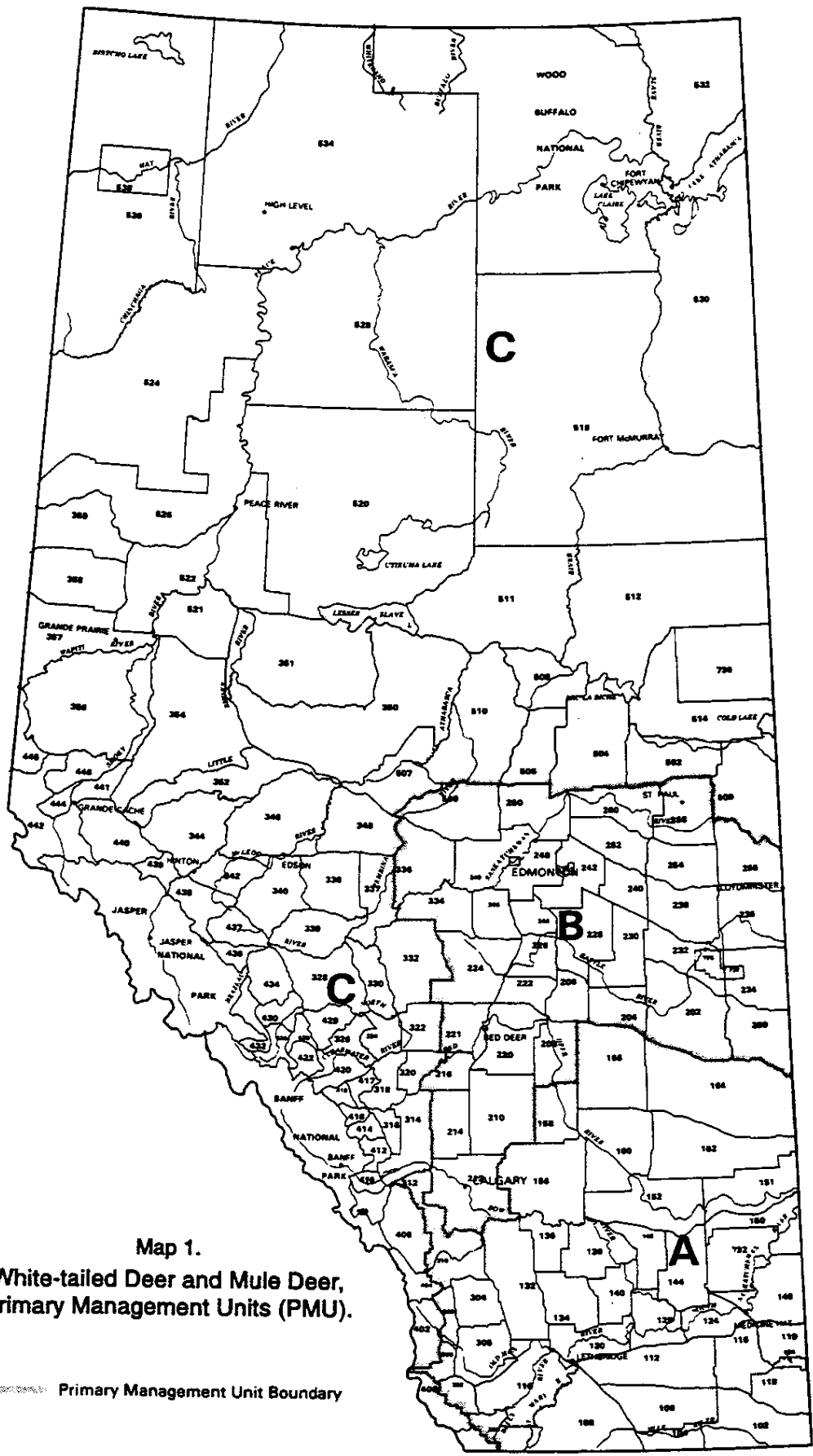
Surveys are required to monitor population trends and to provide population estimates on a WMU basis, where authorization hunts are scheduled. Generally, survey precision is good, although snow cover in the south is unreliable.

PMU B: Big Game Zones 11 and portions of 10, 12 and 15.

Primarily aspen parkland/mixed agriculture, this PMU supports a high population of white-tailed deer. Mule deer numbers are high in the southern portion of this PMU. Surveys are required to monitor population trends and to provide estimates when authorization hunts are scheduled. Habitat stratification is required with survey blocks distributed accordingly.

PMU C: Big Game Zones 1, 2, 3, 4, 5, 6, 13, 14, 16 and WMU 314 from Zone 7.

This PMU includes the boreal, alpine and foothill areas of the province. Deer numbers are lowest in the northern boreal area, but



Map 1.
 White-tailed Deer and Mule Deer,
 Primary Management Units (PMU).

----- Primary Management Unit Boundary

Table 1. Deer information by Primary Management Unit (PMU).

PMU	Productivity	Density	Distribution	Habitat Quality/ Distribution	Hunting Pressure	Surveyability
A	High	High	Uniform	Good/ Discontinuous	High	Good
B	High to Moderate	High to Moderate	Uniform	Good/ Discontinuous	High	Good
C	Low/ Moderate	Very Low to Moderate	Sporadic	Poor to Moderate/ Discontinuous	Low to Moderate	Poor to Moderate

along the major waterways, in the southern alpine and in the foothills. Low densities, extensive coniferous forest cover and rugged terrain make surveying unfeasible.

SURVEY CRITERIA

The broadest level at which deer are managed is the PMU. The PMUs are prioritized for surveying according to the following:

1. Their potential for providing the maximum amount of recreation deer hunting.
2. The feasibility and reliability of surveys.

The WMUs that are within PMUs to be surveyed on a rotational basis are prioritized according to surveyability and recreational contribution.

The following survey criteria for deer are consistent with the above rationale.

1. Surveys will not be conducted in PMU C because of poor surveyability. An inventory approach will be developed for this area in the species management plan.
2. Surveys will be conducted in those PMUs with high hunting pressure and good surveyability (A and B).
3. PMU A: Southern Region
 - a. All WMUs in the traditional Foothills and Western Prairie Deer Survey areas will be surveyed every second year.
 - b. The WMUs in the traditional Prairie Deer Survey area will be surveyed on a two-year rotational basis.Central Region
 - a. The WMUs will be surveyed on a three-year rotation.
4. PMU B: The WMUs that are surveyable and provide moderate to high recreational contribution within the PMU (Table 2) will be surveyed on a three-year rotation.

SURVEY DESIGN

Table 3 provides the provincial survey design for deer based on the above criteria. Rotation of surveys According to WMU reflects an attempt to spread annual coverage throughout the PMU.

1. Survey intensity should provide population estimates within plus or minus 30 percent precision.
2. Two types of survey designs should be used:
 - a. In prairie WMUs (PMU A) permanent blocks of known area and located within good deer habitat.
 - b. In parkland WMUs (PMU B) random stratified 2.6 km² (1 sq. mi.) quadrats.
3. All deer habitat in each WMU of PMUs A and B should be mapped and measured. This habitat mapping should be updated every five years.

Table 2. Wildlife Management Unit (WMU) surveyability and recreational contribution to deer hunting within Primary Management Unit (PMU) B.

WMU	SURVEYABILITY	RECREATIONAL CONTRIBUTION
200	Good	High
202	Good	High
204	Good	Moderate
206	Good	Moderate
208	Good	High
210	Poor	Low
212	Poor	Low
214	Poor	Low
216	Fair	High
220	Good	Moderate
221	Poor	Low
222	Poor	Moderate
224	Good	Moderate
226	Good	Moderate
228	Poor	Low
230	Poor	Low
232	Fair	High
234	Poor	High
728/730	Good	High
236	Good	High
238	Good	High
240	Poor	Low
242	Good	High
244	Poor	Moderate
246	Poor	Moderate
248	Poor	Low
250	Fair	High
252	Poor	Moderate
254	Good	High
256	Good	High
258	Good	High
260	Poor	High
334	Poor	High
336	Poor	High
508	Fair	High

Table 3 (Continued).

REGION	SURVEY	PMU	WMU	YEAR 1		YEAR 2		YEAR 3		
				AIRCRAFT HOURS	COST (\$)	AIRCRAFT HOURS	COST (\$)	AIRCRAFT HOURS	COST (\$)	
CENTRAL	PRAIRIE	A	150	x						
			151	x						
			152				x			
			160						x	
			162						x	
			164							
				166	x					
		Subtotal			7 (RW)	2 450	16 (RW)	5 600	7 (RW)	2 450
		WESTERN PRAIRIE	A	156			8 (RW)	2 800		
	158							8 (RW)	2 800	
310	8 (RW)			2 800						
			312	15 (RW)	5 250					
	Subtotal			23 (RW)	8 050	8 (RW)	2 800	8 (RW)	2 800	
	PARKLAND	B	200					16 (FW)	2 560	
202			20 (FW)	3 200						
204								8 (FW)	1 280	
206			7 (FW)	1 120						
208							8 (RW)	4 720		
					216			12 (FW)		
					220			8 (FW)	1 280	
			224	20 (FW)	3 200			4 (RW)	3 960	
			226			5 (FW)	800	16 (FW)		
	Subtotal			47 (FW)	7 520	8 (RW) 25 (FW)	6 800	4 (RW) 40 (FW)	7 800	
CENTRAL	Subtotal			30 (RW)	18 020	32 (RW)	15 200	19 (RW)	13 050	
				47 (FW)		25 (FW)		40 (FW)		

Table 3 (Continued).

REGION	SURVEY	PMU	WMU	YEAR 1		YEAR 2		YEAR 3		
				AIRCRAFT HOURS	COST (\$)	AIRCRAFT HOURS	COST (\$)	AIRCRAFT HOURS	COST (\$)	
NORTHEAST	PARKLAND	B	232				8 (RW)	2 800		
			236	9 (RW)	3 150					
			238					10 (RW)	3 500	
			242 ^c					5 (RW)	1 750	
			250							
			254	10 (RW)	3 500					
			256				5 (RW)	1 750		
			258						10 (RW)	3 500
508				10 (RW)	3 500					
728 ^d	6 (RW)	2 150		6 (RW)	2 150		6 (RW)	2 150		
730 ^d										
NORTHEAST Subtotal				25 (RW)	8 800	29 (RW)	10 200	31 (RW)	10 900	
TOTAL				75 (RW)	35 820	81 (RW)	34 400	89 (RW)	41 950	
				47 (FW)		25 (FW)		40 (FW)		

^aCost calculated using: Southern Region - \$450/hour rotary wing (RW) (Charter - "dry" rate).
 Central Region - \$350/hour rotary wing (RW) (Government - "dry" rate).
 - \$160/hour fixed wing (FW) (Charter - "dry" rate).
 Northeast Region - \$350/hour rotary wing (RW) (Government - "dry" rate).

^bNo present coverage. To be added to Prairie format after 1985/86 design is completed (five hours allocated).

^cAnnually covered by Blackfoot-Ministik elk survey.

^dAnnually covered (Camp Wainwright).

NOTE: Battle River and Suffield are considered "inventory" and "special" surveys, respectively, and are not included in this survey design.

APPENDIX III.

Deer Habitat Mapping and Assessment Techniques Used by
the Central and Northeast Regions.

THE PROCEDURES USED FOR THE HABITAT STRATIFICATION FOR DEER IN THE CENTRAL REGION

After receiving numerous unsatisfactory results from the satellite imagery program, it was decided to go back to manual interpretation of aerial photographs for habitat stratification. In the winter of 1984-85, six WMUs (200, 208, 220, 228, 230 and 314) were chosen for the habitat stratification program. Since the majority of each WMU was photographed between 1981-1983, the photos provided relatively up-to-date information on development within individual WMUs.

With sufficient manpower, the rest of the WMUs in the Central Region will be stratified by 1987-88 using the procedures listed below.

The following guidelines and procedures were used to produce the color-coded habitat stratification on a mylar base:

1. It was decided to go back to five habitat classes (0-12, 13-30, 31-49, 50-74, 75-100) according to percent cover and/or topography. The river systems were not done separately.
2. It was assumed that white-tailed deer would inhabit any area with sufficient cover.
3. It was assumed that mule deer would inhabit any area with sufficient cover, as well as sandhills, unbroken shrubland and the treeless and rugged riparian zone along major watercourses. All were considered habitat and the percent of each were included in the total.
4. The WMUs were outlined on 1:250 000 scale NTS maps and a 1:250 000 scale blank map, with the square miles and townships penciled in, was constructed for each WMU.
5. All the whole square miles were sequentially numbered from left to right on the NTS map giving the total square miles in the particular WMU. Partial square miles, around the periphery of the WMUs, were ignored.
6. All the air photos required were interpreted at the Map and Air Photo Division, 2nd Floor, Petroleum Plaza, North Tower.

7. The square miles were measured on the different-scale air photos and similar-sized holes were cut out of cardboard. When placed on the air photo, an estimation of the amount of habitat within the square mile could be identified more easily. A large suspended magnifying glass was also used for difficult photos. This apparatus was borrowed from the Bramalea Building.
8. The visually estimated amount of habitat was then recorded on the corresponding blank square mile at 1:250 000 scale.
9. When two sets of numbers appear in a square mile unit, e.g., 20/5, the top number represents percent habitat and the bottom one, percent water.
10. For easy reference, all the pertinent information was taken off each line of air photos and recorded beside the corresponding square-mile coverage on the blank 1:250 000 map. The data included the series (e.g., AS2736), photos (e.g., 227-241), date and line number.
11. A sheet of mylar, with the WMU, townships and square miles drawn on it in India ink, at the 1:250 000 scale, was placed on top of the map with the percent habitat. Four colors were designated to four coverage classes (13%-30%, 31%-49%, 50%-74%, 75%-100%), while a fifth class (0%-12%), which was usually most numerous, was left clear. The colors were put on the mylar using colored pencils.
12. A legend was put on the final copy that included the color and percent cover in each class, the number of square miles in each class and the percent of each class in the WMU.
13. Another mylar, with the square miles drawn on, depicted the area and the year of the air photo coverage.

A tentative schedule to complete an additional seven WMUs (151, 166, 202, 206, 224, 310 and 312) has been approved for the winter of 1985-86.

August 1985

WILDLIFE RESOURCE ASSESSMENT PROGRAM - NORTHEAST REGION

This regional program includes a complete wildlife resource assessment program, but only the habitat stratification component will be presented here. The focus is white-tailed deer but the stratification could be adapted for mule deer.

A. Vegetative Cover Mapping

Map the following on 1:50 000 topographic maps using 1982 aerial photography.

(a) WMUs in Zones 10, 11, 12, 13, 14 and 15.

- tree cover
- native grassland
- cropland
- riparian zones
- water bodies

(b) WMUs in Zones 13, 14, 16 and 1.

- tree cover - conifer, deciduous, mixed, treed muskeg, open muskeg, riparian areas, water bodies

B. Habitat Mapping

Habitat mapping will be done for five indicator species as follows:

- Zones 10, 11, 12 and 15 - primary white-tailed deer (upland forest)
 - sharp-tailed grouse (upland non-forest)
 - waterfowl (wetland)
 - furbearers (muskrat/beaver) - (wetland)
- Zones 13 and 14 - primary white-tailed deer (in the agricultural portion of these zones)
 - sharp-tailed grouse
 - waterfowl
 - primary moose (in the forested portion of these zones)
 - fur (various)
- Zones 1 and 16 - primary moose

- waterfowl
- fur (various)

B. (1) Primary White-tailed Deer Habitat

Using vegetative cover maps, each WMU will be mapped as follows on mylar overlay:

- Class I - indicates areas containing a minimum of 65 ha (green) (160 ac.) of more-or-less continuous tree cover and incorporating neighboring bluffs greater than 4 ha (10 ac.) that are within 1.6 km (1 mi.) of the major block and within 1.6 km (1 mi.) of one another. It includes river breaks and areas of steep topography. This habitat is considered to be the best and is where deer will be present year-round including in severe winters.
- Class II - includes areas with vegetative characteristics similar (red) to Class I except on gentler sloping topography and more interspersed with agricultural cropland. It is considered good deer habitat, where deer will be present year-round and where agricultural products greatly influence winter deer distribution. Overall deer densities are generally less than in Class I.
- Class III - includes areas containing bluffs of 4 ha to 65 ha (orange) (10 to 160 ac.) of tree cover. Contiguous areas include all such bluffs that are within 1.6 km (1 mi.) of one another. This class is considered fair deer habitat, but deer are present only during mild winters.
- Class IV - includes areas containing cropland, open areas, water, (black) industrial and urban development where tree cover occurs in less than 4 ha (10 ac.) bluffs. It is considered poor deer habitat and for practical purposes is considered to support no deer.

Note: The boundary for Class I, II and III is determined by a line approximately 150 m from the contained tree cover.

Appendix IV.

Stable Population Model for White-tailed Deer
in the Prairie/Parkland Region of Alberta.

WHITE-TAILED DEER - MODEL FOR STABLE POPULATION
ALBERTA PRAIRIE/PARKLAND

Time	Females			Males			Totals
	Adult	Yrlg.	Fawn	Adult	Yrlg.	Fawn	
Spring(after fawns are born)	1000	390	1 145	300	390	1 145	4 370
Summer Mortality	10(1%)	4(1%)	527(46%)	3(1%)	4(1%)	527(46%)	1 075
Fall (Preseason)	990	386	618	297	386	618	3 295
Hunting Mortality	182(18%)	71(18%)	71(11%)	181(61%)	160(41%)	71(11%)	736
Fall (Postseason)	808	315	547	116	226	547	2 559
Winter Mortality	84(10%)	39(12%)	157(29%)	13(11%)	29(13%)	157(29%)	479
Spring (before fawns are born) ^a	724+276	390		103+197	390		2 080

^aThese numbers reflect that yearlings of the previous year have now become adults and fawns have now become yearlings.

<u>Season</u>	<u>Buck:Doe:Fawn Ratio</u>
Preseason	50:100:90
Postseason	30:100:97
Late Winter	30:100:78

- 1) Potential increase 2.1 times comparing spring (before fawns) to spring (after fawns).
- 2) Preseason population is 1.58 times larger than spring (before fawns).
- 3) Preseason population is 1.29 times larger than postseason.

Antlered Harvest Goal = 10% of the preseason population
Antlerless Harvest Goal = 12% of the preseason population

**Rationale for the White-tailed Deer Stable
Population Model for the Alberta Prairie/Parkland**

1. It was assumed that the fetal rate of 2.08 fawns/doe (Hall 1973, sample size 111 does 1967-1971) for does older than one year and 0.54 fawns/yearling (Hall 1973, sample size 19 yearlings or long fawns 1967-1971) at Camp Wainwright represents the average in the Prairie/Parkland.
2. It was assumed that the survival rate for fetuses through to becoming fall fawns (prior to hunting harvest) was 54 percent as found by Hall (1973) at Camp Wainwright 1967-72.
3. It was assumed that yearlings would constitute 28 percent of the spring doe population. This proportion was extrapolated from Hall (1973) who found that late fall fawns (next spring's yearlings) made up 28 percent of the potential female breeding stock.
4. It was assumed that yearling females would make up 32 percent of the hunting/winter doe mortality as found in 1571 aged hunter kills submitted in 1978-1982 (Treichel, annual incisor bar age reports).
5. It was assumed that the combined hunting/winter mortality of fawns would be equal in both sexes and result in the 28 percent required for the yearling class the following spring.
6. It was assumed that yearling males would make up 47 percent of the hunting/winter male mortality as found in 3326 aged hunter kills submitted in 1979-82 (Treichel, annual incisor bar age reports).
7. It was assumed that mortality rates in the adult, yearling and fawn female cohorts would reflect a selection for larger does over fawns. The age data for 2342 aged hunter kills submitted in 1978-1982 show the harvest consisted of 46 percent adults, 18 percent yearlings and 36 percent fawns compared to the pre-season population of 38 percent adults, 15 percent yearlings and 47 percent fawns.