PROCEEDINGS OF THE WESTERN STATES AND PROVINCES 1995 JOINT DEER AND ELK WORKSHOP

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MULE DEER
GENERAL HARVEST INFORMATION

STATE	1993 HARVEST ANT	ANT-	TOTAL	5 YR AVE ANT	ANT-	TOTAL	1 SEASON LIMIT	LEGAL HARVEST	HUNTER #'S RES	NONRES	TOTAL	HUNTER DAYS RES	NONRES	TOTAL	LICENSE FEES RES	NONRES	% LAND OPEN TO PUBLIC HUNTING
AK	16,476	4,513	20,989	16,328	6,078	22,406	YES/NO	5+	11,815	365	12,180	68,252	2,072	70,324	$25.00	$220.00	80-90% GMU'S 1-6 AND 8
AZ	13,339	61	13,400	13,185	760	13,945	NO	1		(<10%)	70,130		(<10%)	359,170	$35.50	$164.00	70% OF MULE DEER HABITAT
AB	NO INFORMATION																
BC*	19,072	4,186	23,258	24,535	5,458	29,993	NO	2-3	59,532		59,532	481,114		481,114	$25Can	$150Can	80%
CA	22,900	500	23,400	26,000	NA	26,000	NO	2	NA	NA	200,000	NA	NA	NA	$41.50(1)	$236.25(1)	
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	$62.25(2)	$385.60(2)	
CO	40,659	20,856	61,515	49,900	27,100	77,000	YES	4	139,549	72,813	212,362			660,791	$30.25	$150.25	36-37%
ID	17,785	8,665	26,450	NA	NA	49,400	NO	1-2	NA	NA	100,300	NA	NA	805,600	$17.00	$212.00	69%
MT	50,933	36,287	87,382	53,869	32,167	86,279	NO	6	146,777	30,463	185,575	1,006,577	186,650	1,258,475	$8/11	$245/475	NA
	-	-	-	-	-	-	-	-	(MD/WT DEER COMBINED)			(MD/WT DEER COMBINED)			-	-	-
NM	17,500	(200)	17,500	17,700	(200)	17,700	YES	1	63,300	6,600	69,900	224,400	26,800	251,200	$19.00	$181.00	40%
NV	5,803	473	6,276	13,163	4,461	17,624	YES	1	12,405	1,397	13,802	61,225	7,344	68,569	$45.50	$255.50	80%
OR (MD)	15,801	2,226	18,027	26,978	3,960	30,939	NO	2-3			58,351			480,985	$22.50	$223.00	65-75%
(BT)	34,996	4,957	39,953	38,117	9,228	47,346	NO	2-3	159,310	1,610	160,920			1,956,929	$22.50	$223.00	65-75%
SK	NO INFORMATION																
TX	NO INFORMATION																
UT	25,953	2,104	28,057	62,307	13,957	76,414	YES	1+1	159,172	16,650	175,822			1,017,087	$25.00	$195.00	
WA	INCLUDED IN WT INFORMATION																
WY	33,008	25,328	58,336	43,549	27,478	71,027	NO	2	56,315	35,551	91,866	306,850	160,376	467,226	$17.00	$155.00	95.8%

* Mule deer and coastal black-tailed deer.

MULE DEER SEASON STRUCTURE
GENERAL FIREARM

STATE	OPENING DATES	LENGTH (DAYS)	OVERLAP RUT	HUNTER #S RES	HUNTER #S NONRES	HUNTER #S TOTAL	HUNTER DAYS RES	HUNTER DAYS NONRES	HUNTER DAYS TOTAL	SUCCESS RATE	HARVEST ANT	HARVEST ANT-
AK	NO SPECIFIC FIREARM SEASONS, THE FOLLOWING DATA IS FOR ALL LEGAL METHODS AND MEANS											
	8/1	153	YES									
AB	NO INFORMATION											
AZ	LAST FRI. OCT.	4/10/17	NO		(<10%)	49,300		(<10%)	220,220	27%	11,967	0
BC	VARIES		NO INFORMATION									
CA	VARIES	VARIES	FEW			200,000	NA	NA	NA	10%	22,900	500
CO	10/15&22,11/5	3/5/12/9	FEW	89,025	68,554	157,579			445,570	34%	36,941	17,130
ID	9/15 - 11/1	10-65	FEW	50,300	10,300	60,600	433,800	73,800	576,600	31%	13,500	5,400
MT	10/23	34	YES	146,777	30,463	177,240	1,006,577	186,650	1,193,227	65%	53,869	32,167
	-	-	-	(MD AND WT COMBINED)			(MD AND WT COMBINED)			(MD & WT COMBINED)		
NV	10/2	30	YES	10,754	1,210	11,964	49,895	5,086	54,981	42-53%	5,437	473
NM	10/30	2/3/5/7	FEW	53,500	5,200	58,700	159,000	18,400	177,400	27%	14,900	
OR	(BLACKTAIL DEER ONLY)											
	10/2	40	YES	147,891	1,494	149,385			1,339,673	25%	33,503	4,316
SK	NO INFORMATION											
TX	NO INFORMATION											
UT	APPROX 10/20	9	NO	132,055	14,672	146,727			710,644	19%	19,547	1,973
WA	INCLUDED WITH WHITETAIL INFORMATION											
WY	VARIES	VARIES	YES	56,315	35,551	91,866	306,850	160,376	467,226	63.5%	NA	NA

MULE DEER SEASON STRUCTURE
ARCHERY

STATE	OPENING DATES	LENGTH (DAYS)	OVERLAP RUT	HUNTER #S RES	HUNTER #S NONRES	HUNTER #S TOTAL	HUNTER DAYS RES	HUNTER DAYS NONRES	HUNTER DAYS TOTAL	SUCCESS RATE	HARVEST ANT	HARVEST ANT-
AK	NO SPECIFIC ARCHERY SEASON, THE FOLLOWING DATA IS FOR ALL LEGAL METHODS											
	8/1	153	YES									
AB	NO INFORMATION											
AZ	AUG & DEC	10/16	YES		(<10%)	19,395		(<10%)	132,000	7%	1,087	61
BC	VARIES		NO INFORMATION									
CA	VARIES	VARIES	FEW	NA	NA	NA	NA	NA	NA	7%	1,700	60
CO	8/27 - 9/25	30	NO	14,413	9,240	23,653			182,194	22%	2,448	2,479
ID	8/30 - 12/10	26	FEW	NA	NA	19,100	NA	NA	135,900	5%	500	500
MT	9/3	42	NO	NA	NA	8,335	NA	NA	65,248	12%	650	452
NV	8/14	28	NO	1,510	178	1,688	9,507	1,105	10,612	13-24%	285	0
NM	9/1	20	NO	5,100	500	5,600	45,800	3,500	49,300	15%	800	
OR	9/28	30	YES	25,132	1,323	26,455			297,235	MD=11%	MD=1,461	MD=186
	(ALL DATA EXCEPT "HARVEST" & "SUCCESS RATE" IS FOR MD & BT COMBINED)									BT=19%	BT=1,493	BT=641
SK	NO INFORMATION											
TX	NO INFORMATION											
UT	8/21	28	NO			22,873			198,048	21%	2,512	2,192
WA	INCLUDED IN WHITETAIL INFORMATION											
WY	9/1	10/20/30	NO	5,258	1,280	6,538	39,031	8,150	47,150	14.9%		972 TOTAL

MULE DEER SEASON STRUCTURE
MUZZLELOADER

STATE	OPENING DATES	LENGTH (DAYS)	OVERLAP RUT	HUNTER #S RES	HUNTER #S NONRES	HUNTER #S TOTAL	HUNTER DAYS RES	HUNTER DAYS NONRES	HUNTER DAYS TOTAL	SUCCESS RATE	HARVEST ANT	HARVEST ANT-
AK	NO SPECIFIC MUZZLELOADER SEASON, THE FOLLOWING DATA IS FOR ALL LEGAL METHODS											
	8/1	153	YES									
AB	NO INFORMATION											
AZ	OCT,NOV,DEC	10/16	FEW		(<10%)	1,437		(<10%)	6,950	20%	285	0
BC	VARIES	NO INFORMATION										
CA	VARIES	VARIES	FEW	NA	NA	600	NA	NA	NA		35	15
CO	9/10 - 9/18	9	NO	6,592	1,408	8,000			33,027	34%	1,270	1,247
ID	10/5,11/10 & 25	15/20	YES	NA	NA	10,300	NA	NA	48,600	13%	925	425
MT	NO SPECIAL SEASON											
NV	9/11	16	NO	382	28	410	1,823	137	1,960	29.69%	139	0
NM	9/10	11	FEW	4,700	900	5,600	19,600	4,900	24,500	32%	1,800	
OR	VARIES	VARIES	VARIES	MD=200	MD=4	MD=204			MD=871	MD=40%	MD=42	MD=39
				BT=1,616	BT=23	BT=1,639			BT=9,491	BT=40%	BT=555	BT=93
SK	NO INFORMATION											
TX	NO INFORMATION											
UT	11/6	10	YES			15,587			75,430	22%	3,442	0
WA	INCLUDED IN WHITETAIL INFORMATION											
WY	NO SPECIAL SEASON											

MULE DEER SEASON STRUCTURE
CONTROLLED HUNT

STATE	OPENING DATES	LENGTH (DAYS)	OVERLAP RUT	HUNTER #S RES	HUNTER #S NONRES	HUNTER #S TOTAL	HUNTER DAYS RES	HUNTER DAYS NONRES	HUNTER DAYS TOTAL	SUCCESS RATE	HARVEST ANT	HARVEST ANT-
AK	10/15	14	NO			391	(UNKNOWN)			37%	146	
AB	NO INFORMATION											
AZ	ALL FIREARM AND MUZZLELOADER TAGS ARE LOTTERY DRAW											
BC	VARIES	NO INFORMATION										
CA	ALL HUNTS ARE CONTROLLED											
CO	SUMMARIZED WITH GENERAL RIFLE											
ID	8/24 - 11/10	VARIES	YES	NA	NA	10,300	NA	NA	44,509	*45%	2,860	2,340
MT	INCLUDED WITH GENERAL TOTALS											
NV	SEVERAL SMALL INSIGNIFICANT HUNTS											
NM	9/1 & 11,10/1	2-20	NO	NA	NA	8,500	NA	NA	26,900	29%	1,880	60
OR (MD)	VARIES	VARIES	VARIES	60,887	1,100	61,987			320,021	26%	14,340	2,040
(BT)	VARIES	VARIES	VARIES	17,735	31	17,766			113,810	35%	4,469	1,759
SK	NO INFORMATION											
TX	NO INFORMATION											
UT	VARIES	9-45	VARIES			2,999			8,690	55%	0	2,104
WA	INCLUDED WITH WHITETAIL INFORMATION											
WY	INCLUDED WITH GENERAL INFORMATION											

MULE DEER STATUS REPORT - ALASKA

SUBSPECIES PRESENT:
Sitka black-tailed deer

CONTACT PERSON:
Bruce Dinneford, 465-4369 (Southeast Alaska)
Karl Schneider, 267-2189 (Southcentral Alaska)

OVERALL MANAGEMENT GOALS:
The management goal for deer in Southeast Alaska, Game Management Units (GMUs) 1-5, and Prince William Sound, GMU 6, is to provide the greatest opportunity to participate in deer hunting. On Kodiak and Afognak Islands, GMU 8, the management goal is to maintain a deer population that will sustain a harvest of at least 8,000 deer.

We do an annual hunter survey which samples harvest ticket holders for hunting activity. In some years we query hunters about their satisfaction level with existing seasons and bag limits and their hunting experience.

LONG-TERM STRATEGIC PLAN:
We don't have a plan for Southeast Alaska and Kodiak/Afognak, but we do have one for Prince William Sound.

STATEWIDE POPULATION TREND/ESTIMATE:
The current population estimate for deer in Southeast Alaska is approximately 350,000. The trend is stable. In Prince William Sound the trend is upward. On Kodiak/Afognak Islands the trend is increasing and the harvest is about 67% of the objective.

HARVEST DATA COLLECTION:
Throughout most of the state, harvest is estimated by sampling a portion of all deer harvest ticket holders. This is a mail-out survey. We ask, for each trip, the month of the hunt, the ADF&G code number for the area (we provide a map), number of days hunted, an estimate of the level of deer present, number of deer seen, number of deer killed by sex, and the method of transport.

Personal interviews with residents of small villages by the Division of Subsistence are also conducted. Summary data are used by ADF&G in addressing season and bag limit change. Data are provided to land managers for their use.

In one Southeastern hunt that had been closed for about 15 years, we employed a registration hunt for 4 seasons. We will ask the Board of Game to change this to a more general harvest ticket hunt for 1995.

"QUALITY" MULE DEER HUNTING OPPORTUNITIES:
No

ANTLERLESS MULE DEER HARVEST:
We support antlerless seasons if pellet count analysis and other indicators such as the ratio of females to males in the harvest suggest deer are present in numbers commensurate with habitat capabilities. No discrete goals are established.

CONTROLLING HUNTER DENSITY AND DISTRIBUTION:
We use season lengths and bag limits. The permit hunt referred to in Harvest Data Collection allowed us to analyze this hunt with increased precision over the use of harvest tickets in Southeast Alaska.

In Prince William sound, because of the lack of roads and generally poor weather conditions, hunter crowding is not a problem. On Kodiak/Afognak Islands we provide information to hunters on the best hunting areas. We have longer seasons and higher bag limits in areas with the highest deer numbers and more difficult access.

SEASON STRUCTURE CHANGES IN LAST 10 YEARS:
We have had none. In Southeast Alaska deer populations on the 16-million acre Tongass National Forest are closely tied to habitat condition. In areas not clear-cut, healthy populations are the rule. As clear-cuts mature, canopy closure in second-growth stands will reduce winter forage. Season structure will likely change at that time. In other portions of Alaska no major changes have occurred.

DEVELOPING SEASON STRUCTURE:
We use hunter surveys, harvest data, pellet count trends, winter mortality counts, and aerial surveys. The Statewide Board of Game sets seasons and bag limits. Local advisory committees also have input to the regulatory process and are represented at Board of Game public hearings on regulatory changes.

DATA COLLECTION METHODS:
See Developing Season Structure.

POPULATION MODELING:
No deer population modeling is done. We do use habitat suitability models to evaluate the effects of different logging alternatives on habitat capability.

DEPREDATION POLICY:
No

RESEARCH EFFORTS/RESEARCH CONTACT PERSON:
Matt Kirchhoff, 1-(907) 465-4328. Research is done on deer habitat relationships, including:

deer response to secondary forest succession
deer response to habitat fragmentation
patterns of habitat selection in old-growth forests

CURRENT MANAGEMENT ISSUES:
Some of the forces influencing management are land use practices including clear-cut logging, increasing roads in rural areas, and an increasing rural population base; brown bear, black bear, and wolf predation; and weather patterns characterized by winters with extended, deep snow.

FUTURE MANAGEMENT ISSUES:
See Season Structure Changes in Last 10 Years.

MULE DEER STATUS REPORT - ARIZONA

SUBSPECIES PRESENT:
O. hemionus hemionus

CONTACT PERSON:
Tice Supplee, Game Branch Chief/Ray Lee, Big Game Supv.

OVERALL MANAGEMENT GOALS:
Our goals are to maintain populations at levels which provide recreational opportunities to as many individuals as possible while avoiding adverse habitat impacts.

LONG-TERM STRATEGIC PLAN:
Yes

STATEWIDE POPULATION TREND/ESTIMATE:
It is slightly upward and below the 1992-96 Strategic Plan objectives.

HARVEST DATA COLLECTION:
We use hunter questionnaire mail surveys asking if deer are killed and how many days hunted in what units. The data is provided to the game management unit wildlife managers for use in preparing next year's harvest/hunt recommendations.

"QUALITY" MULE DEER HUNTING OPPORTUNITIES:
Selected game management units are under "alternative" management, where the objective is to manage for narrower buck:doe ratios than the statewide guidelines. Hunts in these units usually have fewer permits and some hunts are scheduled to increase hunter advantage in the field by occurring near or within the rut.

ANTLERLESS MULE DEER HUNTING:
We only schedule antlerless hunts on the North Kaibab (unit 12A), and that occurs only when population estimates indicate population is increasing past calculated habitat capacities. No other units have been open to antlerless harvest since the 1960s except for archery. Archery harvest is very low and considered incidental in most units.

An antlerless hunt would be recommended in a unit or portion of a unit if the deer population was very large and showing evidence of stressing the habitat.

CONTROLLING HUNTER DENSITY AND DISTRIBUTION:
All general firearms hunts are permit/draw by hunt unit. Hunts are stratified (split into multiple seasons) where needed to control overall hunter density.

Access is mostly available. Arizona has an active land access program to gain public access across private lands in those areas where it is an issue. The program seems to be working, although individual access negotiations require a lot of time.

SEASON STRUCTURE CHANGES IN LAST 10 YEARS:
We have had none. Arizona has had permit/draw general firearms seasons statewide since 1972. There is a wide diversity of season structures, but they are very stable.

One change has been the offering of Junior hunter (10-14 years old) deer hunts in 2-3 management units annually during late December, concurrent with the rut. Offered units are changed every 1-3 years as hunt success is high and harvest pressure on mature bucks is also high.

DEVELOPING SEASON STRUCTURE:
Game unit managers conduct winter ground and aerial surveys (fixed-wing & helicopter) to derive buck:doe:fawn ratios at the unit level. The hunter questionnaire program provides unit level harvest, hunt success, and hunter day information.

Deer management in Arizona is not very political at this time. Hunt structures are set up in 5-year hunt management guidelines tied to the 5-year Mule Deer Strategic Plan that is approved by the Arizona Game & Fish Commission.

DATA COLLECTION METHODS:
Game unit managers conduct winter ground and aerial surveys (fixed-wing & helicopter) to derive buck:doe:fawn ratios at the unit level. The hunter questionnaire program provides unit level harvest, hunt success, and hunter day information.

The Department is investigating the use of Global Positioning System (GPS) technology to enhance population estimation from aerial survey efforts. The unit level trend data for harvest and buck:doe:fawn ratios has been collected in the same manner for over 20 years, yielding very good data sets over time. Statistical variation for a given year is still quite high.

POPULATION MODELING:
We use a POPDYN style model that runs on harvest and posthunt buck:doe:fawn ratio data sets. The model is run multiple times to derive a "best fit" statistically, and that is the value used for a population estimate.

The smaller the geographic area and/or the data set, the more unstable the model runs. Some units model better than others. The value of modeling is as an aid to formulating management recommendations, not as an accurate index of populations.

DEPREDATION POLICY:
See Arizona's elk status report. There are no payments or compensation in Arizona. Depredation complaints attributed to deer are infrequent, and are usually associated with orchards or vineyards.

RESEARCH EFFORTS/RESEARCH CONTACT PERSON:
We are beginning a cooperative effort with the Utah Department of Wildlife studying the Paunsagaunt Deer Herd in Southwestern Utah and Northwestern Arizona. Contact: Jim deVos, Research Branch Chief.

CURRENT MANAGEMENT ISSUES:
The greatest force is climate. Permits are adjusted annually to account for annual variations in buck:doe:fawn ratios and overall trends at the management unit level. Other factors are habitat conditions and predator levels. The Department has little influence on these parameters.

FUTURE MANAGEMENT ISSUES:
In the next 5 years, we will see persistent low populations in units that historically held high population levels, which seems associated with climatic conditions.

In 5-20+ years, there will be lack of habitat change to secondary succession browse and forb growth (because of tighter controls on prescription fire, chaining, and other treatments in classic pinyon-juniper winter ranges and chaparral habitats).

There will also be physical loss of prime populations to housing and suburban/rural "ranchette" development.

MULE DEER STATUS REPORT - BRITISH COLUMBIA

SUBSPECIES PRESENT:
Mule deer (*Odocoileus hemionus hemionus*); Coast blacktailed deer (*Odocoileus columbianus* and *O.h. Sitkensis*)

CONTACT PERSON:

OVERALL MANAGEMENT GOALS:
Our goals are to maintain key habitat; increase recreational use opportunities; and preserve and enhance populations.

LONG-TERM STRATEGIC PLAN:
We have a draft plan only.

STATEWIDE POPULATION TREND/ESTIMATE:
We have stable to increasing populations. Numbers are approaching goals.

HARVEST DATA COLLECTION:
We use mail-out hunter sampling and voluntary tooth return for aging. Standard harvest data is collected.

"QUALITY" MULE DEER HUNTING OPPORTUNITIES:
We have quality hunting opportunities, mainly by default because of lack of access in many areas.

ANTLERLESS MULE DEER HARVEST:
Some antlerless harvest under limited-entry regulations occurs in most areas. The goal is to achieve increased antlerless harvests.

CONTROLLING HUNTER DENSITY AND DISTRIBUTION:
We use access management, special regulations, season length adjustments, etc. These methods are working.

SEASON STRUCTURE CHANGES IN LAST 10 YEARS:
We have had some reduction in season lengths in the interior from the end of November-early December to close earlier in November.

DEVELOPING SEASON STRUCTURE:
We use harvest information, biological information, Department/commission regulatory authority, the Legislature, plus anecdotal reports and managers' perceptions.

DATA COLLECTION METHODS:
We use voluntary hunter questionnaire returns.

POPULATION MODELING:
There is some limited use of POP II.

DEPREDATION POLICY:
There is some liberalization of seasons where depredation complaints are numerous. No compensation is paid.

RESEARCH EFFORTS/RESEARCH CONTACT PERSON:
Some limited forestry/deer operational studies are ongoing. Contact person: Don Eastman, Research Section, Wildlife BR, Victoria, B.C.

CURRENT MANAGEMENT ISSUES:
These issues include pressures to provide increased recreational hunting opportunities on bucks, and decreased number of deer in agricultural crop areas. The desire for more buck hunting by hunters is resulting in too many antler-restricted seasons and too few antlerless seasons.

FUTURE MANAGEMENT ISSUES:
--Loss of key habitat to private alienation.
--Lack of adequate funding for population inventory.
--Ensure that hunting is adequately supported politically.

MULE DEER STATUS REPORT - CALIFORNIA

SUBSPECIES PRESENT:

OVERALL MANAGEMENT GOALS:
Our goals are to manage deer herds for their intrinsic and ecological values, as well as for the beneficial use and enjoyment by all citizens of the state.

These are largely unmeasurable goals; however, we have surveyed the public as to the benefits they derive from the deer resource. For example, in 1987, the economic value of deer to hunters and viewers was estimated at $414 million and $34 million, respectively.

LONG-TERM STRATEGIC PLAN:
We are redrafting it.

STATEWIDE POPULATION TREND/ESTIMATE:
The statewide estimate in 1994 was 760,000. The long-term trend has been downward since the late 1960s when large-scale habitat changes began impacting deer herds.

However, in the last 10 years, populations have been stable to slightly declining. Since the late 1980s the drought has further impacted deer habitat and their populations. Unless deer habitat loss and degradation is stopped and California returns to a wetter weather pattern, we expect the trend to continue.

The Department does have specific population goals in herd management plans, but they have been abandoned as being impractical. Under current circumstances, the Department is not able to effectively manage deer populations.

HARVEST DATA COLLECTION:
The Department uses a multi-faceted approach. Hunters are required by law to fill out and return a report card if they kill a deer. These data are used to calculate a "reported take." Facilities that process deer for hunters are required to keep a log of hunters that bring in game.

The Department compares these known kills with the portion of those that reported their kill to the Department. This generates a non-reporting rate used with the reported kill to calculate an estimated kill.

In addition, the Department has begun using telephonic surveys to generate an independent estimator of harvest. Interestingly, the estimated kill figures derived from hunter-returned report cards and game processing facilities are similar to those from the telephonic survey.

"QUALITY" MULE DEER HUNTING OPPORTUNITIES:
The Department defines "quality" deer hunting opportunities as those hunts that tend to provide higher than normal hunter success. The Department provides numerous hunts of this type. They are almost all late-season hunts with limited quotas. They include late-season archery, muzzleloading, rifle, and shotgun hunts.

ANTLERLESS MULE DEER HARVEST:
The Department's position on antlerless harvest is that it is a biologically-sound management tool for mule deer. The Department's goal is to establish antlerless hunting as a regular part of deer management in California.

However, that is far from reality. The current strategy is to slowly gain the confidence of constituents (hunters and nonhunters) by proposing small-scale hunts. This approach is necessitated by a law that provinces the county board of supervisors of 37 counties the authority to veto any antlerless or either-sex hunt proposal.

CONTROLLING HUNTER DENSITY AND DISTRIBUTION:
We rely on tag quotas and hunt zones to regulate hunter density and distribution. Additionally, within some zones we work with land management agencies to restrict the type of access to some areas. For example, we ask the U.S. Forest Service to close certain roads to reduce hunter/vehicle densities in critical areas.

On a large scale, these efforts are working. On a small scale, however, the success is questionable. Since our zone system was created, we have learned much more about our deer populations. As a result, we have discovered that some of our zones do not encompass the dynamics of the particular deer herd.

The result has been that management prescriptions for these zones have often not produced expected results. We are currently reevaluating our zone system to correct this problem.

SEASON STRUCTURE CHANGES IN LAST 10 YEARS:
In 1993 the Department established choose-your-weapon type hunts within selected zones with specific quotas for many of the hunt zones. Before this time, hunters with an Archery Only (AO) tag could hunt in almost any zone in the state. In addition, there was no quota on the number of AO tags.

There were 2 main reasons for this change. One was that the popularity of archery hunting expanded during the late 1980s and early 1990s, increasing the number of archers in the woods and the number of deer they killed. At the same time improvements in archery equipment and more proficient archers apparently contributed to an increase in archery hunter success.

The other reason was the dramatic declines in many of our Great Basin deer herds following the drought of the late 1980s and early 1990s and the severe winter of 1992-93.

This led to a situation where we had deer herds that needed reduced harvests, but no way of regulating an ever-growing and increasingly effective group of archery hunters. The solution was to equally manage all hunters so that harvest could be regulated.

DEVELOPING SEASON STRUCTURE:
Deer seasons are based on migration and rutting patterns of the deer herds and the impacts these have on harvest. In general, the seasons are designed to end before the peak of the rut. This is done for 2 reasons: 1) to reduce hunter success, therefore allowing more hunters in the field; and 2) many California hunters feel that it is "unsporting" to hunt sex-crazed bucks.

DATA COLLECTION METHODS:
The Department relies largely on herd composition surveys conducted in fall and spring by ground and/or air, and hunter harvest data. The Department is currently evaluating these methodologies and experimenting with some new approaches.

The data collected during herd composition and harvest surveys are used to develop population estimates and buck and fawn ratios, and determine appropriate harvest levels.

POPULATION MODELING:
The Department uses a CIR model (KILLVARY) for estimating deer herd populations in the environmental document regarding deer hunting. Some herds are also being modeled with an age-structured population model (POP-4) if the necessary data are available. The Department is currently evaluating the utility of Catch Per Unit Effort models, other deterministic and stochastic models.

DEPREDATION POLICY:
The Department is required under law to issue a depredation permit to kill offending deer when damage has occurred or is threatened to occur. The deer may not be kept by the permittee, and the Department specifies the deposition of the carcass.

Depredation permits are issued by our wardens, who usually make recommendations to solve depredation problems using nonlethal methods. The Department does not compensate owners for damage caused by wildlife.

RESEARCH EFFORTS/RESEARCH CONTACT PERSON:
Predator-prey relationship between deer and mountain lions. The contact is Vern Bleich.

Deer herd estimation project. The contact is Sonke Mastrup.

Habitat suitability model and mapping project. The contact is Eric Loft.

CURRENT MANAGEMENT ISSUES:
Forces influencing management include the deer resource, land management agencies, and special interest groups.

FUTURE MANAGEMENT ISSUES:
Issues include habitat loss and degradation, public safety hysteria, anti-doe hunting, anti-hunting factions, and hunter access.

MULE DEER STATUS REPORT - COLORADO

SUBSPECIES PRESENT:
Odocoileus hemionus hemionus

CONTACT PERSON:
Rick Kahn 303-291-7349

OVERALL MANAGEMENT GOALS:
Colorado has long-term population goals that are the sum of the individual Data Analysis Unit (DAU) population objectives. Individual herds are monitored annually using harvest information, helicopter quadrat census, production and trend counts, and POPII models.

LONG-TERM STRATEGIC PLAN:
Colorado has no long-term strategic plan for deer. The Division of Wildlife (DOW) did publish a Deer and Elk Management Analysis that outlined goals and objectives for 1992-94.

STATEWIDE POPULATION TREND/ESTIMATE:
The long-term objective is 615,750 deer (includes white-tailed deer). The 1993 postseason estimate was 545,171; the trend has been downward for the past 4-5 years.

HARVEST DATA COLLECTION:
Colorado uses a random phone survey of over-the-counter licenses (25% of all licenses sampled). A mail survey, with 3 follow-ups, is used for limited deer licenses (50% of all licenses sampled).

"QUALITY" MULE DEER HUNTING OPPORTUNITIES:
Colorado has a number of totally limited (quality) deer units. The entire eastern plains of Colorado (35% of the state, 10 DAUs) is managed for quality hunting.

In addition, 5 areas of western Colorado will be managed for limited deer hunting in 1995-99. These areas include: North Park, south of Eagle, Douglas Pass (Book cliffs), part of the Uncompahgre Plateau, and selected units in extreme north-west Colorado.

We do not define quality; however, most limited units have buck:doe ratios in excess of 25 bucks:100 does postseason. Most plains units have buck:doe ratios > 40.

ANTLERLESS MULE DEER HARVEST:
Colorado uses both doe licenses and either-sex licenses as the principal means of population control. Antlerless and either-sex seasons are set annually in May, after the DOW has had time to assess winter losses.

CONTROLLING HUNTER DENSITY AND DISTRIBUTION:
The primary strategies are the "one and only" hunt concept, which restricts hunters to only one method (archery, muzzleloading or rifle)/year, and the 3 deer seasons (hunters are restricted to one season for their deer and elk hunting), which historically have done an adequate job of spreading out hunting pressure.

The DOW works with the Bureau of Land Management and the U.S. Forest Service on road management plans and closures.

SEASON STRUCTURE CHANGES IN LAST 10 YEARS:
There have been 3 major changes in deer season since 1988. From 1988-91 Colorado provided 26 days of buck hunting with no limits on the number of licenses. From 1992-94 Colorado had 9 days of buck hunting with unlimited licenses.

The season structure for 1995-99 has 10 days of unlimited buck hunting and 5 days of totally-limited buck hunting statewide. The decrease in the number of days is designed to reduce harvest on buck deer and thus recruit more male deer into older age classes.

DEVELOPING SEASON STRUCTURE:
Season structure is set by the Wildlife Commission for a 5-year period (1995-99). There is no legislative oversight for seasons or license numbers.

The DOW uses biological information (quadrat counts, trend counts, and sex and age classification data), human dimensions survey information, harvest

data, public opinion generated by letters, surveys, task forces and organized groups, and economic assessments to set deer seasons.

DATA COLLECTION METHODS:
Helicopter classification (sex and age) and quadrat density counts are flown annually. We attempt to fly every Game Management Unit (GMU) at least once every 3 years. Approximately 60,000 deer are classified each year. This data is used in the POPII modeling process to help set limited license numbers.

POPULATION MODELING:
All units are modeled annually using POPII. The DOW is working on a new model, POPMOD, which it hopes to be using in lieu of POPII in the future.

DEPREDATION POLICY:
The DOW is liable for damage caused by deer to growing crops, harvested crops, orchards, hay and artificially-seeded rangelands, fences, and livestock forage deferred for seasonal use.

Direct payments to landowners for these types of damage averaged $42,000/year for the past 5 years. In addition, the DOW has spent approximately $200,000/year on deer and elk damage prevention programs.

RESEARCH EFFORTS/RESEARCH CONTACT PERSON:
Compensatory mortality of mule deer in the Piceance Basin--Dick Bartmann, Gary White.

CURRENT MANAGEMENT ISSUES:
1) A growing concern about the lack of "quality" deer available to the hunter.

2) A growing concern about overall mule deer numbers and herd composition, particularly in western Colorado mountain shrub and sagebrush communities. There are various theories and opinions about why mule deer have declined in certain areas of Colorado. The public is concerned about the effect of predation (coyotes, mountain lions, and black bears) and certain DOW employees have expressed concern about competition between elk and mule deer, both nutritionally and spatially. Other opinions point to shrub community degradation by both livestock and deer. Unfortunately, there is little or no data to document the veracity of any of these claims.

3) Ever-decreasing resources to obtain information on deer herds in Colorado.

4) Rapid development of key winter range areas, and few resources being utilized to buy or lease deer habitat.

FUTURE MANAGEMENT ISSUES:
See Current Management Issues.

MULE DEER STATUS REPORT - IDAHO

SUBSPECIES PRESENT:
O.h. hemionus

CONTACT PERSON:
Lonn Kuck

OVERALL MANAGEMENT GOALS:
1) Maintain present population size in most units and allow increases in some units.

2) Maintain or increase buck:doe ratios in all units.

3) Maintain or increase the mature buck component of the deer population in most units.

4) Increase hunter satisfaction from the 56% reporting that they mostly or always experience a quality deer hunt in 1987-88 to at least 70% of the hunters reporting the same level of satisfaction by 1993-94.

5) Increase the supply and improve the distribution of low hunter density/mature buck hunts to the levels specified below (based on the number of hunters able to participate in these hunts):

Region	% of 1995 Opportunity
1	8
2	10
3	8
4	25
5	7
6	14
Statewide	11

LONG-TERM STRATEGIC PLAN:
Yes

STATEWIDE POPULATION TREND/ESTIMATE:
Our short-term goal to maintain or increase deer population size was negated by impacts of the harsh 1992-93 winter. Long-term trends suggest total mule deer numbers have been declining over the past 30 years. The population estimate for the winter of 1993-94 was projected to be at 160,000, an estimated decline of 27% since the 1960s.

Results of the reported harvest of bucks suggest the goal to increase the mature buck component is being achieved.

There have been no surveys conducted to determine deer hunter satisfaction since the 1987-88 deer hunter survey.

HARVEST DATA COLLECTION:
Idaho conducts a random telephone harvest survey annually. Data collected include: harvest by species of deer, success rate, percent males in the harvest, number of hunters, days per hunter, animals seen per day, and a degree of satisfaction in the hunting experience.

In addition, some harvest information is collected at check stations. These data are utilized to set annual deer seasons and monitor harvest trends.

"QUALITY" MULE DEER HUNTING OPPORTUNITIES:
Quality deer and deer hunting experiences are a stated goal of Idaho's mule deer management program. Quality is defined by the probability of harvesting a mature male in a relatively uncrowded hunting environment.

The Department's goal is to distribute hunting pressure more evenly and to simplify the hunting regulations. Common opening dates for general and controlled mule deer hunts have been proposed with limited success.

In 4 units where bucks are vulnerable to overharvest and where mature buck escapement goals were not being met, the general harvest has been limited to those bucks with one or 2 antler points. Yearlings with 3 antler points and virtually all other bucks that escape harvest their first year are allowed to move into mature ages. Mature bucks are then harvested under a controlled hunt framework.

The Department does not restrict antler harvest to bucks with at least 4 points to achieve quality deer. While this strategy does allow escapement to the minimum 4-point size, it also concentrates all hunting pressure on these animals so that very few, if any, bucks reach the desired mature age classes.

An increase in mature bucks is being achieved in many units by shifting general deer hunting earlier, away from the rut period when older bucks are most vulnerable to hunters. Shifting the deer season earlier has allowed more buck escapement, which has created the opportunity to offer some controlled hunts later in the fall. In a few units where early buck hunting is more appropriate, the controlled antlered season begins on August 24.

ANTLERLESS MULE DEER HARVEST:
The Department's antlerless deer harvest strategy is to set general either-sex seasons that either do not occur or last 5, 9, 15, 20, 25, or 65 days, depending on population goals.

CONTROLLING HUNTER DENSITY AND DISTRIBUTION:
Given the relative supply/demand situation evidenced by public input, the Department's current strategy is to place more emphasis on providing more low hunter density/mature buck hunting opportunity. However, biological and sociological limitations probably will never allow supply to fully meet the demand for this type of hunting.

The Department's intent is to try to continue providing a diversity of mule deer hunting opportunities, including early and late archery hunts, muzzleloader hunts, controlled hunts in situations where deer are highly vulnerable to harvest, and general hunts. The remote units in central Idaho continue to have 65-day, either-sex seasons. Some units in densely-settled areas are restricted to short-range weapons.

Although elk have been the targeted beneficiary of most access management programs, deer hunters strongly support access management programs. The Department strongly encourages and cooperates with land management agencies in the development of long-range area management plans which recognize the different types of recreational experiences desired by hunters.

SEASON STRUCTURE CHANGES IN LAST 10 YEARS:
During adoption of the 1991-95 mule deer management plan, the Fish and Game Commission implemented a number of strategies to maintain quality hunting and to shift the harvest away from mature bucks without sacrificing general hunting opportunities. These strategies included:

1) a flip-flop of the deer and elk seasons to reduce the vulnerability of mature males of both species by avoiding the ruts for mule deer and elk respectively;

2) moving opening dates to calendar dates to better sequence mule deer seasons around vulnerable time periods;

3) establishing general, forked-only hunts in units with high potential for overharvest; and

4) establishing late and early controlled hunts to take advantage of increased escapement.

DEVELOPING SEASON STRUCTURE:
The primary information base used to develop mule deer season structures is the random telephone survey. The telephone surveys are conducted on an annual basis to establish harvest levels for the previous year. Helicopter inventory methodology is being developed to produce reliable population estimates. This technique is being utilized on a number of herds to ascertain its usefulness.

The Idaho Fish and Game Commission has authority to set mule deer seasons and regulations. The Idaho legislature regulates the Department's budget.

DATA COLLECTION METHODS:
The results of the annual telephone survey are utilized to monitor the percentage of the buck harvest in the 4-point-plus category to determine the status of the harvest against goals set for each unit. Trends of individual deer herds are currently being monitored with the developing mule deer sightability model.

POPULATION MODELING:
Most regional managers utilize POP II and/or Leslie Matrix models.

DEPREDATION POLICY:
The Department's depredation policy is followed to prevent or minimize depredations. Kill permits or hunts designed to remove depredating animals and/or reduce populations are used in chronic depredation situations that cannot be handled by preventive measures.

In addition, the Department has implemented the depredation claims process instituted by the 1991 Legislature. The average dollar amount compensated to landowners for wildlife damages for the first 4 years of this program has been $70,832.12/year.

RESEARCH EFFORTS/RESEARCH CONTACT PERSON:
Mule Deer Ecology

Study II Mule Deer Mortality
Winter mortality of mule deer
Summer/fall mortality of mule deer

Study III Mule Deer Sightability
Increase Model Application
Timing of mule deer surveys
Mule deer sightability sampling

Study IV Mule Deer Harvest Estimation
Check station sampling

Contact: James W. Unsworth
Principal Wildlife Research Biologist
Idaho Department of Fish and Game
3101 S. Powerline Road
Nampa, Idaho 83686

CURRENT MANAGEMENT ISSUES:
Although long-term trends for mule deer appear downward, while elk populations have simultaneously increased, it is unclear if this relationship is a symptom or a cause for mule deer declines.

The key to sustaining abundant mule deer populations over the long-term lies in maintaining deer habitat quality and diversity. Lacking this, all other management efforts and hunting regulations will be futile.

Many of man's activities, such as logging, grazing, crop cultivation, and fire can substantially affect, positively or negatively, large areas of mule deer range. The Department is actively involved in educating the general public and others in the importance of habitat and as a proponent of land management practices which enhance mule deer habitat quality and diversity.

FUTURE MANAGEMENT ISSUES:
See Current Management Issues.

MULE DEER STATUS REPORT - MONTANA

SUBSPECIES PRESENT:

CONTACT PERSON:
Glenn Erickson

OVERALL MANAGEMENT GOALS:
Our current objectives are harvest; hunter; success; etc. These are measured by Harvest Surveys of hunters following the hunting season.

LONG-TERM STRATEGIC PLAN:
Our Strategic Plan for the period 1985 - 1990 is the most current management plan. We recently initiated a planning process to allocate deer hunting recreation opportunity. When completed in the fall of 1995, this will form the basis for seasons in the future as they relate to hunting opportunity.

STATEWIDE POPULATION TREND/ESTIMATE:
Mule deer population trends are assessed on a habitat basis following survey routes (air and ground). No statewide tabulation of the results of these surveys is currently attempted.

Our best indication is from the harvest survey information collected annually. The trend in harvest has been increasing steadily from the lows recorded following the decline noted in the early 1970s. In 1993 we noted a slight drop in harvest due to mild weather conditions during the fall hunting season. Harvest is expected to be up again in 1994.

HARVEST DATA COLLECTION:
Harvest is estimated through a telephone survey of residents and a mail survey of nonresidents representing approximately 28% of all deer license holders. Estimates are given at the 80% confidence level by deer hunting district. The information collected is used in determining whether or not our recreation objectives are being met and to evaluate success or failure of various seasons.

"QUALITY" MULE DEER HUNTING OPPORTUNITIES:
Currently this is primarily a result of habitat security and/or landowner access restrictions. We do have approximately 10 areas with season types directed at restricting buck harvest in some manner. The permit-only areas appear to be the most successful.

ANTLERLESS MULE DEER HARVEST:
This is used as a population control method as well as recreation. Goals are primarily dictated by private landowner tolerance.

CONTROLLING HUNTER DENSITY AND DISTRIBUTION:
We use Block Management on private land; travel plan development on public land; and permit-only seasons in limited areas.

SEASON STRUCTURE CHANGES IN LAST 10 YEARS:
None. However, we are experiencing more and more demand for older age bucks in the harvest. This is one of the reasons for our current effort to allocate hunting recreation opportunity.

DEVELOPING SEASON STRUCTURE:
We use harvest information, biological information, and Department/commission regulatory authority to develop season structure. The legislature does establish limits on our authority, but does not participate in the biennial season-setting process.

DATA COLLECTION METHODS:
Harvest Survey information and deer trend route surveys form the basis for management. Additional age and sex information on the harvest is collected at check stations.

Current objectives relate to harvest and hunter success. We have also conducted hunter attitude and preference surveys in recent years.

POPULATION MODELING:
We have very limited use of population modeling, and only at the hunting district or research study area level.

DEPREDATION POLICY:
We must respond to damage complaints within 48 hours by statute. We have an administrative rule that guides our response to each situation. Regional supervisors have authority to establish game damage

seasons, after consulting with their local commissioner, within a few days of the complaint. The only delay is in getting the hunters notified.

We do not have a compensation program, but do provide haystack fencing materials and other preventative materials to landowners who provide hunting.

RESEARCH EFFORTS/RESEARCH CONTACT PERSON:
Dave Pac, Bozeman - Bridger Mule Deer Study

CURRENT MANAGEMENT ISSUES:
Most are access related. Private landowner restrictions create refuge situations and prevent us from controlling depredation. Excessive access and reduced habitat security results in lower age structure of the buck segment in some areas.

FUTURE MANAGEMENT ISSUES:
Factors affecting habitat are benefiting whitetail deer and not mule deer. Subdivision of mountain foothills has had and will have a major impact on mule deer.

MULE DEER STATUS REPORT - NEVADA

SUBSPECIES PRESENT:

CONTACT PERSON:
Mike Hess

OVERALL MANAGEMENT GOALS:
Nevada's overall goals are: 1) to maintain and enhance mule deer populations; 2) to maintain and improve annual population status and trend measurements; and 3) to provide for safe utilization of the resource.

Our harvest, census, and hunting programs are integrally tied together. We are constantly trying to improve each facet. The latest improvement has been privatization of the hunter reporting system.

Because our harvest program is very conservative, its impact is measurable, but cannot be considered a controlling factor. The recent severe drought is by far the most significant influence on deer population trend. We are working with land agencies to protect and improve deer habitat, but this work is difficult to assess.

LONG-TERM STRATEGIC PLAN:
Nevada does not have a long-term strategic plan.

STATEWIDE POPULATION TREND/ESTIMATE:
Nevada's mule deer population is about 125,000-130,000 adults. This is down from a recent high of over 250,000 in 1988, and it is similar to levels seen in the mid-1970s. We do not have specified population goals.

HARVEST DATA COLLECTION:
Big game hunters are required to report on their hunt via a return card that comes attached to the deer tag. The hunter provides the postage and his completed card must be returned before January 31. This is mandatory with a penalty of ineligibility to apply for big game tags in the succeeding season or a $50 administrative fine.

Reporting has averaged over 95% for 10 years or more. Adjustments are made in quotas or season length to achieve desired success levels.

Administration of the return card program was privatized in 1993. The contractor is improving the program as the 3-year contract progresses. Results have been very positive to this point. Hunter-initiated telephone reporting is expected next year.

"QUALITY" MULE DEER HUNTING OPPORTUNITIES:
Our mule deer program is intended to provide "quality" almost exclusively. All hunting is controlled by quotas. Quotas are tied to relatively small areas (unit groups) corresponding with coherent populations. Posthunt buck ratios are managed to exceed 20:100 does. Season lengths are meant to maintain hunter success at 50% or better.

ANTLERLESS MULE DEER HARVEST:
While backing away from antlerless harvest in recent years in response to the deer population declines resulting from the drought--due more to political considerations than biological--Nevada normally attempts to hold antlerless hunts in all units.

As populations recover from the drought, more antlerless hunting will be recommended to our Wildlife Commission. When deer populations have recovered from the drought, antlerless hunting should be occurring statewide.

CONTROLLING HUNTER DENSITY AND DISTRIBUTION:
The full quota system acts as our control. We have turned to multiple seasons to further control hunter congestion in a few areas.

SEASON STRUCTURE CHANGES IN LAST 10 YEARS:
The basic structure has not changed in over 15 years, but there have been many minor changes. Most notable of these in recent years are increasing numbers of special weapons seasons, special guided hunter tags, and landowner damage compensation tags.

DEVELOPING SEASON STRUCTURE:
Hunter kill measured by mandatory hunter reporting and intensive postseason and spring helicopter censuses for population composition provide us with inputs for annual population estimates--either change-

in-ratio or computer modeling are used. The annual estimate is the basis for quota recommendations.

Several additional controls are used to maintain standards. These include posthunt buck ratio objectives, recruitment/kill ratio objectives, and hunter success objectives. Wildlife Division recommendations are presented to the public through a formal review process that includes local hearings in each county before the Wildlife Commission sets seasons and quotas.

DATA COLLECTION METHODS:
See Developing Season Structure.

POPULATION MODELING:
Nevada uses both a modified change-in-ratio estimator and a modified version of POP-2 from Fossil Creek for most identified populations. The computer models are updated annually as data is acquired. Models are prepared for over 95% of Nevada's deer populations.

DEPREDATION POLICY:
Responses have varied over the years. Depredation hunts allowing sportsmen some recreation have been the preferred technique if applicable. Fencing has been loaned to ranches with chronic problems. We have no provisions to make payments for depredation by mule deer.

For the last 2 years, ranchers have been awarded special depredation compensation tags for deer and antelope if they qualified. Ranchers can dispose of these tags as they see fit. This program was mandated by legislative action.

While many employees were apprehensive about this program, we have found it to be very positive. It has resulted in decreased depredation complaints and increased tolerance for big game on private property.

RESEARCH EFFORTS/RESEARCH CONTACT PERSON:
Nevada is not conducting research on mule deer presently.

CURRENT MANAGEMENT ISSUES:
The drought has been the major influence on Nevada's deer management in the last decade. In 1988, Nevada offered 57,000 deer tags and sold 51,000. About 14,000 deer tags were sold in 1994 for a decline in available tags of 75% in 6 years.

The politically most divisive issue recently has been the allocation of tags among weapon user groups. After years of wrangling, the Wildlife Commission adopted a tag allocation system based on hunter demand as demonstrated by applications and hunter success rates for the user groups. We are in the third year of using this demand/success system.

FUTURE MANAGEMENT ISSUES:
The following factors will become of increasing importance to mule deer management in Nevada in the future:

1. **Habitat losses to urbanization.** This is mainly a problem in the Reno-Carson City-Tahoe metropolitan area.

2. **Closing of forest and woodland canopies.** Management of pinyon-juniper habitat will become increasingly important as time goes on if recent deer numbers are to be maintained.

3. **Increasing dominance of cheat grass.** As wildland fires from human causes increase, this trend should continue. It may represent the biggest problem for mule deer in the long run.

4. **Decreasing number of hunters as the social acceptance of hunting declines.** Deer hunting could be banned in the foreseeable future. I think this is a very real possibility considering the recent explosive urban growth in Nevada.

MULE DEER STATUS REPORT - NEW MEXICO

SUBSPECIES PRESENT:
O.h. hemionus, northern half of the state, approximately;
O.h. crooki, southern half of the state, approximately.

CONTACT PERSON:
Darrel Weybright 505-827-7893

OVERALL MANAGEMENT GOALS:
Our goals are to improve the deer hunter's experience through a system of hunting regulations which will provide diverse hunting opportunities to the largest number of hunters consistent with increasing the number and age of bucks in pre-hunt populations. We use opinion polls and population modeling to measure these goals.

LONG-TERM STRATEGIC PLAN:
Yes

STATEWIDE POPULATION TREND/ESTIMATE:
Populations are steady at approximately 250,000 deer. Most regions are meeting, or moving toward meeting, harvest goals expressed in terms of harvesting a specific percentage of the pre-hunt bucks available.

HARVEST DATA COLLECTION:
Hunters are required to pick a sporting arms type, deer region, and hunt period. With very few exceptions, only fork-antlered bucks are legal.

After the hunt, mail-in questionnaires are sent to a sample of hunters from each region. The sample size is based on hunter response rates and total hunter numbers for the unit. Information obtained includes:

a. whether the person actually hunted deer that year;
b. verification of license number, sporting arms type, deer region hunted, hunt code, and ZIP-code (an opportunity is given to correct the printed information);
c. which Game Management Unit (GMU) was hunted most and how many days were spent hunting there (a deer region contains one to several GMUs);
d. number of days hunted in other GMUs within the region; and
e. in which GMU the deer was harvested, if any.

Compilation and analysis is completed by a contracted statistician, generating 95% confidence intervals for projected estimates of the number of hunters, days afield, and deer harvested by hunt, sporting arms type, or area. A variety of summary statistics are reported.

Hunter and harvest estimates are used to validate or adjust computer model projections of population size and structure (number of bucks, does, fawns, yearlings, and adults). These population and harvest estimates provide trend data used to assess population responses to environmental and harvest regimes.

"QUALITY" MULE DEER HUNTING OPPORTUNITIES:
Quality deer hunts are not defined. New Mexico has maintained a 3-point or better restriction in one unit that is draw only. However, a 1990 telephone poll of licensed deer hunters indicated rifle hunters prefer to maintain the "hunt every year" systems while primitive weapon hunters prefer systems where hunter numbers are restricted.

Hunter preferences may approach a working definition of quality hunts. The deer management plan provides a variety of opportunities across the state, attempting to match hunter preferences with the appropriate reproductive capabilities of various deer populations.

ANTLERLESS MULE DEER HARVEST:
Antlerless deer harvest is a tool for reducing herd size where appropriate. This is a concern in very few areas of New Mexico.

CONTROLLING HUNTER DENSITY AND DISTRIBUTION:
New Mexico is divided into 14 deer regions and requires hunters to choose a region, a sporting arm, and a hunt period. Hunting on private land requires written permission from the landowner; few other access restrictions apply. Regulations are working. The trend is for regions, units, and areas to become more restrictive.

SEASON STRUCTURE CHANGES IN LAST 10 YEARS:
The region management system was the most significant change: included are requirements to choose a region, sporting arm, and hunt period. These changes restricted hunter movements, provided better control of the harvest, and provided harvest data specific to area, hunt period, and sporting arm.

DEVELOPING SEASON STRUCTURE:
We use harvest and population surveys, depredation concerns, weather patterns, habitat status, and input from department staff, land management agencies, landowners, hunters, outfitters, and other publics.

DATA COLLECTION METHODS:
Winter aerial population surveys are used to generate posthunt ratios. A minimum of 100 does and 25 groups observed comprise a survey. Data include numbers of adult and yearling bucks, fawns, and unknown does, and bucks:100 does and fawns:100 does ratios.

Harvest data from mail-in questionnaires is compiled and analyzed by a contractor. This report yields hunter success rates, 95% confidence intervals for estimates of total numbers of hunters, harvest, and days afield for each sporting arm, hunt period, unit, or region of kill. Data is also compiled by county of residence for New Mexico hunters.

Harvest (legal, illegal, and crippling loss), population (winter ratios, reproductive, and predation rates) and weather (temperature, rainfall, and Palmer Draught Index) data is entered into the Deer Model. Population and harvest estimates are then generated. Winter population ratios and card survey data are used to adjust these estimates.

Each region has a goal of harvesting a certain percentage of available bucks. Model predictions are used to measure fit.

POPULATION MODELING:
We use New Mexico's Mule Deer Population/Environment/Hunt Computer Model (deer model).

DEPREDATION POLICY:
We make no compensation or payments. Most depredation issues are handled by the local District Wildlife Officer. They use standard techniques to educate landowners and other publics, frighten deer, and reduce impacts. As a last resort, depredation hunts are conducted, utilizing public hunters.

RESEARCH EFFORTS/RESEARCH CONTACT PERSON:
A major 15-year deer research project recently was completed. Current and planned research is limited to analysis of available data sets.

Contact person: Wally Haussamen 505-827-9909

CURRENT MANAGEMENT ISSUES:
The major forces influencing management include a large base of resident hunter interest and support, perceptions of a deer population well below capacity in areas with historic high densities of deer, habitat changes, competing land uses, marginal moisture regimes, and low recruitment rates.

The deer management plan established achievable, measurable goals based on hunter input, and biological and environmental parameters. The deer model is used to measure population responses to harvest and environmental impacts. Hunt seasons, public involvement, and planning are the primary tools used to respond to these forces.

FUTURE MANAGEMENT ISSUES:
i. Meeting demands by various publics for sport harvest and recreational viewing, with declining habitat quality and quantity.
ii. Meeting monitoring and management needs with current and anticipated budget levels.
iii. Meeting ecosystem management needs while concentrating on single species management.

MULE DEER STATUS REPORT - OREGON

SUBSPECIES PRESENT:
Mule deer (*Odocoileus hemionus*)
and Columbia black-tailed deer (*O. h. columbianus*)

CONTACT PERSON:
Dan Edwards

OVERALL MANAGEMENT GOALS:
Our goals are to manage mule deer and black-tailed deer populations to provide optimum recreational benefits to the public, and to be compatible with habitat and primary land uses.

Postseason buck ratios are measured during herd composition inventories in all units. Populations are currently estimated from end-of-winter trend counts.

LONG-TERM STRATEGIC PLAN:
Oregon has a 5-year mule deer management plan. We do not have a management plan for black-tailed deer.

STATEWIDE POPULATION TREND/ESTIMATE:
The current trend for the statewide mule deer population has been downward. We have a management objective of 317,400 mule deer; the current population estimate is 216,500.

The black-tailed deer population trend is relatively stable. We have a management benchmark of 384,300 black-tailed deer; the current population estimate is 381,800.

HARVEST DATA COLLECTION:
Deer harvest is estimated through a telephone survey. We collect data concerning whether hunters actually hunted, were they successful, which unit they hunted most if a general season, what antler class or sex they harvested, how many days they hunted, etc.

Data are collected by calling a statistically-sound sample of hunters who participated in each hunt or season. Data are compiled by unit and the proportion of successful hunters is calculated. This proportion is applied to the number of tag holders, and the number of animals harvested is estimated. Data also are used in population simulation models, to set big game regulations, and are printed in the annual "Big Game Statistics."

"QUALITY" MULE DEER HUNTING OPPORTUNITIES:
We define quality as areas that have 20 bucks:100 does or more postseason. We ensure that we meet this criteria by controlling hunter numbers in these quality areas. We reduce tag numbers if postseason buck ratios begin to decline and increase tag numbers as buck ratios increase.

ANTLERLESS MULE DEER HARVEST:
Mule deer populations in Oregon have declined steadily since the mid-1970s. Thus, most antlerless hunting of mule deer is directly related to deer depredation on private property. Some antlerless hunting for population reduction purposes also is done in units where mule deer populations are above their population management objectives.

The goals of mule deer antlerless hunts are to alleviate deer damage to private property and control mule deer populations where they are above management objectives.

Black-tailed deer populations have remained relatively high and steady. We use antlerless hunting to alleviate deer damage, control deer populations, and provide additional hunter recreation.

CONTROLLING HUNTER DENSITY AND DISTRIBUTION:
We use controlled buck hunting to control hunter density and distribution for mule deer. We use cooperative travel management to control vehicle access to many areas that we believe are critical deer habitat.

We initially saw a rapid response in buck ratios from controlled hunting of mule deer. However, a reduced number of hunters kill nearly the same number of bucks as were being killed annually prior to full level controlled hunting in the fall of 1992.

The winter of 1992-93 was quite severe in much of Oregon's mule deer area. Thus, buck ratios returned to pre-controlled hunting levels in many units. Mule deer hunters harvested the lowest number of mule deer bucks ever recorded due to poor hunting conditions and reduced buck levels in the fall of 1993.

Good fawn crops were recorded in many areas in the spring of 1994 and the fall hunting season yielded fair numbers of bucks based on preliminary reports. Preliminary results from 1994 postseason herd composition information indicates good buck survival through the hunting season.

Thus, we feel that controlled hunting is working to improve postseason buck ratios, but results have been compounded by severe weather conditions.

SEASON STRUCTURE CHANGES IN LAST 100 YEARS:
We went to total controlled hunting for mule deer beginning with the 1991 hunting season to improve postseason buck ratios and control hunter densities and distribution within Oregon's mule deer areas.

DEVELOPING SEASON STRUCTURE:
Harvest information is collected from each unit where controlled hunting is in effect and by area of the state for general hunts. We conduct annual deer population trend and herd composition surveys for both mule and black-tailed deer. Regulatory authority is used to change regulations and season structure. Legislative authority is used to change basic statutory authority and responsibility.

DATA COLLECTION METHODS:
Helicopters and fixed-wing aircraft are used to collect annual population trend and herd composition data. Population estimates are derived from trend counts. We are beginning to use these data more to create population simulations. These data are used to generate population estimates and postseason buck:doe and fawn:doe ratios, which are evaluated against Management Objectives for deer populations and postseason ratios.

POPULATION MODELING:
We have traditionally used an annual model, which utilized trend counts to estimate population levels. We are beginning to use POP II more for modeling and are planning to increase our modeling efforts in the near future. A new position was recently filled that will have the majority of its efforts devoted to modeling big game populations in the short-term. We also will review other simulation models as we move forward with our modeling efforts.

DEPREDATION POLICY:
We deal with deer depredation with advice, fencing materials, harassment devices, kill permits, controlled and emergency hunts, and occasionally large scale fencing and winter feeding programs. We do not make direct cash payments for deer depredation.

RESEARCH EFFORTS/RESEARCH CONTACT PERSON:
We do not currently have a major research effort involving mule deer in Oregon. We have several minor projects designed to determine local deer movement patterns and investigate mortality rates and causes. The primary contacts on these projects are Vic Coggins, District Biologist, Enterprise, Oregon (503-426-3279) and Jim Lemos, District Biologist, Hines, Oregon (503-573-6582).

We recently initiated a research project to determine the movement patterns and mortality rates of several age and sex classes of black-tailed deer in southwestern Oregon. The primary contact is Dewaine Jackson, Project Leader, Roseburg, Oregon (503-440-3353).

CURRENT MANAGEMENT ISSUES:
Management influences include habitat changes and degradation, cover loss (forest health), increasing vehicle access, human development on winter range, low postseason buck ratios, changes in forest and range management practices, and hunter demands for a greater diversity of hunting opportunity.

We typically set more restrictive regulations to try to offset increased buck vulnerability associated with increased cover loss and vehicle access. We are looking at new programs and cooperative efforts with land managers to improve deer ranges. We continue to offer a diversity of hunting opportunities for various weapons and styles of hunting.

FUTURE MANAGEMENT ISSUES:
Issues include habitat degradation, increasing human development on both winter and summer range, maintaining postseason buck:doe ratios and buck age structure, maintaining recreational opportunity in a time when the emphasis of wildlife management is changing from single species management to a wildlife diversity approach, improving the hunter's image with the general public and improving hunter ethics, obtaining funding necessary to maintain and improve data collection efforts, and funding research by which to better understand mule and black-tailed deer biology.

MULE DEER STATUS REPORT - TEXAS

SUBSPECIES PRESENT:
Mule deer

CONTACT PERSON:
Doug Humphreys, Texas Parks and Wildlife Dept., 1600 W. Highway 90, Alpine, TX 79830

OVERALL MANAGEMENT GOALS:

LONG-TERM STRATEGIC PLAN:

STATEWIDE POPULATION TREND/ESTIMATE:
Current population trend is down due to severe drought.

HARVEST DATA COLLECTION:
Mule deer harvest estimate is determined from statewide mail questionnaire sent to random sample of 25,000 hunting license purchasers.

"QUALITY" MULE DEER HUNTING OPPORTUNITIES:
N/A

ANTLERLESS MULE DEER HARVEST:
We have very limited harvest of antlerless mule deer in high-density management compartments.

CONTROLLING HUNTER DENSITY AND DISTRIBUTION:
Almost all hunting in Texas is on private property. The state does not control hunter density, distribution, or access for mule deer buck hunting.

SEASON STRUCTURE CHANGES IN LAST 10 YEARS:
The season length increased from 9 to 16 days in 1988. It was changed to increase mule deer hunting opportunity and increase buck harvest.

DEVELOPING SEASON STRUCTURE:

DATA COLLECTION METHODS:
We use spotlight and aerial fixed-wing census transects. Major mule deer range is divided into management compartments. Population estimates are built from management compartment estimates.

POPULATION MODELING:
Future efforts will be made using the New Mexico Mule Deer Model.

DEPREDATION POLICY:
We have no compensation program.

RESEARCH EFFORTS/RESEARCH CONTACT PERSON:
None at this time.

CURRENT MANAGEMENT ISSUES:
None to report.

FUTURE MANAGEMENT ISSUES:
Basically, we're at the point in time for redesigning the program for the next 5 years and longer. Work this year will accomplish Strategic and Operational plans, Federal Aid documents, and set the stage for much work on mule deer management and other concerns and issues.

MULE DEER STATUS REPORT - UTAH

SUBSPECIES PRESENT:
Mule deer

CONTACT PERSON:
Wes Shields, (801) 538-4780

OVERALL MANAGEMENT GOALS:
We manage deer to: (1) provide and sustain statewide populations of robust animals; (2) provide varied, quality, recreational opportunities for harvesting and viewing; (3) balance the impact on man, his economic activities, private property rights, and local economies; and (4) balance populations within the carrying capacity of the habitat.

Objectives: Minimum 15 bucks:100 does, postseason; 30% greater than 2 pts.; avoid general hunting seasons during rutting periods; seek population control through antlerless hunting; balance deer and predator populations; manage for escapement through vehicle access management; address private landowner depredation concerns; implement deer management strategies for 5-year periods with 3-year critical review; and promote group (family) and youth hunting opportunity.

LONG-TERM STRATEGIC PLAN:
We are presently beginning strategic planning.

STATEWIDE POPULATION TREND/ESTIMATE:
During the last 2 years Utah has experienced a historical low in deer numbers due, initially, to long-term drought culminated by a tragic winter kill in 1992-93.

Since bottoming out in 1993, we are experiencing a statewide resurgence in deer numbers. However, we don't expect to return to recent historical deer numbers because of habitat concerns in much of northern Utah and localized problems in other parts of the state.

We will be challenged to achieve the buck objectives recently identified (15 bucks:100 does, postseason). Presently, many public land units range from 3-8 observed bucks.

HARVEST DATA COLLECTION:
Limited-entry harvest is determined through a mail questionnaire. On most limited-entry units we merely determine if harvest did or didn't occur and the number of days afield. However, on certain units we also collect age data through cementum annuli and antler measurements (main beam length, width, points, and basal circumference). We also query the hunter to determine quality of experience, etc.

"QUALITY" MULE DEER HUNTING OPPORTUNITIES:

We offer High Country buck hunts in September to a limited number of hunters, as well as Limited Entry buck deer hunting. Quality is mainly ensured through restricted hunter numbers.

We don't attempt to define quality, although there is a basic assumption that most hunters participating in these hunts expect little competition or interference from other hunters and appreciate seeing significant numbers of deer and especially bucks in older age classes.

ANTLERLESS MULE DEER HARVEST:
We emphasize antlerless harvest as an important management tool for controlling populations. We have no particular goals oriented to antlerless components, although it is wondered if perhaps important management opportunities are being missed.

CONTROLLING HUNTER DENSITY AND DISTRIBUTION:
General buck hunter numbers (including archery, rifle, and muzzleloader) have been reduced, beginning in 1994, from about 185,000 total hunters to 97,000. This statewide cap will occur again in 1995.

These numbers are apportioned among 5 regions in the state. Hunters may not cross regional boundaries. Our Board has adopted a strategy that will create 10 to 18 deer hunting management areas in 1998, when a hunter would be restricted to hunting only one of these areas.

We also have been directed to incorporate vehicle access management where appropriate.

SEASON STRUCTURE CHANGES IN LAST 10 YEARS:
Our general season historically has been an 11-day season beginning on the Saturday nearest the 20th of October. Season length has varied from 5 to 11 days. Its present length is 9 days.

Our most radical changes have been a drastic reduction in general season hunter numbers--from about 185,000 to a statewide cap of 97,000 in 1994. The present plan is to manage hunter numbers by specific hunt management area.

DEVELOPING SEASON STRUCTURE:
We use harvest information, biological information, Department/commission regulatory authority, and the Legislature to develop our mule deer season structure.

DATA COLLECTION METHODS:
We use Postseason and Spring classification; statewide range inventory and survey in cooperation with the U.S. Forest Service and Bureau of Land Management; and harvest surveys. Basically, classification and harvest guide annual hunting recommendations. Range inventory guides us in long-term habitat considerations.

Recently-adopted goals and objectives are compelling our division to look at other available data collection methods. We are shopping for ideas.

POPULATION MODELING:
We haven't used modeling on a large scale. However, management plans mandated by our legislature which require population objectives will necessitate modeling.

DEPREDATION POLICY:
By Utah law we must address depredation in cultivated crops and stored crops. We have been making every attempt to respond to crop damage immediately and decisively.

In many instances we attempt to remove offending animals by capture or through special public hunts. In particularly aggravated circumstances our division personnel may kill specific animals.

Until 1994, Utah compensated agriculture only for crop losses with a maximum individual annual payment of $2,000. However, in 1994 the legislature included compensation for damage to fences and irrigation equipment and removed the maximum individual payment cap. We now have a $500,000 pot from which we make annual payments. If damage claims exceed this amount at the end of the fiscal year, individual payments are prorated.

Also, in 1994, the legislature adopted a law which requires us to address damages to private rangelands, as well as fences and irrigation equipment on rangelands. This law does not require monetary compensation but we do repair damaged fences and irrigation equipment.

In terms of range damage, we are required to respond to a complainant within 72 hours to review with him options for minimizing the damage (forage use) or remove the animals. The law allows us to issue him any number (determined at our discretion) of harvest permits for immediate removal of the "offending" animals.

Similar permits may also be issued when actual hunting of the animals will occur during an established season. In this case the landowner may assign a permit to a hunter who then pays a fee to access the private land area.

Permits issued under these regulations are strictly limited to antlerless animals. Male animal permits may be issued only upon approval from our director's office.

We have only administered this law for about one year. In many cases, we have improved landowner tolerance of mule deer on rangelands with one or 2 permits. In some cases we have issued as many as 20 kill permits with only limited harvest success; the landowners remain dissatisfied that the animals still venture onto their lands.

This year, during the harvest recommendation process, we were able to anticipate problem areas where these depredation permits would be issued and hence adjusted our scheduled harvest accordingly.

RESEARCH EFFORTS/RESEARCH CONTACT PERSON:
None.

CURRENT MANAGEMENT ISSUES:
The primary forces influencing deer management in Utah are agricultural depredation, public hunting, and an overall desire by hunters and nonhunters to manage

for a more "naturally appearing" deer population (in other words, citizens want a broader spectrum of buck age classes in deer populations throughout the state).

Habitat concerns are also influencing deer management. Urbanization in northern Utah is negatively impacting both summer and winter ranges. It also appears that long-term ecological changes are diminishing our ability to maintain deer populations.

FUTURE MANAGEMENT ISSUES:
The factors identified in Current Management Issues as well as threats from anti-hunters.

MULE DEER STATUS - WYOMING

SUBSPECIES PRESENT:
O. hemionus

CONTACT PERSON:
Larry Roberts (307) 777-4590

OVERALL MANAGEMENT GOALS:
Objective/Measurement

Post Hunt Population: 511,000/Census count
Annual Harvest: 88,580/Mail survey
Harvest Success Rate: 56%/Mail survey
Recreation Days: 502,125/Mail survey
Hunter Effort Rate: 5.7 days/animal/Mail survey
Occupied Elk Habitat: 80,575 sq.mi./Computer program

LONG-TERM STRATEGIC PLAN:
1990-95 Strategic Plan. Each herd has its own objective which ties into the overall strategic plan. The plan is updated every 5 years.

STATEWIDE POPULATION TREND/ESTIMATE:
In 1994, we had 488,825 mule deer, approximately 66,000 under the objective of 554,650.

HARVEST DATA COLLECTION:
a. The University of Wyoming Survey Research Center performs a mail survey under contract with the Wyoming Game and Fish Department (WGFD) on a statistically-valid sample of hunters.

The Center surveys total harvest, number of adult males, number of yearling males, number of females, and number of juveniles; total hunters, number of residents, and number of nonresidents; recreation days and days/animal harvested; and success rate.

b. Through check stations and random hunter checks we determine age, sex, and hunt area of harvest.

We also analyze population dynamics, assist in population estimates, determine population characteristics, and monitor recreational criteria and hunter satisfaction.

"QUALITY" MULE DEER HUNTING OPPORTUNITIES:
We generally use male:100 female ratio (posthunt) as a guide for "special" (not trophy) management:

Mule Deer: 30-45 Male:100 Female Range for Special Management

ANTLERLESS MULE DEER HARVEST:
Antlerless harvests are the most effective tool to alter overall herd size and are used as such. Our goals are to reduce population size to herd objective and maximize hunter opportunity.

CONTROLLING HUNTER DENSITY AND DISTRIBUTION:
Hunt areas (one or more of which are contained within each herd unit) are used to direct hunter pressure, density, and distribution. Weapon restrictions, license types, season dates and splits, and license quotas are also used. We utilize little access management. Regulations are working to control hunter density and distribution.

SEASON STRUCTURE CHANGES IN LAST 10 YEARS:
None.

DEVELOPING SEASON STRUCTURE:
We use harvest information; biological information; and input from the public, hunters, outfitters, land management agencies, and private landowners. Damage problems are also considered.

DATA COLLECTION METHODS:
We use tooth collection/cementum annual aging and sexing of harvested animals; University of Wyoming Survey Research Center harvest survey; posthunt herd classifications; and winter range trend counts.

This information and information outlined in Developing Season Structure are used to analyze present population status and its relationship with objectives and with the 5-year trend. Based on this information, the upcoming year's seasons are set to move herds towards objectives.

POPULATION MODELING:
We use POP II.

DEPREDATION POLICY:

Annual Damage Payments

Year	Mule Deer
1988	$ 184,993.29
1989	$ 49,645.84
1990	$ 57,366.79
1991	$ 40,010.08
1992	$ 46,736.34
1993	$ 84,360.81

Damage Prevention Costs*

1988	$ 304,707
1989	$ 339,503
1990	$ 462,543
1991	$ 384,563
1992	$ 372,948
1993	$ 479,909

*All species, but elk and deer comprise the largest proportion of prevention efforts. These costs include damage investigation and administrative costs associated with processing damage claims.

RESEARCH EFFORTS/RESEARCH CONTACT PERSON:

There are presently no mule deer research projects. Wyoming usually has several 2- to 4-year mule deer enhancements ongoing. Research efforts have been directed at migration/movements, sampling techniques, mitigation, etc.

CURRENT MANAGEMENT ISSUES:

Forces influencing management are competing land uses; loss of habitat; high demand in some areas of the state; and the public's expectations/desires. We are using hunting seasons, public land management planning, environmental impact commenting, habitat enhancement projects, and research to deal with these challenges.

FUTURE MANAGEMENT ISSUES:

Future issues include declining habitat quality and quantity, ORV use increases, energy, road and housing development in winter ranges, change in hunter demographics, funding shortages, and too much demand for too few bucks.

WHITE-TAILED DEER STATUS REPORTS

WHITE-TAILED DEER
GENERAL HARVEST INFORMATION

STATE	1993 HARVEST ANT	ANT-	TOTAL	5 YR AVE ANT	ANT-	TOTAL	1 SEASON LIMIT	LEGAL HARVEST	HUNTER #'S RES	NONRES	TOTAL	HUNTER DAYS RES	NONRES	TOTAL	LICENSE FEES RES	NONRES	% LAND OPEN TO PUBLIC HUNTING
AK	NO WHITE TAILED DEER																
AB	NO INFORMATION																
AZ	5,665		5,665	5,170		5,170	YES	1		(<10%)	16,000		(<10%)	40,750	$35.50	$164.00	90% OF WT DEER HABITAT
BC	6,369	2,487	8,883	6,711	1,684	8,395	NO	2-3	28,224		28,224	239,670		239,670	$15Can	$75Can	
CA	NO WHITE TAILED DEER																
CO	NO INFORMATION																
ID	13,230	5,720	18,950	NA	NA	22,400	NO	2	NA	NA	74,400	NA	NA	85,100	$17.00	$327.00	69%
MT	31,731	28,594	60,369	29,668	24,060	53,880	NO	1-6	146,777	30,463	177,240	1,006,577	186,650	1,193,227	$8/11	$245/475	NA
	-	-	-	-	-	-	-	-	(WT AND MD COMBINED)			(WT AND MD COMBINED)			-	-	-
NV	NO WHITE-TAILED DEER																
NM	NO INFORMATION			NO INFORMATION			YES	1		NO INFO			NO INFO		$19.00	$181.00	40%
OR	342	252	594				NO	2	NO ESTIMATES			NO ESTIMATES			$23.00		60-65%
SK	26,100	20,700	46,800	25,000	15,500	40,500	NO	4/2	70,123	2,860	72,983	291,868	16,457	308,325	$44/33	$291.00	
	-	-	-	-	-	-	-	-	-	-	-	--		($151.00 CANADIAN RESIDENT)			
TX	254,901	197,608	452,509	253,095	207,400	460,494	NO	5			593,110			5,487,930	$13.00	$200.00	<5%
UT	NO WHITE-TAILED DEER																
WA	27,197	8,484	35,681	37,102	11,364	48,465	YES	1	97,992	1,301	199,293			1,218,490	$33.00	$210.00	38.7% + PRIV. TIMBER CO LANDS
WY	6,088	6,535	12,623	6,107	5,170	11,277	NO	2	16,883	10,005	26,888	74,425	45,201	119,626	$17.00	$155.00	95.8%

WHITETAIL SEASON STRUCTURE
GENERAL FIREARM

STATE	OPENING DATES	LENGTH (DAYS)	OVERLAP RUT	HUNTER #S RES	HUNTER #S NONRES	HUNTER #S TOTAL	HUNTER DAYS RES	HUNTER DAYS NONRES	HUNTER DAYS TOTAL	SUCCESS RATE	HARVEST ANT	HARVEST ANT-
AK	NO WHITE-TAILED DEER IN ALASKA											
AB	NO INFORMATION											
AZ	OCT,NOV,DEC	4/10/16	NO		(<10%)	16,000		(<10%)	40,750	23-43%	5,556	
BC	VARIES		NO INFORMATION									
CA	NO WHITE-TAILED DEER IN CALIFORNIA											
CO	NO INFORMATION											
ID	9/15 - 11/1	10-65	YES	54,100	6,300	60,400	373,000	50,800	423,800	31%	12,800	5,300
MT	WT AND MD COMBINED, SEE MULE DEER GENERAL FIREARM											
NV	NO WHITE-TAILED DEER IN NEVADA											
NM	10/30	2-7	FEW		NO INFORMATION			NO INFORMATION			NO INFORMATION	
OR	NO GENERAL FIREARM SEASON											
SK	8/23 -11/15	21-105	YES	70,123	2,860	72,983	291,868	16,457	308,325	48-76%	26,100	20,700
TX	11/5 & 11/12	9-65	VARIES	575,317	17,793	593,110			5,487,930	56%	254,901	197,808
UT	NO WHITE-TAILED DEER IN UTAH											
WA	10/16	15	NO			163,149			966,907	18.2%	24,927	4,741
WY	VARIES	VARIES	YES	16,883	10,005	26,888	74,425	45,201	119,626	46.9%	12,408 TOTAL	

WHITETAIL SEASON STRUCTURE
ARCHERY

STATE	OPENING DATES	LENGTH (DAYS)	OVERLAP RUT	HUNTER #S RES	HUNTER #S NONRES	HUNTER #S TOTAL	HUNTER DAYS RES	HUNTER DAYS NONRES	HUNTER DAYS TOTAL	SUCCESS RATE	HARVEST ANT	HARVEST ANT-
AK	NO WHITE-TAILED DEER IN ALASKA											
AB	NO INFORMATION											
AZ	NO SPECIFIC SEASON FOR WHITETAIL										167	
BC	VARIES		NO INFORMATION									
CA	NO WHITE-TAILED DEER IN CALIFORNIA											
CO	NO INFORMATION											
ID	8/30 - 12/10	26	FEW	NA	NA	8,800	NA	NA	62,500	6%	250	250
MT	9/3	42	NO	NA	NA	8,391	NA	NA	72,759	20%	746	1,292
NV	NO WHITE-TAILED DEER IN NEVADA											
NM	9/1	20	NO		NO OTHER INFORMATION AVAILABLE							
OR	NO RECORD OF HARVEST AVAILABLE											
SK	8/23, 8/30, 9/6	56-105	NO	NA	NA	NA	NA	NA	NA	NA	NA	NA
TX	10/1	31	VARIES			NA			NA	NA	NA	
UT	NO WHITE-TAILED DEER IN UTAH											
WA	9/15 & 11/24	28/22	YES			22,040			199,213	17.2%	1,434	2,355
WY	9/1	10/20/30	NO	1,066	256	1,322	8,176	1,563	9,739	16.2%	215 TOTAL	

WHITETAIL SEASON STRUCTURE
MUZZLELOADER

STATE	OPENING DATES	LENGTH (DAYS)	OVERLAP RUT	HUNTER #S RES	HUNTER #S NONRES	HUNTER #S TOTAL	HUNTER DAYS RES	HUNTER DAYS NONRES	HUNTER DAYS TOTAL	SUCCESS RATE	HARVEST ANT	HARVEST ANT-
AK	NO WHITE-TAILED DEER IN ALASKA											
AB	NO INFORMATION											
AZ	NO SPECIFIC SEASON FOR WHITETAIL										2	
BC	VARIES		NO INFORMATION									
CA	NO WHITE-TAILED DEER IN CALIFORNIA											
CO	NO INFORMATION											
ID	10/5,11/10 & 25	15/20	YES	NA	NA	5,200	NA	NA	22,600	7%	180	170
MT	SAME AS MULE DEER											
NV	NO WHITE-TAILED DEER IN NEVADA											
NM	9/10	11	NO	NO OTHER INFORMATION AVAILABLE								
OR	VARIES	VARIES	YES			475			2,401	31%	57	84
SK	8/23,9/13,10/4	28-105	NO	NO OTHER INFORMATION AVAILABLE								
TX	1/7	31	NO	NO OTHER INFORMATION AVAILABLE								
UT	NO WHITE-TAILED DEER IN UTAH											
WA	9/15 & 29,11/24	11/14/22	YES			9,310			52,370	23.9%	836	1,388
WY	NO SPECIAL SEASON											

WHITETAIL SEASON STRUCTURE
CONTROLLED HUNT

STATE	OPENING DATES	LENGTH (DAYS)	OVERLAP RUT	HUNTER #S RES	HUNTER #S NONRES	HUNTER #S TOTAL	HUNTER DAYS RES	HUNTER DAYS NONRES	HUNTER DAYS TOTAL	SUCCESS RATE	HARVEST ANT	HARVEST ANT-
AK	NO WHITE-TAILED DEER IN ALASKA											
AB	NO INFORMATION											
AZ	ALL GENERAL AND MUZZLELOADER HUNTS ARE BY DRAW											
BC	VARIES		NO INFORMATION									
CA	NO WHITE-TAILED DEER IN CALIFORNIA											
CO	NO INFORMATION AVAILABLE											
ID	NO INFORMATION AVAILABLE											
MT	INCLUDED WITH GENERAL TOTALS											
NV	NO WHITE-TAILED DEER IN NEVADA											
NM	NO CONTROLLED HUNTS											
OR	VARIES	VARIES	VARIES			12,690			NA	NA	342	252
SK	NO CONTROLLED HUNTS											
TX	NO INFORMATION AVAILABLE											
UT	NO WHITE-TAILED DEER IN UTAH											
WA	VARIES	VARIES	FEW			17,198			NA	7.6-48.9%	356	4,715
WY	INCLUDED WITH GENERAL INFORMATION											

WHITE-TAILED DEER STATUS REPORT - ARIZONA

SUBSPECIES PRESENT:
O. virginianus couseii

CONTACT PERSON:
Vashti "Tice" Supplee, Game Branch Chief, and Ray Lee, Big Game Supervisor, Game Branch, Arizona Game & Fish Department, 2221 W. Greenway Road, Phoenix, AZ 85023

OVERALL MANAGEMENT GOALS:
Our goals are to maintain whitetail deer populations at levels which provide recreational opportunity to as many individuals as possible while avoiding adverse impacts to the habitat.

LONG-TERM STRATEGIC PLAN:
Yes

STATEWIDE POPULATION TREND/ESTIMATE:
Whitetail numbers are 90,000-95,000, which is at the top end, and above the Strategic Plan objective.

HARVEST DATA COLLECTION:
We use hunter questionnaire mail surveys asking if deer are killed and how many days hunted in what units. The data is provided to the game management unit wildlife managers for use in preparing next year's harvest/hunt recommendations.

"QUALITY" WHITE-TAILED DEER HUNTING OPPORTUNITIES:
A late December hunt is scheduled just before the rut.

ANTLERLESS WHITE-TAILED DEER HARVEST:
There have been no antlerless hunts since the 1960s. Some whitetail units are open to any deer for archery hunters. A unit would be recommended for an antlerless General season only if the unit deer population was large enough and habitat damage was a concern.

CONTROLLING HUNTER DENSITY AND DISTRIBUTION:
See mule deer status report. All General and muzzleloader seasons are by limited draw permit-tag only.

Access is a problem in southeastern Arizona units where the deer are on federal (U.S. Forest Service) lands, but access is controlled by surrounding private landowners.

SEASON STRUCTURE CHANGES IN LAST 10 YEARS:
The most significant change has been offering more of the December hunts as single units rather than combined.

DEVELOPING SEASON STRUCTURE:
Game unit managers conduct winter ground and aerial surveys (fixed-wing & helicopter) to derive buck:doe:fawn ratios at the unit level. The hunter questionnaire program provides unit level harvest, hunt success, and hunter day information.

DATA COLLECTION METHODS:
Game unit managers conduct winter ground and aerial surveys (fixed-wing & helicopter) to derive buck:doe:fawn ratios at the unit level. The hunter questionnaire program provides unit level harvest, hunt success, and hunter day information.

The Department is investigating the use of Global Positioning System (GPS) technology to enhance population estimation from aerial survey efforts. The unit level trend data for harvest and buck:doe:fawn ratios has been collected in the same manner for over 20 years, yielding very good data sets over time. Statistical variation for a given year is still quite high.

POPULATION MODELING:
We use a POPDYN style model that runs on harvest and posthunt buck:doe:fawn ratio data sets. The model is run multiple times to derive a "best fit" statistically, and that is the value used for a population estimate.

The smaller the geographic area and/or the data set, the more unstable the model runs. Some units model better than others. The value of modeling is as an aid to formulating management recommendations, not as an accurate index of populations.

DEPREDATION POLICY:
See Arizona's elk status report. There are no payments or compensation in Arizona. Depredation

complaints attributed to deer are infrequent, and are usually associated with orchards or vineyards.

RESEARCH EFFORTS/RESEARCH CONTACT PERSON:
We have no active projects at this time. A study was completed in the late 1980s examining whitetail deer habitat characteristics in southeastern Arizona.
Contact: Richard Ockenfels, Research Biologist, Arizona Game & Fish Department 2221 W. Greenway Road, Phoenix, AZ 85023.

CURRENT MANAGEMENT ISSUES:
Climatic factors are the greatest influence, followed by habitat conditions, particularly closed canopies in chaparral habitat. Unit level population changes measured by annual survey of buck:doe:fawn ratios result in commensurate adjustment of offered hunting permit-tags for that unit.

FUTURE MANAGEMENT ISSUES:
In the next 5 years, retaining reasonable all-season hunter access may be a problem. In the next 10-20 years, we see no known major problems.

WHITE-TAILED DEER STATUS REPORT - BRITISH COLUMBIA

SUBSPECIES PRESENT:
Odocoileus virginianus ochrourus

CONTACT PERSON:
Dan Blower, Wildlife BR, Victoria, BC

OVERALL MANAGEMENT GOALS:
Our goals are to protect key habitat, conserve populations, and provide recreational use. The goals are not measured.

LONG-TERM STRATEGIC PLAN:
A plan is not yet developed.

STATEWIDE POPULATION TREND/ESTIMATE:
We have an increasing trend; numbers are close to approximate goals.

HARVEST DATA COLLECTION:
We use a hunter mail sample, and teeth returns for aging.

"QUALITY" WHITE-TAILED DEER OPPORTUNITIES:
Yes, we provide them by default because of access restrictions/limitations.

ANTLERLESS WHITE-TAILED DEER HARVEST:
We offer liberal harvest opportunities, with a relatively large antlerless component.

CONTROLLING HUNTER DENSITY AND DISTRIBUTION:
We use access management, special regulations, season date changes, and limiting the number of permits. These methods are working.

SEASON STRUCTURE CHANGES IN LAST 10 YEARS:
There has been some slight liberalization of seasons based on increase in population size and in agriculture crop depredations.

DEVELOPING SEASON STRUCTURE:
We use harvest information, biological information, Department/commission regulatory authority, the Legislature, plus anecdotal reports and agricultural damage reports.

DATA COLLECTION METHODS:
We use a mail-out hunter sample. Success (harvest) trend data is sometimes used.

POPULATION MODELING:
None.

DEPREDATION POLICY:
Some season liberalizations are made in response to depredations. No compensation is paid.

RESEARCH EFFORTS/RESEARCH CONTACT PERSON:
Little to no research is undertaken.

CURRENT MANAGEMENT ISSUES:
Forces influencing management include hunters desiring recreational hunting opportunities and farmers desiring reduced populations.

FUTURE MANAGEMENT ISSUES:
Issues include ensuring that land alienation does not reduce whitetail habitat and/or reduce recreational hunting access, and ensuring that harvests are sufficiently liberal to prevent crop depredations, range deterioration, and disease/winter die-offs.

WHITE-TAILED DEER STATUS REPORT - COLORADO

SUBSPECIES PRESENT:
O. virginianus texanus

CONTACT PERSON:
Rick Kahn

OVERALL MANAGEMENT GOALS:
Colorado does not have distinct goals for white-tailed deer; instead, they are combined with mule deer in areas where both species occur.

Generally, white-tailed deer are restricted to the eastern plains of Colorado, with a few limited populations in mountain parks. White-tailed deer appear to be increasing on the plains, particularly in the South Platte river basin and the Arkansas river basin. In these riparian areas white-tailed deer comprise > 50% of the overall population.

There has been discussion among wildlife biologists that Colorado should consider separate management strategies for white-tailed deer. Presently, all deer harvest data is accumulated together. For specific seasons and overall deer population information see the mule deer status report.

WHITE-TAILED DEER STATUS REPORT - IDAHO

SUBSPECIES PRESENT:
O. v. ochrourus

CONTACT PERSON:
Lonn Kuck

OVERALL MANAGEMENT GOALS:
1) Maintain white-tailed deer populations in north and north-central Idaho at current levels.

2) Maintain harvest and increase recreational hunting opportunity in the major white-tailed deer management units.

3) Manage all units north of the Salmon River, and Unit 14, with a season framework designed primarily for white-tailed deer.

4) Manage all units south of the Salmon River, and Unit 14, with a framework designed primarily for mule deer.

5) On a 3-year average, maintain at least 40% of the buck harvest in the 4-point-plus category as determined by the telephone harvest survey.

6) Continue to offer November antlered-only seasons in most of Region 2.

7) Initiate research in a portion of Region 2 to determine seasonal habitat use and mortality rates and causes.

8) Continue research in Region 1 to further evaluate mortality causes and rates, winter habitat use, and existing habitat management guidelines.

Goals Measurement: Utilize the percentage of bucks in the harvest as ascertained by the annual telephone survey to determine if management goals are being achieved.

LONG-TERM STRATEGIC PLAN:
Yes

STATEWIDE POPULATION TREND/ESTIMATE:
The statewide trend in white-tailed deer populations appears to be static or increasing slightly. The statewide population estimate is between 35,000 and 40,000.

HARVEST DATA COLLECTION:
Idaho conducts a random telephone harvest survey annually. Data collected include harvest by species of deer, success rate, percent males in the harvest, number of hunters, days per hunter, animals seen per day, and a degree of satisfaction in the hunting experience.

In addition, some harvest information is collected at check stations. These data are utilized to set annual deer seasons and monitor harvest trends.

"QUALITY" WHITE-TAILED DEER HUNTING OPPORTUNITIES:
The Department's objective is to offer a wide diversity of opportunity to harvest mature whitetail bucks, including general archery, general muzzleloader, and general rifle seasons.

The general goal is to maintain whitetail hunting opportunities where nearly one out of every 2 whitetail bucks taken is a 4-point or better. The percentage of bucks in the harvest is measured in the random telephone harvest survey.

ANTLERLESS WHITE-TAILED DEER HARVEST:
The Department's strategy is to allow antlerless harvest if objectives to maintain current levels of white-tailed deer populations are being met.

CONTROLLING HUNTER DENSITY AND DISTRIBUTION:
As the demand and popularity of whitetail hunting has increased, there is a growing concern from the hunting public that hunter density needs to be controlled. This was not a significant issue during the development of the current white-tailed deer plan, but will have to be addressed in the future.

SEASON STRUCTURE CHANGES IN LAST 10 YEARS:
The Department has expanded most whitetail deer seasons in Region 2 into the November rut to provide more hunting opportunity when bucks are more available to the hunting public.

DEVELOPING SEASON STRUCTURE:
The primary information base used to develop white-tailed deer season structures is the random telephone survey. The telephone surveys are conducted on an annual basis to establish harvest levels for the previous year.

The Idaho Fish and Game Commission has the authority to set white-tailed deer seasons and regulations. The Idaho legislature regulates the Department's budget.

DATA COLLECTION METHODS:
Idaho conducts a random telephone harvest survey annually. Data collected include harvest by species of deer, success rate, percent males in the harvest, number of hunters, days per hunter, animals seen per day, and a degree of satisfaction in the hunting experience.

In addition, some harvest information is collected at check stations. These data are utilized to set annual deer seasons and monitor harvest trends.

POPULATION MODELING:
Limited data bases for white-tailed deer populations limits the potential for most modeling efforts.

DEPREDATION POLICY:
The Department's Depredation Policy is followed to prevent or minimize depredations. Kill permits or hunts designed to remove depredating animals and/or reduce populations are used in chronic depredation situations that cannot be handled by preventive measures.

In addition, the Department has implemented the depredation claims process instituted by the 1991 Legislature. The average dollar amount compensated to landowners for wildlife damages for the first 4 years of this program has been $70,832.12/year.

RESEARCH EFFORTS/RESEARCH CONTACT PERSON:
White-tailed Deer Ecology
Mortality Rates

Contact: Pete Zager
Principal Research Biologist
Idaho Department of Fish and Game
1540 Warner Avenue
Lewiston, Idaho 83501

CURRENT MANAGEMENT ISSUES:
The key to sustaining abundant white-tailed deer populations over the long-term lies in maintaining deer habitat quality and diversity. Lacking this, all other management efforts and hunting regulations will be futile.

Many of man's activities such as logging, grazing, crop cultivation, and fire can substantially affect, positively or negatively, large areas of white-tailed deer range. The Department is actively involved in educating the general public and others in the importance of habitat and as a proponent of land management practices which enhance deer habitat quality and diversity.

FUTURE MANAGEMENT ISSUES:
See Current Management Issues.

WHITE-TAILED DEER STATUS REPORT - MONTANA

SUBSPECIES PRESENT:

CONTACT PERSON:
Glenn Erickson

OVERALL MANAGEMENT GOALS:
Our current objectives are harvest; hunter; success; etc. These are measured by Harvest Surveys of hunters following the hunting season.

LONG-TERM STRATEGIC PLAN:
Same as mule deer.

STATEWIDE POPULATION TREND/ESTIMATE:
Deer are increasing and show a wider distribution; all-time highs are noted west of the divide.

HARVEST DATA COLLECTION:
Harvest is estimated through a telephone survey of residents and a mail survey of nonresidents representing approximately 28% of all deer license holders. Estimates are given at the 80% confidence level by deer hunting district. The information collected is used in determining whether or not our recreation objectives are being met and to evaluate success or failure of various seasons.

"QUALITY" WHITE-TAILED DEER HUNTING OPPORTUNITIES:
Yes, we have them. They are determined by habitat--no special season types.

ANTLERLESS WHITE-TAILED DEER HARVEST:
It is used primarily to address landowner tolerance--depredation issues.

CONTROLLING HUNTER DENSITY AND DISTRIBUTION:
We use Block Management on private land; travel plan development on public land; and permit-only seasons in limited areas.

SEASON STRUCTURE CHANGES IN LAST 10 YEARS:
We have added B licenses for antlerless harvest in response to high populations and depredation complaints.

DEVELOPING SEASON STRUCTURE:
We use harvest information, biological information, and Department/commission regulatory authority to develop season structure. The legislature does establish limits on our authority, but does not participate in the biennial season-setting process.

DATA COLLECTION METHODS:
Harvest Survey information and deer trend route surveys form the basis for management. Additional age and sex information on the harvest is collected at check stations. Current objectives relate to harvest and hunter success. We have also conducted hunter attitude and preference surveys in recent years.

POPULATION MODELING:
Modeling is limited to research studies.

DEPREDATION POLICY:
We must respond to damage complaints within 48 hours by statute. We have an administrative rule that guides our response to each situation. Regional supervisors have authority to establish game damage seasons, after consulting with their local commissioner, within a few days of the complaint. The only delay is in getting the hunters notified.

We do not have a compensation program, but do provide haystack fencing materials and other preventative materials to landowners who provide hunting.

RESEARCH EFFORTS/RESEARCH CONTACT PERSON:
Carolyn Sime - Kalispell - NW MT Whitetail Deer Study

CURRENT MANAGEMENT ISSUES:
Same as those outlined in the mule deer status report, except that whitetails are responding positively to changes.

FUTURE MANAGEMENT ISSUES:
Urban deer herd control.

WHITE-TAILED DEER STATUS REPORT - NEW MEXICO

SUBSPECIES PRESENT:
O. v. couesi Southwest quadrant
O. v. texanus Eastern plains

CONTACT PERSON:
Darrel Weybright 505-827-7893

OVERALL MANAGEMENT GOALS:
There are no defined goals for white-tailed deer that are separate from those of mule deer.

LONG-TERM STRATEGIC PLAN:
No

STATEWIDE POPULATION TREND/ESTIMATE:
Populations are steady at less than 10,000 deer.

HARVEST DATA COLLECTION:
Whitetails are found in scattered, low-density populations, and do not have a separate harvest season. Very few animals are harvested, and no attempt is made to distinguish whitetail harvest from mule deer harvest.

"QUALITY" WHITE-TAILED DEER HUNTING OPPORTUNITIES:
The deer management plan does not specifically define quality nor distinguish management between species.

ANTLERLESS WHITE-TAILED DEER HARVEST:
Antlerless harvest is an appropriate tool for herd reduction, but whitetail populations have not exceeded appropriate levels in New Mexico.

CONTROLLING HUNTER DENSITY AND DISTRIBUTION:
Hunters must choose sporting arm, hunt period, and region. We have no special regulations or access management. Distribution works fairly well.

SEASON STRUCTURE CHANGES IN LAST 10 YEARS:
Changes are the same as for mule deer--the requirement to specify region, sporting arm, and hunt period when purchasing license.

DEVELOPING SEASON STRUCTURE:
We have no separate season for whitetails. Population, harvest, and ecological and sociological data are taken into consideration.

DATA COLLECTION METHODS:
Generally, whitetails are at densities too low to effectively conduct aerial surveys. Incidental observations are recorded.

POPULATION MODELING:
None.

DEPREDATION POLICY:
We have no depredation problems, and no compensation or payments are made.

RESEARCH EFFORTS/RESEARCH CONTACT PERSON:
No research at this time. Wally Haussamen 505-827-9909

CURRENT MANAGEMENT ISSUES:
Management influences include low densities; scattered populations (often on private land) intermixed with desert mule deer; the perceived difficulty of hunters to distinguish the different species, resulting in inappropriate harvest; lack of adequate population and harvest information; and a desire to not further complicate deer hunting in New Mexico.

FUTURE MANAGEMENT ISSUES:
i. Developing and achieving separate management plans, goals, and strategies for white-tailed deer.
ii. Meeting monitoring and management needs at current and anticipated budget levels.

WHITE-TAILED DEER STATUS REPORT - OREGON

SUBSPECIES PRESENT:
Odocoileus virginianus ochrourus and *O. v. leucurus* (endangered)

CONTACT PERSON:
Dan Edwards

OVERALL MANAGEMENT GOALS:
Oregon does not have a large population of white-tailed deer. We have 2 subspecies, one of which is endangered.

We do not have special goals for white-tailed deer; however, we do hunt them in northeastern Oregon. Much of the hunting is incidental to mule deer hunting; however, we do have several controlled white-tailed deer hunts.

Our only goal related to white-tailed deer is to manage them for present and future generations as is our goal with other wildlife.

LONG-TERM STRATEGIC PLAN:
No

STATEWIDE POPULATION TREND/ESTIMATE:
Oregon does not conduct annual inventories for white-tailed deer.

HARVEST DATA COLLECTION:
Controlled deer harvest is estimated through a telephone survey process. We collect data concerning whether hunters actually hunted, were they successful, which unit they hunted most if a general season, what antler class or sex they harvested, how many days they hunted, etc.

We also ask whether or not they killed a mule deer or a white-tailed deer in 16 units in northeastern Oregon where white-tailed deer are likely to occur.

Data are collected by calling a statistically-sound sample of hunters who participated in each hunt or season. These data are compiled by unit and a ratio is calculated between successful and unsuccessful hunters. This ratio is applied to the number of tag holders, and the number of animals harvested is estimated.

These data also are used to determine hunter success rates. Data are used in population simulation models, to set big game regulations, and are printed in the annual "Big Game Statistics."

"QUALITY" WHITE-TAILED DEER HUNTING OPPORTUNITIES:
None.

ANTLERLESS WHITE-TAILED DEER HARVEST:
Antlerless white-tailed deer are harvested in conjunction with several controlled antlerless rifle deer hunts designed to alleviate deer damage. We also have a few controlled rifle and muzzleloader seasons specifically for white-tailed deer with either-sex bag limits.

These hunts help solve deer depredation on private property or provide some recreational opportunity for hunting white-tailed deer.

CONTROLLING HUNTER DENSITY AND DISTRIBUTION:
We have no control strategies specifically for white-tailed deer.

SEASON STRUCTURE CHANGES IN LAST 10 YEARS:
None. We have added a couple of controlled white-tailed deer hunts to provide recreational opportunity.

DEVELOPING SEASON STRUCTURE:
We allow very limited white-tailed deer hunting in areas where healthy white-tailed deer populations exist. Season recommendations are based on biologists' local knowledge of these populations.

DATA COLLECTION METHODS:
None.

POPULATION MODELING:
None.

DEPREDATION POLICY:
We deal with deer depredation with fencing advice, fencing materials, harassment devices, kill permits,

controlled and emergency hunts, and occasionally large-scale fencing and winter feeding programs.

We cannot use lethal means to deal with white-tailed deer depredations when the endangered Columbia River white-tailed deer are involved. We do not have a compensation program.

RESEARCH EFFORTS/RESEARCH CONTACT PERSON:
None.

CURRENT MANAGEMENT ISSUES:
White-tailed deer are probably influenced by factors similar to those affecting mule deer and elk. Management is not affected, for the most part.

WHITE-TAILED DEER STATUS REPORT - SASKATCHEWAN

SUBSPECIES PRESENT:
Odocoileus virginianus dakotensis

CONTACT PERSON:
Adam Schmidt, Environment and Resource Management, Box 2170, Melville, Saskatchewan SOA 2PO
Phone: (306) 728-7487

OVERALL MANAGEMENT GOALS:
Our goals are to maintain a provincial white-tailed deer population of 350,000 deer and provide 300,000 days of recreational opportunity. The goals are measured with data from hunter harvest surveys and biological surveys.

LONG-TERM STRATEGIC PLAN:
Development of a white-tailed deer management strategy is a priority for 1995. At the present time we do not have one that is up to date.

STATEWIDE POPULATION TREND/ESTIMATE:
The 1994 pre-season population of white-tailed deer in Saskatchewan was estimated to be 352,900.

HARVEST DATA COLLECTION:
White-tailed deer harvest is estimated through a mail-out hunter questionnaire. In 1993 surveys were sent to 27,500 Saskatchewan residents. The return rate was 34%.

Information collected includes number of days hunted by wildlife management zone for each license type, date and zone for each deer harvested, and antler size. The information is used to compare the harvest for the different license types from year to year and between wildlife management zones.

"QUALITY" WHITE-TAILED DEER HUNTING OPPORTUNITIES:
We do not manage specifically for "quality" white-tailed deer hunting. A series of mild winters has resulted in a high deer population in most parts of the province. This combined with relatively low hunting pressure compared to some other jurisdictions has resulted in quality hunting.

Saskatchewan is known for production of trophy-class white-tailed deer. Quality versus quantity will be one subject addressed in a white-tailed deer management strategy.

ANTLERLESS WHITE-TAILED DEER HARVEST:
A regular (either-sex) deer license gives the hunter the option of shooting a buck, doe, or fawn. The majority of hunters harvest a buck with their regular license. In areas with expanding populations, hunters may purchase up to 2 non-trophy licenses. The goal of harvesting antlerless white-tailed deer is to try to stabilize the population.

CONTROLLING HUNTER DENSITY AND DISTRIBUTION:
To date there have not been any restrictions on the number of resident licenses. Hunter density and distribution are managed through season length, opening dates, and bag limits. Canadian resident licenses are not limited, but hunter density and distribution are managed through season length, opening dates, and opening or closing zones to Canadian residents.

Nonresidents must use the services of a licensed outfitter. Hunter numbers and distribution are managed by controlling the number of clients and size of the operating area of the outfitters. Nonresidents are limited to northern zones.

SEASON STRUCTURE CHANGES IN LAST 10 YEARS:
The only appreciable change to the season structure in the last 10 years has been the introduction of non-trophy (antlerless) seasons in southern zones. These changes have been primarily to provide more hunting opportunity and increase the harvest particularly of antlerless deer.

DEVELOPING SEASON STRUCTURE:
White-tailed deer season structure is based on harvest information, sex and age ratio information, deer density information, and in some years age information obtained through jaw collections.

DATA COLLECTION METHODS:
The following data is collected:

a) deer density and population estimates based on stratified random quadrant aerial surveys;

b) productivity and sex and age ratios determined by preseason observations (Department staff and volunteers record deer observations throughout September, October, and November);

c) harvest information obtained from a mail-out questionnaire; and

d) age structure of the population based on jaws collected during the hunting season.

These data are used primarily as indices to determine if seasons should be liberalized or made more restrictive.

POPULATION MODELING:
We use J. Bartholow's POP-II to model deer populations in select management zones.

DEPREDATION POLICY:
Landowners experiencing depredation from white-tailed deer are eligible for damage prevention assistance (bloodmeal, snow fence, and intercept feed). Landowners with chronic depredation problems are eligible for financial assistance (maximum $3,000) to help with building permanent fences around hay storage yards.

In areas with high deer densities landowners may apply for in-season depredation licenses. Licenses are issued free to the landowner, who distributes them to hunters. Hunters are restricted to the area around the depredation site and may only harvest antlerless deer. The licenses are valid only during the regular deer seasons and hunters are limited to 2 licenses. Outside of the regular hunting season, landowners with damage exceeding $500 may apply for damage control permits.

A compensation program was in place until 1993. Between 1988 and 1993 compensation paid for all big game damage (including white-tailed deer, mule deer, and elk) varied from $125,000 to $347,000 and averaged $260,500. Assistance to prevent damage (bloodmeal, snow fence, permanent fencing, and intercept feed) is still in place. Between 1988 and 1993 budgets varied from $27,000 to $396,800 and averaged $216,400.

RESEARCH EFFORTS/RESEARCH CONTACT PERSON:
At the present time no one is conducting white-tailed deer research in Saskatchewan.

CURRENT MANAGEMENT ISSUES:
There is pressure to expand hunting opportunities for nonresidents in southern Saskatchewan. A wildlife diversification task force has the responsibility for examining options, developing a consensus, and making recommendations on this subject and others. No changes will be made in management until the task force makes its recommendations.

Loss of habitat is an ongoing concern. Several mild winters combined with low numbers of hunters has resulted in deer population increases, resulting in depredation problems. This combined with elimination of compensation has lowered landowner tolerance for high deer populations.

In response we have developed non-trophy seasons, in-season depredation licenses, and damage control permits to try to deal with high populations and depredation.

FUTURE MANAGEMENT ISSUES:
Major problems for white-tailed deer management over the next 5 years will be:

a. loss of habitat;

b. maintaining or increasing numbers of resident hunters;

c. maintaining interest in harvesting the antlerless component of the deer herd; and

d. balancing the harvest between residents and nonresidents.

These problems will also be present in 10 years and 20 years, although some will become more or less significant depending on weather, factors influencing land use, and factors influencing hunter numbers.

WHITE-TAILED DEER STATUS REPORT - TEXAS

SUBSPECIES PRESENT:
O.v. texensis, O.v. macrourus, O.v. mcilhennyi, and O.v. carminis

CONTACT PERSON:
Butch Young, White-tailed Deer Program Leader, TPWD, 309 Sidney Baker South, Kerrville, TX 78028.

OVERALL MANAGEMENT GOALS:
There are no written goals for white-tailed deer. Generally, the Texas Parks and Wildlife Department (TPWD) intends to maximize deer hunting opportunity within a sustained yield framework, to encourage landowners to practice proper habitat management through demonstration and extension services, to encourage ethical hunting, and to reduce overpopulation of white-tailed deer through hunting.

LONG-TERM STRATEGIC PLAN:
None yet.

STATEWIDE POPULATION TREND/ESTIMATE:
Texas is a large state with several ecoregions. Current deer numbers are nearly 4 million, with a 1993 estimate of 3,364,000. Deer populations fluctuate locally, depending on rainfall and range conditions, and there is no numerical goal for the state or even for ecoregions.

We strive for a healthy herd that provides maximum hunting opportunity and meets the objectives of landowners--the key to deer management in Texas. At present the trend is generally upward except for portions of the Trans Pecos, where drought has been a problem for 2 consecutive years.

HARVEST DATA COLLECTION:
Harvest is estimated through surveys of a sample of hunters by mail questionnaire after the season closes. Hunter success, sex of animal, county of kill, and harvest chronology are collected. They are used to estimate harvest by sex, county, report unit, and ecoregion.

"QUALITY" WHITE-TAILED DEER HUNTING OPPORTUNITIES:
Less than 5% of Texas is public land. Three of the state wildlife management areas can be considered to be "quality" or trophy deer areas. Two are under a high fence, and populations are kept well below carrying capacity.

"Quality" can be defined as mature male deer in good physical condition with antlers exceeding the minimum score for the Texas Big Game Awards Program.

ANTLERLESS WHITE-TAILED DEER HARVEST:
We encourage antlerless deer harvest except where populations have been recently introduced or where other factors make conservative management necessary. Archery regulations are either-sex with no permit required. The Edwards Plateau, South Texas, and many Cross Timbers counties have either-sex regulations with no antlerless permit required.

In cases of habitat damage by deer, landowners with an approved management plan may reduce antlerless deer numbers with a special permit which negates the bag limit requirement. In counties with high hunting pressure, such as in the Post Oak and Piney Woods ecoregions, antlerless harvest in high population counties is by "doe days," a short season in which does may be taken without a special permit.

CONTROLLING HUNTER DENSITY AND DISTRIBUTION:
While white-tailed deer belong to the state, landowners control hunting access. Hunter density and distribution are also controlled by landowners.

Landowners are encouraged to cooperate in the development of management plans that deal with buck and doe harvest, habitat management, and hunter management. Special regulations used include TPWD-implemented Wildlife Habitat and Harvest Annual Recommendation (WHHAR) plans that provide antlerless deer permits when biologists recommend them for areas that do not have either-sex hunting under regulations.

Landowner Assisted Management Plans (LAMPS) is a computer-assisted program that uses habitat and land use characteristics to calculate conservative antlerless deer permit issuance in East Texas counties.

Managed Lands Buck Permits (MLBP) allow landowners with approved plans to obtain additional buck permits in one-buck counties.

These programs reward good management of private lands. The programs are successful in some areas and well-received, but in others do not appear to meet the need in the local situation. LAMPS, while generally useful, has proven to be an expensive program, and we are exploring cost-reduction methods.

SEASON STRUCTURE CHANGES IN LAST 10 YEARS:
Regulations in the eastern part of the state are more conservative, while those in the South Texas Plains and Edwards Plateau have become more liberal. Public perception of populations and hunting pressure, and public acceptance of antlerless deer hunting are primary factors.

DEVELOPING SEASON STRUCTURE:
Regulations are developed from harvest data, hunting pressure data, population data, and studies conducted on wildlife management areas (WMAs) and on regulatory projects throughout the state.

Regulations also originate from public recommendations to the Texas Parks and Wildlife Commission and from the Commission itself. As in most states, some regulations originate with legislative acts, while others have developed because of public pressure on elected officials, who in turn apply pressure to the Department and Commission for regulation modification. If biological harm does not result (the bottom line), these political proposals may be implemented.

DATA COLLECTION METHODS:
The TPWD recently completed a 3-year study of breeding chronology to help us evaluate the effects of season dates on the population, if any. A sample of age and antler information is taken from harvested deer at cold storage plants each year in every ecoregion. A weight sample is taken at cold storage plants every 5 years in every ecoregion.

As for population monitoring, deer are censused in every ecoregion every year by various methods: aerial transects, Hahn 2-mile walking census, vehicle spotlight counts, mobile daytime census, and sex/age classification. Vegetation use transects are used in some portions of eastern Texas.

Biologists use collected data to evaluate trends and spot "trouble areas" that may require specific management goals, and to provide advice to the Commission in setting regulations.

POPULATION MODELING:
We are only beginning to consider the use of population models. We intend to examine models from other states to help us design a model for Texas that will meet the wide variety of conditions found here. Our goal is to develop a population model that would assist biologists in understanding and predicting deer population changes.

DEPREDATION POLICY:
There is a cumbersome system of issuing depredation permits that is handled by the Law Enforcement Division. In case of deer habitat damage (not crop depredation), there is a legislated system to provide Antlerless Deer Control Permits to landowners to allow them to reduce deer numbers in accordance with a Department-approved plan. There is no compensation program.

For discussion of suburban depredation problems, see Current Management Issues.

RESEARCH EFFORTS/RESEARCH CONTACT PERSON:
Project 20: Exotic Competition, The Influence of Fallow Deer and Aoudad Sheep on White-tailed Deer Production and Survival - D.E. Harmel, Kerr WMA, Hunt, Texas.

Project 95: White-tailed Deer Breeding Chronology and Reproduction- W.J. Williams, San Antonio, Texas.

Project 96: Genetic/Environmental Interaction in White-tailed Deer- D. E. Harmel, Kerr WMA, Hunt, Texas.

Project 97: Effects of Baiting on Female White-tailed Deer Movements and Harvest- Royce Jurries, Columbus, Texas.

Project 98: Inheritability of Breeding Dates for Female White-tailed Deer- B. Carroll, La Grange, Texas.

CURRENT MANAGEMENT ISSUES:
Demographic changes with a shift toward urban or suburban living and increasing minority representation

in the population will require the TPWD to shift some of its efforts from landowner education and cooperation to working with the urban population.

Voters may well decide the fate of wildlife management programs in the state in the future. The TPWD is currently stepping up its public hunting program to provide additional opportunity to those from urban centers. The TPWD has a program to involve women in the outdoors and acquaint them with hunting and shooting. The TPWD Wildlife Division recruits qualified women and minorities for biologist/technician positions.

Urban expansion into deer range and the resulting no-hunting regulations enacted by subdivisions and/or municipalities is an increasing problem. The TPWD allows permitted private trapping and transplanting of white-tailed deer, which is an administrative burden and leads the public to believe that trapping is a viable option for dealing with deer problems.

Habitat mismanagement is a problem in many parts of the state. Excessive numbers of livestock and exotic ungulates abuse the range and reduce carrying capacity. In other situations, cattle are removed from ranges in the mistaken notion that they are anathema to deer.

High fences which are constructed to contain exotics often contribute to overpopulation of white-tailed deer and resultant abuse of habitat. Federal endangered species laws prohibit needed habitat manipulation in some areas and foster distrust of TPWD biologists among landowners.

Liberal regulations on captive white-tailed deer allow private individuals to experiment with genetic improvement of deer and allows the movement of deer from county to county and the purchase and importation of deer from outside the state, raising questions of privatization of a public resource. This also shifts the management emphasis away from the habitat, a dangerous tactic.

FUTURE MANAGEMENT ISSUES:
In the next 5 years, issues will include: developing regulations to deal with increasing hunting pressure in parts of the state; suburban deer/people conflicts; polarization of managers' attitudes toward "quality management"; and a trend in increasing privatization of white-tailed deer.

In the next 10 years, we could see increasing numbers of exotics and owners unable to control those numbers as the price hunters are willing to pay for exotics declines (supply-demand phenomenon). Deteriorating "deer-proof" fences could allow the escape of exotic ungulates, establishing overpopulations of "free-ranging" exotics and leading to a decline in white-tailed deer habitat.

In the next 20 years, anti-hunting sentiment will be increasingly supported by a public which has lost contact with the land, wildlife, and stewardship principles. The next 20 years will be a battle to convince the public that wildlife management is needed and that hunting is a vital part of that management.

DEER STATUS REPORT - WASHINGTON

SUBSPECIES PRESENT:
White-tailed Deer
Mule Deer
Black-tailed Deer

CONTACT PERSON:
Rolf Johnson

OVERALL MANAGEMENT GOALS:
a. Maintain and enhance deer habitat to ensure productive populations.

b. Manage deer populations at current levels and manage for sustainable production.

c. Manage deer for a variety of recreational uses, including harvesting of quality bucks, maximizing sustainable harvest, and for education or viewing opportunities.

These goals are not measured. We have objectives for habitat, population, recreation, information and education, enforcement, and research.

LONG-TERM STRATEGIC PLAN:
We do not have a current strategic plan.

STATEWIDE POPULATION TREND/ESTIMATE:
The current statewide population of deer by subspecies is as follows:

Black-tailed deer 173,000
Mule deer 145,000
White-tailed deer 80,000
Total 398,000

HARVEST DATA COLLECTION:
We estimate deer harvest with a Hunter Harvest Questionnaire sent to about 10% of the hunters. We send a questionnaire to all muzzleloaders and about 50% of archery hunters.

In addition, we have a report card system that every successful hunter must submit. We get about 50% compliance on the report card, based on hunter questionnaire estimates. The report card data is used to allocate harvest to game management units.

"QUALITY" DEER HUNTING OPPORTUNITIES:
We offer a variety of hunting opportunities that some characterize as quality. The opportunities some may consider quality include (a) 2 and 3 point minimum areas, (b) limited-entry units, (c) units managed under road management to preclude the use of motorized vehicles, and (d) units managed under a combination of the above.

ANTLERLESS DEER HARVEST:
We have a general goal for deer of maintaining current population sizes. That means more antlerless hunting of white-tailed and mule deer because they are more productive, and very limited hunting of black-tailed does. Overall we harvest about 12% of the deer per year. Buck harvest accounts for over 75% of the deer harvest. Antlerless hunting is very limited except for damage control strategies.

CONTROLLING HUNTER DENSITY AND DISTRIBUTION:
We have a weapon selection system (modern firearm, archery, and muzzleloader) designed to reduce hunter pressure in the more crowded hunting seasons. About 16% of the hunters purchase the archery or muzzleloader deer tag. This strategy helps reduce crowding, but we still have crowding on the opening weekend of modern firearm deer seasons.

We also have a number of road management programs that help, but the program needs to be enhanced. A few units are limited by permit, but those are very limited at this time. Eventually we will have to resort to limited-entry hunting statewide to reduce hunter density.

SEASON STRUCTURE CHANGES IN LAST 10 YEARS:
Our mule deer seasons have been shortened in the last 10 years to achieve buck escapement goals. Our most popular mule deer area, the Okanogan, has had the buck season cut about a week to achieve buck escapement goals. In the Blue Mountains we went to a 3-point minimum system for both mule and white-tailed deer to achieve buck escapement goals. This strategy is working and is very popular with hunters. Black-tail seasons have remained fairly stable over the years.

DEVELOPING SEASON STRUCTURE:
Hunting season structure is developed in a rather complicated manner. First of all, we set the basic seasons for 3 years at a time. The year we set the 3-year package we hold a series of public meetings around the state soliciting recommendations from the public.

Then after receiving public input we draft our preferred option or options. Next, we hold another series of public meetings to describe our proposals. We then review those proposals again in view of public comment and draft agency proposals. These proposals are submitted to our Fish and Wildlife Commission for consideration. The public has the opportunity to testify before the Commission at public meetings. The Fish and Wildlife Commission establishes hunting seasons and rules.

DATA COLLECTION METHODS:
Our basic data collection methods for deer are herd composition surveys and harvest data. Herd composition surveys in eastern Washington are conducted both before and after hunting seasons. Most of the surveys are done by helicopter. On the western side, we are doing more Sex Age Kill analysis.

Harvest data is collected by harvest questionnaires, hunter report cards, game field checks, and check station monitoring. We determine the age of harvested deer at check stations and use cementum tooth analysis for selected units. These data are used in the Sex Age Kill modeling.

Westside deer are very difficult to survey so we rely on harvest methods. On the eastern side we also do some ground surveys for herd composition and winter kill hiking routes. For the most part we rely on trends in surveys to determine population status, but we do have a few areas of more intense survey analysis.

POPULATION MODELING:
Some of our biologists are working on a Sex Age Kill model. It relies on harvest data as well as some herd composition and productivity information. The most important information for this model is accurate harvest information, including sex and age of harvested animals. We are still evaluating this technique.

DEPREDATION POLICY:
We respond to damage complaints by sending an officer to the landowner to investigate the complaint. The landowner and the officer work together to identify a solution.

If a damage claim is filed, there are several ways these can be handled. In some cases a third party (Soil Conservation Extension Agent) is asked to review the damage problem and determine compensation (both parties agree beforehand to accept the damage assessment of the third party). The landowner can also file a damage claim directly with the Department.

There is a limitation of $2,000 per claim for claims to the Department. In the past, claims in excess of $2,000 could be submitted to the Legislature. A recent Attorney General opinion indicates that the damage claim liability is limited to $2,000 from the Agency or Legislature. Damage claims for deer and elk have exceeded over $200,000 per year, but payments have averaged only $50,000 to $60,000.

RESEARCH EFFORTS/RESEARCH CONTACT PERSON:
No deer research is currently conducted by the Washington Department of Fish and Wildlife (WDFW). I believe a deer study is being conducted on the Yakima Indian Reservation by Scott McCorquodale.

CURRENT MANAGEMENT ISSUES:
The forces influencing deer management vary by geographic area. For western Washington the main forces are urban sprawl, firearm restrictions, and tribal hunting. For central and eastern Washington the main forces are agricultural development of winter ranges, damage claims, winter range recreation resorts, and sprawling development. In a few areas of eastern Washington, tribal harvest is increasing and is becoming an important factor.

As a result of these forces on the western side, modern firearm seasons have been curtailed. Many firearm restriction areas have expanded and more of the hunting opportunity is by archery, shotgun, or muzzleloader. On the eastern side, our deer management programs have not changed appreciably, except that deer seasons in areas heavily hunted by tribes have been curtailed.

FUTURE MANAGEMENT ISSUES:
The major issues in the next 20 years will be the same factors identified in Current Management Issues.

WHITE-TAILED DEER STATUS REPORT - WYOMING

SUBSPECIES PRESENT:
O. virginianus

CONTACT PERSON:
Larry Roberts (307) 777-4590

OVERALL MANAGEMENT GOALS:
Objective/Measurement
Post Hunt Population: 54,750/Census count
Annual Harvest: 9,200/Mail survey
Harvest Success Rate: 50%/Mail survey
Recreation Days: 56,810/Mail survey
Hunter Effort Rate: 6.2 days/animal/Mail survey
Occupied Elk Habitat: 54,780 sq.mi./Computer program

LONG-TERM STRATEGIC PLAN:
We have a 1990-95 Strategic Plan. Each herd has its own objective which ties into the overall strategic plan. The plan is updated every 5 years.

STATEWIDE POPULATION TREND/ESTIMATE:
In 1994, the population was 37,267, approximately 14,233 under the objective of 51,500.

HARVEST DATA COLLECTION:
a. The University of Wyoming Survey Research Center performs a mail survey under contract with the Wyoming Game and Fish Department (WGFD) on a statistically-valid sample of hunters. The Center surveys total harvest, number of adult males, number of yearling males, number of females, and number of juveniles; total hunters, number of residents, and number of nonresidents;recreation days and days/animal harvested; and success rate.

b. Through check stations and random hunter checks we determine age, sex, and hunt area of harvest.

We also analyze population dynamics, assist in population estimates, determine population characteristics, and monitor recreational criteria and hunter satisfaction.

"QUALITY" WHITE-TAILED DEER HUNTING OPPORTUNITIES:
We generally use male:100 female ratio (posthunt) as a guide for "special" (not trophy) management:

Mule Deer: 30-40 Male:100 Female Range for Special Management

ANTLERLESS WHITE-TAILED DEER HARVEST:
Antlerless harvests are the most effective tool to alter overall herd size and are used as such. Goals are to reduce population sizes to herd objectives and maximize hunter opportunity.

CONTROLLING HUNTER DENSITY AND DISTRIBUTION:
Hunt areas (one or more of which are contained within each herd unit) are used to direct hunter pressure, density, and distribution. Weapon restrictions, license types, season dates and splits, and license quotas are also used. We utilize little access management. Regulations are working to control hunter density and distribution.

SEASON STRUCTURE CHANGES IN LAST 10 YEARS:
None.

DEVELOPING SEASON STRUCTURE:
We use harvest information; biological information; and input from the public, hunters, outfitters, land management agencies, and private landowners. Damage problems are also considered.

DATA COLLECTION METHODS:
We use tooth collection/cementum annual aging and sexing of harvested animals; University of Wyoming Survey Research Center harvest survey; posthunt herd classifications; and winter range trend counts.

This information and information outlined in Developing Season Structure are used to analyze present population status and its relationship with objectives and with the 5-year trend. Based on this information, the upcoming year's seasons are set to move herds towards objectives.

POPULATION MODELING:
We use POP II.

DEPREDATION POLICY:

Annual Damage Payments

Year	White-tailed Deer
1988	$ 12,274.00
1989	$ 192,438.76
1990	$ 31,823.37
1991	$ 42,018.55
1992	$ 31,087.66
1993	$ 16,806.14

Damage Prevention Costs*

1988	$ 304,707
1989	$ 339,503
1990	$ 462,543
1991	$ 384,563
1992	$ 372,948
1993	$ 479,909

*All species, but elk and deer comprise the largest proportion of prevention efforts. These costs include damage investigation and administrative costs associated with processing damage claims.

RESEARCH EFFORTS/RESEARCH CONTACT PERSON:

There are presently no white-tailed deer research projects. Wyoming usually has several 2- to 4-year white-tailed deer enhancements ongoing. Research efforts have been directed at migration/movements, sampling techniques, mitigation, etc.

CURRENT MANAGEMENT ISSUES:

Forces influencing management are competing land uses; loss of habitat; high demand in some areas of the state; and the public's expectations/desires. We are using hunting seasons, public land management planning, environmental impact commenting, habitat enhancement projects, and research to deal with these challenges.

FUTURE MANAGEMENT ISSUES:

Future issues include declining habitat quality and quantity, ORV use increases, energy, road and housing development in winter ranges, change in hunter demographics, funding shortages, and too much demand for too few bucks.

ELK
STATUS REPORTS

ELK
GENERAL HARVEST INFORMATION

STATE	1993 HARVEST ANT	ANT-	TOTAL	5 YR AVE ANT	ANT-	TOTAL	1 SEASON LIMIT	LEGAL HARVEST	HUNTER #'S RES	NONRES	TOTAL	HUNTER DAYS RES	NONRES	TOTAL	LICENSE FEES RES	NONRES	ALIEN	% LAND OPEN TO PUBLIC HUNTING
AK	48	39	87	63	66	132	NO	1	350	7	357			1540	$25.00	$385.00	$485.00	
AB	NO INFORMATION																	
AZ	3,872	4,189	8,061	3,844	2,650	6,494	YES	1		(<10%)	16,984		(<10%)	77,950	$81.00	$388.50		90% OF ELK HABITAT
BC	2,618	636	3,254	2,585	1,125	3,710	NO	1	13,555	682	14,237	120,157	4,517	124,674	$25Can	$150Can		30%
CA	51	30	81				YES	1	140	10	150				$261.45	$85+		50%
CO	21,122	26,243	47,365	21,758	20,676	42,434	YES	4	140,000	85,000	225,000			1,149,941	$30.25	$250.25		36-37%
ID	13,300	7,500	20,800	14,460	8,660	23,800	NO	1-2	NA	NA	92,600	NA	NA	825,000	$23.00	$427.00		69%
MT	10,663	11,089	21,779	12,009	11,670	23,528	NO	1	93,673	15,010	108,684	741,276	127,453	868,729	$16.00	$475.00		NA
NV	113	63	176	103	52	155	YES	1	206	9	215	933	55	988	$120.50	$600.50		80%
NM	4,552	6,302	10,854	5,184	2,752	7,936	YES	1			26,282			120,404	$41.00	$356.00		40%
OR	13,254	8,335	21,589	12,243	7,960	20,204	YES	1	13,827	124,443	138,270			810,669	$38.00	$324.00		65-75%
SK	844	401	1,245	750	365	1,115	NO	1	5,046	0	5,046	25,169	0	25,169	$44/66	UNAV.		
TX	NO ELK IN TEXAS																	
UT	5,700	4,449	10,149	6,109	3,586	9,715	YES	1	---	---	48,372			223,174	$50.00	$328.00		
WA	3,804	2,563	6,367	5,090	3,340	8,430	YES	1	88,947	1,029	89,976			496,666	$39.00	$270.00		38.7% + PRIV. TIMBER CO LANDS
WY	8,774	9,244	18,018	9,441	10,408	19,849	NO	1	45,859	8,445	54,304	293,339	54,099	348,033	$28.00	$155.00		95.8%

ELK SEASON STRUCTURE
GENERAL FIREARM

STATE	OPENING DATES	LENGTH (DAYS)	OVERLAP RUT	HUNTER #S RES	HUNTER #S NONRES	HUNTER #S TOTAL	HUNTER DAYS RES	HUNTER DAYS NONRES	HUNTER DAYS TOTAL	SUCCESS RATE	HARVEST ANT	HARVEST ANT-
AK	ALL HUNTS CONTROLLED											
AB	NO INFORMATION											
AZ	9/23 - 12/2	4/6/7	FEW		(<10%)	11,000		(<10%)	39,923	58%	3,134	3,654
BC	VARIES	NO INFORMATION										
CA	VARIES	4 to 16	SOME	140	<10	150				85%	51	30
CO	10/14 - 11/12	5/12/9	NO	123,341	80,771	204,112			914,946	22%	18,426	24,236
ID	9/15 - 10/15	65/15/25/5	FEW	62,350	7,790	70,140	390,500	57,400	447,900	16%	9,500	1,500
MT	10/23	35	NO	93,673	15,010	108,684	741,276	127,453	868,729	20%	10,663	11,089
NV	ALL HUNTS ARE BY DRAW											
NM	10/2	5	YES			15,893			51,348	52.4%	4,523	3,796
OR	10/16 - 11/20	7/5/9/5/9	NO	71,935	2,997	74,932			598,232	17%	12,080	7,159
SK	9/13 & 11/15	14	FEW	2,501	0	2,501	12,322	0	12,322	23%	559	14
TX	NO ELK IN TEXAS											
UT	10/11	9	NO			36,000 cap			183,682	15%	5,151	4,449
WA	10/27 - 11/3	6-12	NO			63,008			331,277	6.8%	3,003	1,300
WY	VARIABLE	VARIABLE	YES	40,166	7,689	47,855	246,486	47,833	294,310		17,338 COMBINED	

ELK SEASON STRUCTURE
ARCHERY

STATE	OPENING DATES	LENGTH (DAYS)	OVERLAP RUT	HUNTER #S RES	HUNTER #S NONRES	HUNTER #S TOTAL	HUNTER DAYS RES	HUNTER DAYS NONRES	HUNTER DAYS TOTAL	SUCCESS RATE	HARVEST ANT	HARVEST ANT-
AK	NO SPECIAL SEASON											
AB	NO INFORMATION											
AZ	9/9 & 11/11	14	YES		(<10%)	5,225		(<10%)	38,027	24%	738	535
BC	VARIES		NO INFORMATION									
CA	VARIES	4 to 16	SOME	140	<10	150				85%	51	30
CO	8/26 - 9/24	30	YES	10,238	13,259	23,497			192,570	13%	1,745	1,374
ID	8/30,12/5,12/10	26/28/23	YES	NA	NA	26,700	NA	NA	194,000	7%	1,445	455
MT	1ST SAT SEPT.	42	YES	NA	NA	15,402	NA	NA	121,606	9%	991	349
NV	NO SPECIAL SEASON											
NM	9/1	20	YES			6,540			53,688	22.5%	1,075	399
OR	8/28	30	YES	20,943	1,487	22,430			219,596	10%	1,174	1,176
SK	8/23	14	YES	453	0	453	2,688	0	2,688	9%	29	12
TX	NO INFORMATION											
UT	8/31	16	YES			5,468			NO INFO	7-10%	256	133
WA	10/1 & 11/24	14/22	YES			14,417			107,076	7.7%	399	710
WY	9/1 - 9/30		YES	5,693	756	6,449	46,853	6,266	53,119	10.7%	687 COMBINED	

ELK SEASON STRUCTURE
MUZZLELOADER

STATE	OPENING DATES	LENGTH (DAYS)	OVERLAP RUT	HUNTER #S RES	HUNTER #S NONRES	HUNTER #S TOTAL	HUNTER DAYS RES	HUNTER DAYS NONRES	HUNTER DAYS TOTAL	SUCCESS RATE	HARVEST ANT	HARVEST ANT-
AK	NO SPECIAL SEASON											
AB	NO INFORMATION											
AZ	9/9,16,23;12/2	6	YES	752 PERMITS IN 1993, COMBINED WITH GENERAL FIREARM								
BC	VARIES	NO INFORMATION										
CA	NOT ALLOWED											
CO	9/9 - 9/17	9	YES	4,891	3,042	7,933			42,425	20%	951	633
ID	11/10 & 11/25	20/15	NO	NA	NA	15,500	NA	NA	71,000	13%	135	365
MT	NO SPECIAL SEASON											
NV	NO SPECIAL SEASON											
NM	10/2	5	YES			3,849			15,368	27.6%	704	357
OR	VARIED	VARIED	NO			216			795	7%	1,174	1,176
SK	NO REGULAR (NON-DRAW) SEASON											
TX	NO INFORMATION											
UT	11/9*	9	NO			1,000 permits						
WA	10/8 & 11/24	7/22	YES			9,663			58,313	7.3%	402	553
WY	NO SEPARATE DATA AVAILABLE											

* Little information available because this is a new season structure.

ELK SEASON STRUCTURE
CONTROLLED HUNTS

STATE	OPENING DATES	LENGTH (DAYS)	OVERLAP RUT	HUNTER #S RES	HUNTER #S NONRES	HUNTER #S TOTAL	HUNTER DAYS RES	HUNTER DAYS NONRES	HUNTER DAYS TOTAL	SUCCESS RATE	HARVEST ANT	HARVEST ANT-
AK	10/10 - 11/25	47	YES	350	7	357			1,540	25%	48	39
AB	NO INFORMATION											
AZ	ALL HUNTS LIMITED PERMIT BY MANAGEMENT AREA ONLY											
BC	VARIES	NO INFORMATION										
CA	SEE GENERAL SEASON											
CO	DATA IS COMBINED WITH GENERAL RIFLE SECTION											
ID	9/15 - 11/15	VARIES	FEW	NA	NA	22,500	NA	NA	135,460	30%	2,220	5,100
MT	NO SEASON											
NV	VARIES	VARIES	FEW	206	9	215	933	55	988	60-70%	113	63
OR	VARIES	VARIES	NO	50,534	2,105	52,639			217,900	24%	6,305	6,298
SK	8/30 - 12/6	14-21	FEW	1,874	0	1,874	9,060	0	9,060	29%	228	358
TX	NO INFORMATION											
UT	VARIES	9-45	NO			7,000+			33,684	61%		4,500+
WA	VARIES	VARIES	NO	INCLUDED IN GENERAL SEASON SUMMARY							1,561 COMBINED	
WY	INCLUDED WITH GENERAL FIREARMS SEASON											

ELK STATUS REPORT - ALASKA

SUBSPECIES PRESENT:
Cervus elaphus roosevelti (Southeast Alaska and Afognak Island, Alaska); *Cervus elaphus nelsoni* (Southeast Alaska). Fifty elk of the 2 subspecies were introduced to Southeast Alaska in 1985.

The only goals for elk in the region are to consider an open season when the population reaches about 250 and to discourage the spread of elk to other areas in the region. Currently there are about 150-200 elk on Etolin Island in Game Management Unit (GMU) 3. Elk on Afognak Island are in GMU 8.

CONTACT PERSON:

Afognak Island	Southeast Alaska
Roger Smith	Bruce Dinneford
211 Mission Road	PO Box 240020
Kodiak, AK 99615	Douglas, AK 99824-0020
Phone: 1-(907) 486-1880	Phone: 1-(907) 465-4265

OVERALL MANAGEMENT GOALS:
The current management objective is to maintain a population of at least 1,000 elk for use by all user groups and maintain population densities of 1-2 elk/mi. sq.

LONG-TERM STRATEGIC PLAN:
No

STATEWIDE POPULATION TREND/ESTIMATE:
Trend is increasing with population estimated at 1,000-1,100 elk pre-season.

HARVEST DATA COLLECTION:
Mandatory hunter report cards are used; permits are required for all hunters. Data collected include: number of days hunted; hunting location; date of kill; sex of kill; location of kill; transportation used; and commercial services used.

Data is used to determine trends in harvest chronology, harvest rates, and harvest levels for individual herds, and to set hunt boundaries and determine the number of permits issued the following year.

"QUALITY" ELK HUNTING OPPORTUNITIES:
In some locations, the number of hunters in the field is limited with assigned hunting periods.

ANTLERLESS ELK HARVEST:
Either sex hunting is allowed in all hunts. Harvest strategy is to maintain harvest favoring males with about a 15% exploitation rate overall.

CONTROLLING HUNTER DENSITY AND DISTRIBUTION:
There are set boundaries for several management areas, each encompassing the ranges of 1 or more individual elk herds, based on access and trend in population of each herd. Least-accessible herds have longer seasons and unlimited permits. Most-accessible herds have limited permits with assigned hunting periods issued by lottery.

We also use Emergency Order closures frequently to regulate harvest in management areas with unlimited permits. The system works well, but extreme variations in weather conditions between years influence harvest rates and chronology, and harvest objectives for individual herds are occasionally exceeded and frequently not reached.

SEASON STRUCTURE CHANGES IN LAST 10 YEARS:
Seasons have been shortened in response to increased logging road access and decreasing overwinter survival in 1989-91. Opening dates were changed from 1 September to 10 October in response to low bull:cow ratios. We were attempting to optimize breeding opportunities before bulls were exposed to hunting.

DEVELOPING SEASON STRUCTURE:
Elk regulations are considered once every 2 years by the Board of Game. To allow timely responses to annual variations in elk numbers, the Board authorizes liberal permit quotas with "up to" language which enables managers to set permit quotas in April. Local advisory committees also have input into the regulatory process and are represented at the Board of Game public hearings on regulatory changes.

Local Area Biologists analyze harvest data and sex/age composition survey data, and make

recommendations for changes in regulations which are revised/reviewed by the supervisory staff and submitted to the Board of Game.

DATA COLLECTION METHODS:
Fixed-wing surveys of sex/age composition of each herd are done in July-September. We maintain radio-collared elk in each herd to assist in locating the herds for surveys and to define the ranges of each herd. We also require mandatory hunter reports, conduct field check stations and periodically monitor hunting by boat, aircraft and auto.

POPULATION MODELING:
No formal model used.

DEPREDATION POLICY:
None

RESEARCH EFFORTS/RESEARCH CONTACT PERSON:
Our current project is to determine ranges of individual elk herds using aerial telemetry. Contact: Roger Smith, 211 Mission Road, Kodiak, AK 99615

CURRENT MANAGEMENT ISSUES:
The extensive logging of Sitka spruce forests and the associated increase in road access is an issue. Most of the elk habitat is in private ownership and forestry regulations have no provisions for terrestrial wildlife protection.

Public access to hunting may be limited by private landowners in the future. Extreme annual fluctuations in winter weather and snow accumulation cause high natural mortality, thereby regulating elk populations.

FUTURE MANAGEMENT ISSUES:
See Current Management Issues.

ELK STATUS REPORT - ARIZONA

SUBSPECIES PRESENT:
Rocky Mountain elk

CONTACT PERSON:
Tice Supplee, Game Branch Chief; Ray Lee, Big Game Supv.

OVERALL MANAGEMENT GOALS:
Our goal is to maintain elk populations at levels which provide recreational opportunity while avoiding adverse habitat impacts and minimizing substantiated depredation complaints. Our progress is measured by harvest and hunter participation/ application data, population surveys and site-specific habitat monitoring.

LONG-TERM STRATEGIC PLAN:
Yes

STATEWIDE POPULATION/TREND ESTIMATE:
Current trend is slightly increasing and is within stated 1992-96 objectives.

HARVEST DATA COLLECTION:
Harvest is determined from a mail hunter questionnaire card. The return rate is about 60%. There is a 100% mail-out to all elk hunters. The information is provided to game management unit wildlife managers for use in calculating the next year's harvest and hunt permit levels.

"QUALITY" ELK HUNTING OPPORTUNITIES:
We provide quality hunting opportunities, although they are not labeled as such. Two hundred fifty to three hundred early "bugle" general firearms bull elk permits are allocated annually.

Almost all archery seasons occur during the rut as do approximately 200 bull muzzleloader permits. The season dates and limited permits for a given area (General & Muzzleloader) assure a "quality" opportunity.

ANTLERLESS ELK HARVEST:
To attain the strategic goals of avoiding adverse habitat impacts and minimizing substantiated depredation complaints, game unit wildlife managers are instructed to "harvest antlerless elk, if necessary, to stabilize populations in specific units or local areas." Local managers are given latitude to select season dates and hunt areas to attain local harvest objectives.

CONTROLLING HUNTER DENSITY AND DISTRIBUTION:
Arizona elk hunting is 100% permit/draw by hunt area and hunt method. Hunts are "stratified" (split into multiple season dates) to manage hunter densities.

Over 80% of Arizona elk habitat is on public lands (U.S. Forest Service), which have excellent access. We are experimenting with vehicle closure areas to provide escape cover and hold elk herds off private lands. The technique shows promise. We have no special regulations.

SEASON STRUCTURE CHANGES IN LAST 10 YEARS:
There have been no bull season changes, but we have had a significant increase in antlerless harvest and a diversity of season structures to attain antlerless harvest objectives. The rationale has been to slow the rate of elk herd increase and in some areas reduce populations to 1989-90 levels.

DEVELOPING SEASON STRUCTURE:
Elk season structures for archery, muzzleloader, and general firearms bull hunts are established in 5-year hunting season guidelines that correspond with the 5-year Strategic Plan. Seasons for antlerless, as mentioned, are more dynamic and arise from local-level public participation and planning efforts that include land agencies and landowners.

The returns from the hunter questionnaire are used to gather harvest data, and field checks are used in specific areas to gather age distribution of the harvest. Pre-hunt bull:cow and cow:calf ratios are used to guide changes in bull permit levels. Generally, permits will be decreased if pre-hunt bull:cow ratios are below 20:100 and increased if they are above 30:100. Cow:calf ratios below 50:100 are an indicator to decrease permits, and ratios above 55:100 indicate an increase.

This particular data set is not working as well with the high levels of antlerless harvest and may be overly

conservative. The "political" component is indexed from substantiated depredation complaints. The current Arizona Game & Fish Commission is striving toward minimizing elk depredations on private lands through aggressive antlerless harvest.

DATA COLLECTION METHODS:
Elk herds are surveyed in late August and early September in each game management unit and pre-season bull:cow:calf ratios are derived. Select units also have winter aerial surveys to determine areas of population concentrations.

POPULATION MODELING:
Our population modeling is driven by past harvest data and bull:cow:calf ratios. Multiple "runs" are processed and a run with the "best fit" statistically is selected as the population estimate. The model requires a reasonable guess at the starting date population level.

Recently the "other than hunt" mortality factor was reduced to 5% (from 10-12%) and seems to yield better results. The modeling becomes less satisfactory as the geographic scale becomes smaller.

DEPREDATION POLICY:
Our depredation complaint response is spelled out in state statute and is limited to technical advice and harvest programs. The Commission can authorize landowner kill permits, but the meat must be salvaged and given to a charitable foundation.

Hunter demand for elk permits is so high that creation of "depredation hunts" is politically very unpopular. After losing such a hunt in the courts, Arizona landowners are reluctant to seek that avenue. There are no payments or compensation program in Arizona as of this writing. We are anticipating proposed legislation this legislative year.

RESEARCH EFFORTS/RESEARCH CONTACT PERSON:
Elk research is focused on mortality rates of cows, population distribution, and herd use areas. Contact: Richard Brown, Research Biologist, 2221 W. Greenway Rd., Phoenix 85023.

CURRENT MANAGEMENT ISSUES:
An increasing elk herd in conjunction with pressure on livestock interests to cut herds on public lands has created an adversarial environment. Arizona has created Local Elk Habitat Partnership Committees (9 statewide in elk habitat) that include local stakeholders to attempt more proactive solutions, including locally-developed hunt strategies and habitat projects.

FUTURE MANAGEMENT ISSUES:
I believe elk herds have responded to the high level of timber harvest and reseeding with palatable forage plants using KV funds and other timber harvest-related revenues. Reduction in timber harvest and regrowth of forests to benefit threatened/endangered species will likely result in lower habitat capacities for elk in the next 10-20 years.

Over the next 5 years elk will continue to be a "cash cow" for Arizona game management as permits remain at all-time high levels. The next issue on the near horizon is elk impact on riparian ecosystems and aspen.

ELK STATUS REPORT - BRITISH COLUMBIA

SUBSPECIES PRESENT:
C.e. nelsoni, C.e. Roosevelti

CONTACT PERSON:
Dan Blower, Wildlife BR, Victoria, B.C.

OVERALL MANAGEMENT GOALS:
Our goals are to protect key habitat, conserve populations, and provide recreational use.

LONG-TERM STRATEGIC PLAN:
The plan is not yet finalized.

STATEWIDE POPULATION TREND/ESTIMATE:
Provincial populations are stable to increasing and numbers are near current goals.

HARVEST DATA COLLECTION:
A mail-out random hunter sampling and tooth return program is carried out. Compulsory inspections are also made in some regions. Seasons are sometimes adjusted depending upon data.

"QUALITY" ELK HUNTING OPPORTUNITIES:
Quality elk hunting is provided by default because of a lack of access in some areas, access restriction in some areas, and limiting the number of hunters by a permit draw system.

ANTLERLESS ELK HARVEST:
We have limited cow and calf harvesting by permit. The goal is to increase harvest on calves and juveniles.

CONTROLLING HUNTER DENSITY AND DISTRIBUTION:
Access management, special regulations, seasons dates, and limited permits are used. They are generally working.

SEASON STRUCTURE CHANGES IN LAST 10 YEARS:
We have reduced cow and calf harvests in the East Kootenays because of regulation changes made in response to the perception of lower elk numbers in the area.

DEVELOPING SEASON STRUCTURE:
We use harvest information, biological information, Department/commission regulatory authority, and the Legislature, plus anecdotal reports and managers' perceptions.

DATA COLLECTION METHODS:
We mail out hunter samples and/or conduct compulsory inspections.

POPULATION MODELING:
We have utilized POP II and Cohort models.

DEPREDATION POLICY:
Some special seasons are initiated to reduce numbers of elk. No compensation is paid by the provincial government for wildlife damage.

RESEARCH EFFORTS/RESEARCH CONTACT PERSON:
Various small operational research is carried out in regions. Contact person: Don Eastman, Research Section Manager, Wildlife Branch, Victoria.

CURRENT MANAGEMENT ISSUES:
Demands for recreational hunting opportunities and crop depredation concerns are the main influences for offsetting the inherently conservative attitudes of biologists and environmentalists.

FUTURE MANAGEMENT ISSUES:
5 Years:
- to protect key wintering habitat areas
- to get regional biologists/managers to liberalize hunting regulations, i.e. longer seasons, more antlerless hunting opportunities
- to overcome opposition to the establishment of herds in new locations
- to find adequate funding to carry out needed population inventory work

10-20 Years: as above, plus:
- develop an effective range enhancement program
- ensure that hunting and game management is adequately supported by governments

ELK STATUS REPORT - CALIFORNIA

SUBSPECIES PRESENT:
Roosevelt and tule elk are native; Rocky Mountain elk are introduced.

CONTACT PERSON:
Jon Fischer/Doug Updike

OVERALL MANAGEMENT GOALS:
Goals are to:

1) maintain existing populations of native elk subspecies in a healthy condition;

2) provide recreational use opportunities to the public;

3) reestablish elk in suitable historic habitat; and

4) minimize agriculture and property damage by using hunting/relocation to maintain populations at herd objective levels.

LONG-TERM STRATEGIC PLAN:
We have a 1985 tule elk management plan.

STATEWIDE POPULATION TREND/ESTIMATE:
Current Roosevelt elk numbers are 3,500-4,000; tule elk, 2,900; Rocky Mountain elk, 1,000-1,500; and total elk numbers, 7,400-8,400.

Assuming no major depredation conflicts, California's habitat is capable of supporting at least 5,000 Roosevelt elk, 4,000 to 5,000 tule elk, and 1,500 to 2,000 Rocky Mountain elk.

HARVEST DATA COLLECTION:
Elk harvest is estimated based on mandatory tag returns, with a tag return of approximately 90%. Age and sex data, and in some cases body weight data, are collected. Antler samples have been collected for chemical analysis. Data on rumen capacity and abomasum parasites have been collected.

"QUALITY" ELK HUNTING OPPORTUNITIES:
Because of very limited tag quotas (<130 statewide public hunting tags; 122 tags for 1994), virtually all of the elk hunts are quality hunts. Quality is defined subjectively to include high hunter success rate (>50% statewide for all hunts combined). Quality is ensured by means of very limited tag quotas, which serve to reduce competition in the field. Additionally, many hunts are population control hunts.

ANTLERLESS ELK HARVEST:

In general, the harvest of antlerless elk is encouraged, except in isolated cases where population levels are perceived to be much less than desired. Some hunts are specifically designed to reduce/maintain populations at desired levels. Harvest of female elk is essential in such instances.

In areas where elk are extremely vulnerable to hunters, and/or where hunting is used to control population levels, tag quotas are stratified according to sex (i.e., bulls and cows). In areas where elk are less vulnerable to hunters, either-sex tags may be issued.

CONTROLLING HUNTER DENSITY AND DISTRIBUTION:
Strategies to control hunter density include strictly limiting tag quotas and stratifying tag quotas according to desired age/sex harvest (e.g., spike bull tags vs. "any" bull tags, bull tags vs. cow tags). These strategies are working, as there continues to be a strong demand for elk hunting opportunities in California.

SEASON STRUCTURE CHANGES IN LAST 10 YEARS:
Elk season structure has changed in the last 10 years with the addition of *annual* tule elk hunts in 1989. (Tule elk hunting was prohibited until statewide population numbers reached 2,000). Consistent annual elk hunting in California is relatively new.

DEVELOPING SEASON STRUCTURE:
Season structure often is based on individual herd management objectives. Harvest information and biological information (sex composition and population estimates based on air surveys) affect Department recommendations.

In California, the Fish and Game Commission determines seasons, bag limits, tag quotas, etc., based on authority established through legislative action. In some cases, season structure is modified by deer season regulations so overlap does not occur.

DATA COLLECTION METHODS:
Harvest information was discussed previously. Population characteristics (age/sex structure, population size) are based on fixed and rotary wing surveys and, in some cases, on ground surveys.

POPULATION MODELING:
Modeling of populations occurs by means of a kill-vary type model where the effects of various harvest scenarios are simulated.

DEPREDATION POLICY:
Hunting seasons and in some cases relocations are agency methods of dealing with depredations. The Department does not have compensation programs for depredations. The Department may issue permits to kill depredating elk; however, such permits have not been issued in recent years.

RESEARCH EFFORTS/RESEARCH CONTACT PERSON:
Tule Elk Observability Study
Owens Valley
Contact: Dr. Vern Bleich

Roosevelt Elk Habitat Suitability Study
Klamath Province
Contact: Mr. Tim Burton

Roosevelt Elk Demographics/Habitat Use Study
Siskiyou County
Contact: Mr. Tim Burton

Roosevelt Elk Demographics/Ground Survey Methods
Smith River Area of Del Norte County
Contact: Dr. Floyd Weckerly

CURRENT MANAGEMENT ISSUES:
Political forces are influencing elk management. In one particular instance, political/social forces are preventing the use of hunting as a population control for a herd that will likely soon exceed range carrying capacity and fail to meet desired conditions.

FUTURE MANAGEMENT ISSUES:
The major problems for elk management in California over the next 5, 10, and 20 years will be resolving the conflict associated with damage to private property. If previous development and human population growth rates continue, these conflict will become even more serious, perhaps threatening the welfare of some herds.

ELK STATUS REPORT - COLORADO

SUBSPECIES PRESENT:
C.e. nelsoni

CONTACT PERSON:
Rick Kahn 303-291-7349

OVERALL MANAGEMENT GOALS:
Colorado has long-term population goals that are the sum of the individual Data Analysis Unit (DAU) population objectives. Individual herd unit populations are measured annually utilizing harvest information, aerial trend counts, and POP II models.

In addition, Colorado has a general goal of providing maximum recreational opportunities and a diversity of opportunities for our hunters.

LONG-TERM STRATEGIC PLAN:
We have no long-term strategic plan for elk. We do have a "Deer and Elk Management Analysis Guide" that details the period from 1992-94.

STATEWIDE POPULATION TREND/ESTIMATE:
The population trend has been declining for the past 2-3 years. Presently, the goal is to maintain a posthunt population of approximately 215,000 elk.

HARVEST DATA COLLECTION:
Colorado uses a random phone survey of over-the-counter licenses (40% of all licenses sampled); a mail survey is used for limited licenses (50% of all licenses sampled)

"QUALITY" ELK HUNTING OPPORTUNITIES:
Colorado has 23 Game Management Units (GMUs) that are managed for quality hunting utilizing limited licenses. We do not define or insure quality, rather most of these units are managed for postseason bull:cow ratios > 25. Some units have bull:cow ratios > 50.

In addition, there are 13 large ranches in Colorado that are enrolled in the Ranching for Wildlife program. This program provides the public limited opportunity for quality hunting.

ANTLERLESS ELK HARVEST:
Colorado uses cow hunting as our principal means of population control. Our goals for cow harvest are generally set annually. We have been very aggressive in recent years in attempting to lower the elk population. Average cow licenses for the past 5 years have been > 50,000.

CONTROLLING HUNTER DENSITY AND DISTRIBUTION:
Our primary strategy is the "one and only" hunt concept that limits hunters to one license\year. The Colorado Division of Wildlife (CDOW) works with the Bureau of Land Management and the U.S. Forest Service on road closures and travel management plans.

The principal factor limiting hunter density and distribution is the 3 combined deer and elk seasons. We have been able to keep the number of hunters per season below 100,000. Past experience has shown that hunter complaints increase and satisfaction declines with more than 100,000 hunters in the field at any one time.

SEASON STRUCTURE CHANGES IN LAST 10 YEARS:
There have been no major changes in the past 10 years. The present elk seasons are well accepted by both the public and the Division.

DEVELOPING SEASON STRUCTURE:
Season structure is set by the Wildlife Commission for a 5-year period (e.g., 1995-99). There is no legislative oversight for seasons or limited license numbers.

The CDOW uses biological information, human dimension survey data, harvest data, public opinion (primarily from organized groups such as sportsmen, environmental groups and agricultural groups), and economic assessments, such as license sales, to set hunting seasons.

DATA COLLECTION METHODS:
Helicopter trend counts are flown every year in December and January to assess bull:cow and cow:calf ratios. Summer classification counts are done in some DAUs to gain more insight into production. Approximately 75,000 elk are classified

each year. Classification data is used in the models to set cow licenses on an annual basis.

POPULATION MODELING:
All units are modeled annually using POPII. The CDOW is moving toward using a new model, POP-MOD, in the near future.

DEPREDATION POLICY:
The CDOW is liable for damage caused by elk to growing crops, harvested crops, orchards, hay and artificially-seeded rangelands, fences, and livestock forage deferred for seasonal use.

Direct payments to landowners for these types of damage averaged $155,000/year for the last 5 years. In addition the CDOW spent approximately $200,000/year on deer and elk damage *prevention* programs.

RESEARCH EFFORTS/RESEARCH CONTACT PERSON:
1) Elk survival and population estimation (sighting bias and mark\resight on sampled search quadrats) Dave Freddy (303-484-2836)
2) Early season elk movements in the White River National Forest.

CURRENT MANAGEMENT ISSUES:
1) Private landowners are concerned about elk on private land and effects on livestock operations; this has fostered a legislative concern. 2) Some elk hunters are concerned about the lack of "quality" elk hunting in Colorado. 3) More resources are being allocated toward non-hunted species, leaving less available for elk management.

FUTURE MANAGEMENT ISSUES:
There are a number of concerns the CDOW has about the future of elk and elk hunting in Colorado. The most pressing are:

1) The amount of private land where hunting and harvest can occur is dramatically decreasing. We have difficulty getting any harvest on certain herds.

2) Elk/livestock competition for forage on both public and private property.

3) Landowners' desire to *have elk* on their land during hunting seasons for economic reasons and their *unwillingness* to maintain any elk after hunting periods are over.

4) The lack of good census techniques that allow population estimation with reasonable confidence.

ELK STATUS REPORT - IDAHO

SUBSPECIES PRESENT:
C.e. nelsoni

CONTACT PERSON:
Lonn Kuck (208) 334-2920

OVERALL MANAGEMENT GOALS:
Statewide goals:

1) Continue to offer antlered bulls-only, general hunt opportunity in conjunction with antlerless harvest by permit in most units.

2) Continue to offer either-sex, general hunt opportunity in some northern Panhandle units.

3) Maintain or increase bull:cow ratios in all units.

4) Establish and maintain the desired percentage of yearling and mature bulls in the antlered portion of the harvest for each management area.

5) Increase hunter satisfaction from the 43% reporting they mostly or always experienced a quality elk hunt in 1987-88 to at least 60% of the hunters reporting the same level of satisfaction in 1994-95.

Measurements:

1) Minimum bull:cow ratios are set for each game management unit; management changes are initiated if objectives are not met as indicated by the results from two sightability surveys; and/or,

2) Maintain a certain percentage of yearling bulls and mature bulls in the antlered segment of the harvest. Harvest is monitored with a random telephone survey, mandatory check requirements, and/or standard check stations, if at least 50% of the harvest is checked.

LONG-TERM STRATEGIC PLAN:
Yes

STATEWIDE POPULATION TREND/ESTIMATE:
The long-range trend has been increasing; the 1994 estimated winter population was 115,000-120,000 elk. This is a projected increase of over 250% since the 1960s. For the most part, the number of elk is consistent with individual unit goals, but many bull:cow ratios are below the objectives.

HARVEST DATA COLLECTION:
Idaho conducts a random telephone harvest survey annually. Data collected include: harvest, success rate, percent males in the harvest, number of hunters, days per hunter, animals seen per day, and degree of satisfaction in the hunting experience.

In addition, some harvest information is collected at check stations and all elk harvested in the Panhandle Region are subject to a mandatory check. These data are utilized to set annual elk seasons and are used to monitor harvest trends.

"QUALITY" ELK HUNTING OPPORTUNITIES:
Quality elk hunting experiences are a stated goal of Idaho's elk management program. Quality is defined by the probability of harvesting a mature male in a relatively uncrowded hunting environment.

Idaho is attempting to meet this objective by restricting hunter participation in 14 units with a zone tag called the Mountain elk tag. Hunters who desire to hunt in 14 remote units with a higher chance of harvesting a mature male are required to purchase a mountain elk tag. In these units hunters who buy a mountain elk tag are restricted to hunting only in mountain units.

The objective is to restrict hunters sufficiently to reduce harvest to maintain adequate bull escapement and to preserve uncrowded hunting experiences.

In addition, many controlled or limited-entry hunts are offered in areas in which demand for elk far exceeds supply. These hunts give the hunter an opportunity to hunt elk with limited competition and many mature animals are often available.

In some units where bull:cow ratios exceed objectives, a number of controlled hunts in the September rut are offered. These hunts provide rifle hunters quality hunting experiences and the opportunity to hunt bulls in the rut in relatively accessible hunting areas.

ANTLERLESS ELK HARVEST:
Idaho's position is to offer some antlerless hunting

throughout the state where biologically possible. This includes offering either-sex, general hunt opportunities in some northern Panhandle units. This opportunity is maintained where elk security is relatively high and hunters are restricted by a zone tag called the Panhandle elk tag.

In the remainder of the state, antlerless harvest is restricted by permit. The number of permits offered is determined by herd trend and management objective.

CONTROLLING HUNTER DENSITY AND DISTRIBUTION:
General rifle hunter distribution is restricted by 3 zone tags: Panhandle, Mountain, and Regular. Hunters can hunt in only one area for all weapon types by purchasing a tag of their choice.

The Commission annually sets a non-resident elk tag quota. The 1995 non-resident elk tag quota is 12,815 tags. Elk hunters are further restricted by the controlled hunt process, since successful controlled-hunt applicants can only hunt in the unit in which they were selected.

A 100,000 total elk tag cap was established during adoption of the 1991-95 elk management plan. Although 113,000 elk tags were sold in 1994, this cap has yet to be implemented.

In addition, the Department is working with federal land management agencies to adopt an aggressive access management plan.

In general, all of these strategies are working to some degree; however, the overall combined effect of these strategies is probably being negated by the failure to implement the 100,000 elk tag quota.

SEASON STRUCTURE CHANGES IN LAST 10 YEARS:
During adoption of the 1991-95 elk management plan, the Fish and Game Commission implemented a number of strategies to maintain quality hunting and to shift the harvest away from mature bulls without sacrificing general hunting opportunities. These strategies included:

1) the creation of the Mountain elk tag;

2) a flip-flop of the deer and elk seasons to reduce the vulnerability of mature males of both species by avoiding the ruts for mule deer and elk, respectively;

3) moving opening dates to calendar dates to better sequence elk seasons around vulnerable time periods;

4) spike-only, general hunts were implemented in 7 units in eastern Idaho to increase escapement of mature males while maintaining general rifle hunting. Following implementation, controlled hunts are being offered for mature bulls to take advantage of the increased bull escapement; and

5) once units are meeting objectives, some controlled hunts are being offered to hunt bulls during the rut by rifle hunters.

DEVELOPING SEASON STRUCTURE:
The primary information bases used to develop elk season structures are the random telephone survey and helicopter inventories. The telephone surveys are conducted on an annual basis to establish harvest levels for the previous year. Helicopter inventories are conducted using the elk sightability model; most units are flown on a 3-year rotation basis.

The Idaho Fish and Game Commission has authority to set elk seasons and regulations. The Idaho legislature regulates the Department's budget.

DATA COLLECTION METHODS:
Data collections include:

1) telephone surveys to determine harvest;

2) measurement of population status with the elk sightability model from helicopter surveys flown on the 3-year rotation;

3) check stations; and

4) mandatory check requirements for all elk harvested in the Panhandle Region.

All elk management goals established in the 1991-95 elk management plan are set to be measurable with either the annual telephone survey and/or the elk sightability results.

POPULATION MODELING:
Most regional managers utilize POP II and/or Leslie Matrix models.

DEPREDATION POLICY:
The Department's goal is to prevent economic losses to landowners' livelihoods. Idaho does compensate landowners for losses based on a statute set by the 1991 Legislature. The average dollar amount compensated to landowners for wildlife damages for the first 4 years of this program has been $70,832.12/year.

RESEARCH EFFORTS/RESEARCH CONTACT PERSON:
Coeur d'Alene Elk Ecology

Study I: Bull Elk Habitat Use

Elk home range size and location in the Coeur d'Alene River drainage, and elk habitat use in the Coeur d'Alene River drainage.

Study II: Elk Habitat Security Characteristics

The size and location of areas used by elk during the hunting season in the Coeur d'Alene River drainage, and elk habitat use during the hunting season in the Coeur d'Alene River drainage.

Study III: Hunting Season Mortality Rates

Hunting pressure in the Coeur d'Alene River drainage, and elk mortality during the fall hunting seasons in the Coeur d'Alene River drainage.

Contact: David J. Leptich
Senior Wildlife Research Biologist
Idaho Department of Fish and Game
2750 Kathleen Avenue
Coeur d'Alene, Idaho 83814

Lochsa Elk Ecology

Study I: Road Closures and Bull Elk Mortality

The effects of road closures on elk mortality in north-central Idaho, and the effects of road closures on hunter density, distribution, and success.

Study II: Optimum Yield of Elk

The effects of harvest on elk population size and composition in Idaho.

Study III: Elk Sightability

Develop an elk sightability model for the Bell 206 Jet Ranger helicopter.

Contact: Michael W. Gratson
Senior Wildlife Research Biologist
Idaho Department of Fish and Game
1540 Warner Avenue
Lewiston, Idaho 83501

CURRENT MANAGEMENT ISSUES:
Some of the major influences on elk management include:

1) excessive demand for general-season harvest on bulls resulting in declining bull:cow ratios;

2) lack of interest in antlerless elk harvest in many remote units;

3) inability to obtain an adequate harvest of antlerless elk in some units because of limited access to privately-owned lands;

4) overall reluctance to harvest antlerless elk in units with a general, antlered-only management tradition;

5) a growing tendency to restrict public hunting on private lands;

6) possible excessive harvest of antlerless elk in units with a long-standing tradition of general, either-sex hunting;

7) increasing intolerance for elk on private lands;

8) an increasing dependency on elk tag sales to fund many Departmental programs;

9) declining calf production in some units; and

10) an overall degradation and\or loss of elk habitat.

The greatest short-term effect on future elk management is the conflict between the dependency of elk tag sales and elk herd health. Some elk management options include:

1) allow continued increase in elk tag sales, lower bull:cow ratio objectives resulting in a further decline in bull:cow ratios, lower quality of hunting experience, and maintain Departmental programs;

2) implement cap on elk tag sales, maintain bull:cow ratio objectives, reduce income to the Department, and trigger backlash against nonresident hunters by resident hunters;

3) maintain bull:cow ratios without a cap on elk tag sales, implement a combination of aggressive access management programs, and reduce elk hunting opportunity, which results in a lower-quality elk hunting experience, some possible backlash against the Department, and an unknown impact on elk tag sales; or

5) maintain bull:cow ratio objectives, implement an elk tag sales cap, and increase the cost of elk tags (requires unlikely Legislative approval), which results in no disruption of Departmental programs, but does not resolve the conflict between resident and nonresident elk tag sales.

The immediate future of elk management in Idaho appears to be dynamic. The maintenance of quality elk and elk hunting experiences will require a reduction in general elk tag sales with serious ramifications on the type of programs the Idaho Department of Fish and Game currently offers its sporting publics.

Without a reduction in elk tag sales, the type of elk and elk hunting experience Idaho currently offers will be lost. The answers are not as simple and certainly not as inclusive as those listed above, but will require creativity and risks.

FUTURE MANAGEMENT ISSUES:

See Current Management Issues for the near future. Although these are difficult issues, they are issues for the most part that are directly controlled by the Department. It's likely the issues that come in to play 10 and 20 years from now will come progressively more from outside the Department.

A major issue to be faced by future elk managers is the possible decline in elk resources when the biological factors that have resulted in major elk increases in the recent past are exhausted. If or when this scenario occurs, elk management will face a whole new set of management problems, which will probably be compounded by growing involvement by nontraditional user groups and certainly a growing demand for space, elk resources, and habitats.

It's probable that the maintenance of elk hunting opportunity and public hunting access to and through private property will become a much more significant issue in the future.

ELK STATUS REPORT - MONTANA

SUBSPECIES PRESENT:
Rocky Mtn. *nelsoni*

CONTACT PERSON:
Glenn Erickson

OVERALL MANAGEMENT GOALS:
a. Habitat Objectives: measured by % bull harvest during first week of season, and number and size of habitat improvement projects in association with public and private landowners.

b. Population objectives (both statewide & by Elk Management Unit [EMU]): measured by numbers observed on trend survey routes; harvest statistics by hunting district and EMU.

c. Recreation Objectives: measured by analysis of harvest statistics and periodic hunter attitude and preference surveys.

d. Game Damage Objectives: measured by level of complaints and landowner contact.

e. Access Objectives: measured by landowner participation in Block Management, and % harvest of bulls in first week of season.

LONG-TERM STRATEGIC PLAN:
Yes

STATEWIDE POPULATION TREND/ESTIMATE:
Estimate is based on trend.

HARVEST DATA COLLECTION:
We conduct a telephone survey of resident license holders and a mail survey of nonresidents. A sample of 44% of all elk license holders is obtained and confidence intervals of 80% are used for estimates.

Data collected relates to harvest: days hunting; locations of hunting; time of kill; sex and age of kill; and other data. An annual report of harvest statistics is prepared by species.

"QUALITY" ELK HUNTING OPPORTUNITIES:
We established objectives by EMU through a public comment process and adoption by the Fish, Wildlife & Parks (FWP) Commission.

ANTLERLESS ELK HARVEST:
Antlerless elk harvest is used to control population levels within objectives established in the elk plan. In addition, they are used to address game damage.

CONTROLLING HUNTER DENSITY AND DISTRIBUTION:
We use block management on private land and road management through cooperative travel plans with the federal land management agencies. They are working better on private land than on federal land.

SEASON STRUCTURE CHANGES IN LAST 10 YEARS:
Seasons are more restrictive on bull harvest (i.e., brow-tined bull regulations) and less restrictive on antlerless harvest (i.e., increased opportunities for either-sex hunting and special late seasons).

These changes have been implemented to meet hunter demand for more opportunity to take a raghorn bull and to address private landowner tolerance issues and specific game damage complaints.

DEVELOPING SEASON STRUCTURE:
We use harvest information, biological information, and Department/commission regulatory authority. The legislature does establish limitations through law changes, but does not function during the biennial season-setting process.

DATA COLLECTION METHODS:
Aerial trend surveys, together with aerial and ground classification surveys, form the basis for management. Vegetation surveys and distribution surveys are also utilized. Hunter harvest surveys and checking stations provide basic biological information.

POPULATION MODELING:
We have used POSIM and Colorado's POP models. We have used them more as a tool to find holes in data collection rather than to determine management actions.

DEPREDATION POLICY:
We have a game damage policy adopted through our

administrative rules that requires us to respond within 48 hours to all game damage complaints. We do not have a compensation program.

RESEARCH EFFORTS/RESEARCH CONTACT PERSON:
Gravelly Mtns. Elk Study - Ken Hamlin, F&W Biologist, Bozeman, MT.; Elkhorns Elk Study - Rich DeSimone, F&W Biologist, Helena, MT.

CURRENT MANAGEMENT ISSUES:
Access to elk on private land and/or access to public land through private land is the primary force influencing our ability to manage elk populations and address game damage.

FUTURE MANAGEMENT ISSUES:
Access and private land issues are immediate and probably long-term. Hunter demand for larger bulls will likely increase as numbers of hunters decrease.

ELK STATUS REPORT - NEVADA

SUBSPECIES PRESENT:

CONTACT PERSON:
Mike Hess

OVERALL MANAGEMENT GOALS:
Nevada's overall goals are to maintain and enhance elk populations, and to provide a quality hunter use program. Nevada conducts an aggressive introduction program in cooperation with land management agencies. A trophy hunting program is maintained with high success and trophy quality.

LONG-TERM STRATEGIC PLAN:
Nevada does not have a long-term strategic plan for elk.

STATEWIDE POPULATION TREND/ESTIMATE:
Elk were estimated to number about 3,000 in 1994. We believe suitable habitat exists to support many more animals. An unofficial of goal of 20,000 elk by the turn of the century has been discussed.

HARVEST DATA COLLECTION:
Big game hunters are required to report on their hunts via a return card that comes attached to the deer tag. The hunters provide the postage and their completed cards must be returned before January 31. This is mandatory with a penalty of ineligibility to apply for big game tags in the succeeding season or a $50 administrative fine.

Reporting has averaged over 95% for 10 years or more. Adjustments are made in quotas or season length to achieve desired success levels.

Administration of the return card program was privatized in 1993. The contractor is improving the program as the 3-year contract progresses. Results have been very positive to this point. Hunter-initiated telephone reporting is expected next year.

"QUALITY" ELK HUNTING OPPORTUNITIES:
Our program is intended to provide a "quality" hunt. Quotas, season lengths, and timing are intended to achieve high hunter success and mature animals in the harvest.

ANTLERLESS ELK HARVEST:
Antlerless elk hunting is a regular feature of our harvest strategy. If there are no extenuating circumstances, we plan to hold antlerless hunts in all healthy populations.

CONTROLLING HUNTER DENSITY AND DISTRIBUTION:
The full quota system acts as our control.

SEASON STRUCTURE CHANGES IN LAST 10 YEARS:
The basic structure has not changed in over 15 years, but there have been many minor changes. The most notable of these in recent years are increasing numbers of special weapons seasons.

DEVELOPING SEASON STRUCTURE:
Hunter kill is measured by mandatory hunter reporting, and intensive postseason helicopter censuses for population composition provide us with inputs for annual population estimates--computer modeling is used. The annual estimate is the basis for quota recommendations.

Several additional controls are used to maintain standards. These include posthunt bull ratio objectives, recruitment:kill ratio objectives, and hunter success objectives. Wildlife Division recommendations are presented to the public through a formal review process that includes local hearings in each county before the Wildlife Commission sets seasons and quotas.

DATA COLLECTION METHODS:
See Developing Season Structure.

POPULATION MODELING:
Nevada uses both a modified version of POP-2 from Fossil Creek for most identified populations. Several biologists have developed their own models in computer spreadsheets to suit their individual elk herds. The computer models are updated annually as data is acquired.

DEPREDATION POLICY:
Response varies from special public depredation hunts to supplying fencing materials. By statute, we pay for damage or help eliminate the problem. Originally,

some general fund money was supplied as seed money for the payment fund. Now payment comes exclusively from a special elk application hunt fee.

Not much has been paid out in damages, usually less than $10,000 per year in total. Most of the annually-collected funds are used to purchase fencing materials that are stockpiled for future use.

RESEARCH EFFORTS/RESEARCH CONTACT PERSON:
Nevada is not conducting research on elk presently.

CURRENT MANAGEMENT ISSUES:
Nevada conducts an aggressive big game release program including elk. Much of our effort centers around securing land management agency approval and public support for releases.

Controlling elk populations to prevent range damage is an issue with some land management agency personnel and some ranching interests. No elk damage has been demonstrated yet.

FUTURE MANAGEMENT ISSUES:
The following factors will become of increasing importance to elk management in Nevada in the future:

1) **Habitat losses to urbanization.** This is mainly a problem in the Reno-Carson City-Tahoe metropolitan area.

2) **Closing of forest and woodland canopies.** Management of pinyon-juniper habitat will become increasingly important as time goes on.

3) **Increasing dominance of cheat grass.** As human-caused wildfires from human causes increase, this trend should continue. It may represent the biggest problem for elk in the long run.

4) **Decreasing number of hunters as the social acceptance of hunting declines.** Elk hunting could be banned in the foreseeable future. I think this is a very real possibility considering the recent explosive urban growth in Nevada.

ELK STATUS - NEW MEXICO

SUBSPECIES PRESENT:
Rocky Mountain (*Cervus elaphus canadensis*)

CONTACT PERSON:
Darrel Weybright

OVERALL MANAGEMENT GOALS:
a. To manage elk populations at maximum numbers consistent with habitat capability and resource management considerations.

b. To provide maximum diverse recreational opportunity consistent with sustainable elk resource capabilities.

Each management unit has general population and harvest objectives determined by the concerns of land management agencies, Department biologists, and public opinion.

Population numbers are not measured, but trends are taken from similar surveys and observations, where possible. Monitoring numbers to assure consistency with habitat capability and management concerns is assessed by field "savvy" or observations, monitoring levels of habitat impact, and social concerns.

Recreational opportunity is measured in terms of hunt parameters. Estimates of hunters and harvest, days afield, and harvest success rates are projected from responses to mail-in questionnaires included with each license.

LONG-TERM STRATEGIC PLAN:
Our plan is currently being written and will be available August 1995.

STATEWIDE POPULATION TREND/ESTIMATE:
It is increasing, and probably exceeds 60,000 animals statewide. Population goals of most management units are being exceeded.

HARVEST DATA COLLECTION:
Elk harvest parameters are projected from responses of mailed-in questionnaires sent out with each elk license. Information collected includes number of days hunted, whether the hunt was successful, and the sex of the elk harvested. Management unit, hunt season, and weapon type are established during the application process. All public hunts are drawn.

Hunter responses provide harvest rates and are projected over the total licenses issued for each hunt to estimate total hunter participation, harvest (bull and cow) and days afield.

These estimates provide one estimate of harvest and hunter days, and are compared with other field data, if available, and are compared against each management unit's goals and objectives.

"QUALITY" ELK HUNTING OPPORTUNITIES:
The Department does not have a standard for "quality elk" hunting. However, conservative harvest quotas in combination with excellent elk range has allowed development of management units with both older bulls and limited hunter numbers.

These units are highly sought by resident and non-resident hunters alike, and approach a working definition of "quality" hunting.

ANTLERLESS ELK HARVEST:
Antlerless harvest is an appropriate and acceptable tool for elk management. Antlerless harvest is used primarily as a herd reduction tool where herds have exceeded desired ecological or sociological levels.

CONTROLLING HUNTER DENSITY AND DISTRIBUTION:
All public elk hunts in New Mexico are through a draw, allowing a ready system to manipulate hunter distribution. Each hunter must first choose a weapon type, then a first and second hunt choice that specifies one management unit and a specific time frame.

This works well, generally. Hunters accept the trade-off between good areas with low chances of drawing versus better chances of drawing in more marginal areas. Opponents include residents wishing to limit nonresident hunters in the premier units and those wanting to establish a preferential draw system based on years of unsuccessfully drawing in the public hunts.

The latter opponents have been successful: a preferential draw will begin in 1996, requiring 5 documented consecutive years of not drawing a public or private land hunt, including herd reduction (depredation) hunts.

New Mexico also has a separate private land hunt system based on exchanging authorizations to purchase elk permits to landholders providing sufficient elk habitat requirements. The Department determines this allocation based on a formula accounting for percentage of private to public land, elk use, and acreage. Hunters contact landowners to vie for these authorizations.

One area, the Valle Vidal, has once-in-a-lifetime restrictions on elk hunting. It is a very popular hunt with large numbers of older elk.

SEASON STRUCTURE CHANGES IN LAST 10 YEARS:
Few changes have occurred in the 2-3 week bow pre-rut season and the 5-day muzzleloader and rifle post-rut season elk hunt structures. The Department continues to keep hunters out of the peak of the rut. As a response to increasing elk herds and hunter desires, larger quotas and more hunts have been initiated.

Bow hunts have changed the most. In 1984 unlimited numbers of bowhunters could hunt 7 management units during the 13-day hunt. Today, bow hunts must be drawn (some units have no quota, however), but most hunters have 20 days to hunt in one of the 34 areas open to bowhunters. In 1995, 9 units will have the 20-day hunt replaced by 2 hunts, a 15-day hunt and a 9-day hunt. This allows more hunters in the field without hunter crowding.

Muzzleloaders have gone from 1,020 public licenses in 5 units (8 hunts) in 1984 to 3,000 public licenses available in 16 units (25 hunts) in 1993.

Rifle hunts numbered 76 in 21 units/areas with a total of 6,925 public licenses available in 1984. In 1993, 127 hunts in 35 units/areas provided more than 9,700 public licenses (some units are unlimited). Private land hunts follow a similar trend.

DEVELOPING SEASON STRUCTURE:
The hunt structure has virtually remained unchanged. The hunter quotas and bag limits are determined by previous harvest success and available population and ecological information. The Department presents a recommended level of hunters in each hunt to the Game Commission at a public meeting. The Commission takes in public comment and then sets the seasons. The Legislature rarely gets involved, primarily requesting data and occasionally setting policy.

DATA COLLECTION METHODS:
Mail-in questionnaires are included with 100 percent of licenses sold; compliance is voluntary. Projections are made for all hunts and units with an adequate number of responses. This harvest information is compared to winter aerial populations surveys and any available habitat and sociological information and against management goals to ascertain whether management unit goals are being met.

POPULATION MODELING:
None

DEPREDATION POLICY:
Depredation by elk is first assessed by the local District Wildlife Officer. "Big picture" discussions with the involved parties outlining options, including non-lethal alternatives (modifying fences, etc.), and their resulting costs and benefits usually follow. Standard scare/harassing techniques are often applied to stubborn elk.

If further immediate action is warranted, a depredation hunt is initiated, drawing hunters from a previously-generated list, within 10 days or so. If significant depredation continues, in the following season regular hunt quotas and bag limits are modified for both public and private land hunts. Private and public parties involved are not compensated monetarily or with equipment.

RESEARCH EFFORTS/RESEARCH CONTACT PERSON:
No elk research is currently under way. For inquiries regarding elk management, Darrel Weybright, Big Game Project Leader, can be reached at (505) 827-7893, or send a request to his attention, c/o New Mexico Department of Game and Fish, P.O. Box 25112, Santa Fe, NM 87504.

CURRENT MANAGEMENT ISSUES:
Forces influencing management efforts include increasing elk herds with complex interactions between publics desiring more (or better "quality") elk, landowners suffering property damage by elk and

elk hunters, and public land management agencies charged with a variety of land uses.

Additional forces are landowners participating in or desiring to participate in the Department's Land Owner Sign-up System (authorizations to purchase hunting licenses are allocated to landowners with recognized elk use; landowners usually sell these, often for large sums of money). This system creates a secondary and complex enterprise, influencing the number and tenor of depredation complaints.

FUTURE MANAGEMENT ISSUES:

i. Developing sufficient trust levels with the various publics and land management agencies, particularly regarding elk population estimates, to effectively manage elk;

ii. collecting accurate and complete population, ecological, and sociological data;

iii. developing a cooperative and ongoing public involvement process that effectively resolves or mitigates the increasing number of issues regarding elk in New Mexico;

iv. implementing the elk management plan's strategies with sufficient manpower, time, and money to meet all identified concerns and issues;

v. large and perhaps increasing demand for the few prime-aged bulls; and

vi. human encroachment on elk range, primarily winter range.

The Department has taken action on these issues; however, better information, improved relationships, and appropriate management practices are always present.

ELK STATUS REPORT - OREGON

SUBSPECIES PRESENT:
Roosevelt Elk (*Cervus elaphus roosevelti*) and Rocky Mountain Elk (*C.e. nelsoni*)

CONTACT PERSON:
Dan Edwards

OVERALL MANAGEMENT GOALS:
Our goals are to protect and enhance elk populations in Oregon to provide optimum recreational benefits to the public and to be compatible with habitat capability and primary land uses. Oregon has established Management Objectives for postseason bull ratios and winter elk populations in each Big Game Management Unit.

Postseason bull ratios are measured during herd composition inventories in most units. Populations are currently estimated from end-of-winter trend counts.

LONG-TERM STRATEGIC PLAN:
Oregon has a 5-year elk management plan.

STATEWIDE POPULATION TREND/ESTIMATE:
Elk populations are expanding their ranges and increasing in numbers or are stable in most of Oregon. We recently updated our Management Objectives for elk and our new statewide Management Objective is 136,600 animals and our current population estimate is 120,950 animals. The old Management Objective was 116,450 elk statewide.

HARVEST DATA COLLECTION:
Elk harvest is estimated through a telephone survey process. We collect data concerning whether a hunter actually hunted, hunter success, which unit was hunted most if a general season, what antler class or sex was harvested, how many days were hunted, etc.

Data are collected by calling a statistically-sound sample of hunters who participated in each hunt or season. These data are compiled by unit and a ratio is calculated between successful and unsuccessful hunters. This ratio is applied to the number of tag holders and the number of animals harvested is estimated. These data also are used to determine hunter success rates.

Data are used in population simulation models, to set big game regulations, and are printed in the annual "Big Game Statistics."

"QUALITY" ELK HUNTING OPPORTUNITIES:
Oregon offers several units that we would classify as quality elk hunting units. We have Management Objectives for post-season bull ratios in these units of 20 bulls:100 cows. Some of these units have large expanses in wilderness. We also manage several units under either 3-point or better regulations or spike-only regulations to provide quality hunting.

ANTLERLESS ELK HARVEST:
Our primary strategies for harvesting antlerless elk are to address elk damage to private property and to manage elk numbers at the adopted Management Objective levels. The goals of these strategies are to alleviate elk damage in specific situations or to maintain a particular elk population at the desired level.

We also use antlerless hunting as part of either-sex hunts. These hunts provide a different type of recreational opportunity and bull ratios remain relatively high in these units.

CONTROLLING HUNTER DENSITY AND DISTRIBUTION:
We control hunter numbers by using controlled hunting only for certain seasons and areas. We use Cooperative Travel Management areas to restrict vehicle travel, which affects hunter density and distribution.

We use antler point regulations both in the form of maximum and minimum antler point regulations. Often hunters will choose other areas with less restrictive regulations, thus affecting hunter density and distribution.

These types of regulations usually improve postseason bull ratios. Areas with controlled hunting only or areas with antler point regulations typically have higher postseason bull ratios than general season areas.

Travel management areas are typically placed on relatively small areas and the effect on postseason bull ratios is difficult to measure.

SEASON STRUCTURE CHANGES IN LAST 10 YEARS:
We separated the Cascade elk season from Coastal elk seasons and opened the Cascade season earlier in the year. We also went to first-season controlled hunting and second-season general season in much of northeastern Oregon. These changes were primarily attempts to improve postseason bull ratios and maintain hunter recreational opportunity.

DEVELOPING SEASON STRUCTURE:
Harvest information is collected from each unit where controlled hunting is in effect and by area of the state for general hunts. We conduct annual elk population trend and herd composition surveys.

Regulatory authority is used to change regulations and season structure. Legislative authority is used to change basic statutory authority and responsibility.

DATA COLLECTION METHODS:
Helicopters and fixed-wing aircraft are used to conduct annual population trend and herd composition surveys. Population estimates are derived from trend counts. We are beginning to use these data more to create population simulations.

These data are used to generate population estimates and postseason bull:cow and calf:cow ratios, which are evaluated against Management Objectives for elk populations and postseason ratios.

POPULATION MODELING:
We have traditionally used an annual model, which utilized trend counts to estimate population levels. We are currently beginning to utilize POP II more for modeling and are looking to increase our modeling efforts in the near future.

A new position was recently filled that will have the majority of its efforts devoted to modeling big game populations in the short-term. We also will review other simulation models as we move forward with our modeling efforts.

DEPREDATION POLICY:
We deal with elk depredation with fencing advice, fencing materials, harassment devices, kill permits, controlled and emergency hunts, and occasionally large-scale fencing and winter feeding programs. We do not make direct cash payments for elk depredation.

RESEARCH EFFORTS/RESEARCH CONTACT PERSON:
The major elk research efforts in Oregon are taking place at the Starkey Experimental Forest and Range, near La Grande. Bruce Johnson (503-963-7122), Oregon Department of Fish and Wildlife, is the primary contact.

Research also is being conducted on the effects of ungulates on vegetative structure in northeastern Oregon. John Cook is the primary contact on this research (503- 962-6536). Pat Clark (503-428-2143) is a graduate student conducting research on using livestock to pre-condition elk forage and monitoring elk response to such forage treatment.

Tim DelCurto (503-526-5129) is the primary contact on a study evaluating livestock-wildlife ungulate interactions in northeastern Oregon.

CURRENT MANAGEMENT ISSUES:
Some of our issues are cover loss (forest health), increasing vehicle access, human development on winter range, low postseason bull ratios, changes in forest management, hunter demands for a greater diversity of hunting opportunity, elk depredation to private property, and desire for greater landowner control of elk on private property.

We typically set more restrictive regulations to try to offset increased bull vulnerability associated with increased cover loss and vehicle access. We are looking at new programs and cooperative efforts with land managers to improve elk ranges. We continue to offer a diversity of hunting opportunities for various weapons and styles of hunting. We are currently looking at new and different cooperative methods for managing elk on private lands.

FUTURE MANAGEMENT ISSUES:
In the next 5 to 20 years, issues will include habitat degradation, increasing human development on both winter and summer range, elk depredation to private property, maintaining postseason bull:cow ratios and bull age structure, maintaining recreational opportunity, improving the hunter's image with the general public and improving hunter ethics, obtaining funding necessary to maintain and improve data collection efforts, and funding research by which to better understand elk biology.

ELK STATUS REPORT - SASKATCHEWAN

SUBSPECIES PRESENT:
C.e. manitobensis

CONTACT PERSON:

Edward H. Kowal
Saskatchewan Environment & Resource Management
Prince Albert Region
Box 3003
Prince Albert, Saskatchewan
S6V 6G1
Ph. (306) 953-2695

OVERALL MANAGEMENT GOALS:
Our goals are to provide maximum recreational hunting and viewing opportunities within the tolerance of landowners affected by the elk population.

LONG-TERM STRATEGIC PLAN:
Saskatchewan does subscribe to a long-term plan for elk, but has deferred producing this plan until a species priority list has been established for all big game species in the Province. In the meantime, our department produces an annual strategy (Saskatchewan Game Management 1993-94).

STATEWIDE POPULATION TREND/ESTIMATE:
The provincial elk population is estimated at about 10,000. The elk population is estimated to be increasing in most forest/farmland interface areas and is reaching the maximum tolerance levels among forest fringe landowners.

HARVEST DATA COLLECTION:
Elk harvest estimates are largely based on hunter survey questionnaires and field reports from Conservation Officers. Tooth samples to determine harvest sample age structure are collected at contracted biological sample collection points (service stations, outfitters, etc.) as well as at our District field offices.

Hunter surveys request specific information on the sex/age of the animal, date of kill, location of kill by Wildlife Mgmt Zone, weapon type, and number of days spent to harvest the animal to determine the number of recreation days.

"QUALITY" ELK HUNTING OPPORTUNITIES:
We have bulls-only calling season hunts, as well as draw season either-sex hunts and either-sex open season hunts where the population can sustain the harvest.

Quality elk hunting includes a diversity of hunting seasons, liberal hunting seasons and bag limits, and a high-demand calling season. Hunts range from the warm to cold weather periods.

ANTLERLESS ELK HARVEST:
Antlerless elk are harvested in areas with high populations that require stabilization or downsizing, particularly where elk depredation is an issue.

CONTROLLING HUNTER DENSITY AND DISTRIBUTION:
Hunter densities and distribution are largely regulated by a draw license allocation by specific quota to area. Access to the forest is regulated by 12-hour restrictions on all-terrain vehicle use and routine forest road closure programs conducted jointly with forest companies.

These regulations and vehicle restrictions are working to a large degree. In some specific areas designated hunting trails are used that allow off-trail vehicle use for harvested animal retrieval only.

SEASON STRUCTURE CHANGES IN LAST 10 YEARS:
The elk seasons remained relatively constant, except for last year when an open either-sex season replaced the draw season in 6 Wildlife Mgmt Zones due to the demand by landowners to reduce elk depredation problems by reducing the herd.

Also, several years ago the bulls-only season was moved from the end of August-early September to mid-September to protect large breeding bulls that are more vulnerable in the early part of the breeding season.

About 4 years ago archery and muzzleloading opportunity was allowed for elk, which now has led to a one-license system that allows a hunter to use different weapons on the same license to hunt elk during different hunting seasons.

DEVELOPING SEASON STRUCTURE:
To develop season structures, we collect population and harvest of elk information and anecdotal field information. We collect harvest data on sex, age, location of kill, date of kill, and number of recreation days generated. We use biological-tooth aging to determine harvest structure. Some aerial surveys are used for population census and herd structure.

We confer with a Wildlife Advisory Committee. All hunter sample collections are voluntary. Field information is provided by Conservation Officers.

DATA COLLECTION METHODS:
We use population sex/age and census surveys, hunter survey questionnaires, telephone surveys, tooth age collections, and field monitoring. The entire data set is analyzed to determine that the overall elk population is not being overharvested, that there is a focus on harvesting young bull elk, and that elk in farmland depredation sites are more available to hunting than those that dwell in the forest.

Habitat retention and enhancement are also key considerations in elk management. In areas with low numbers of elk but good habitat, we have an aggressive elk relocation program to stock these areas. Some released animals are radiocollared and all are eartagged to determine their movements.

POPULATION MODELING:
None yet.

DEPREDATION POLICY:
A year ago the big game depredation compensation program was dropped, but there is a strong lobby by landowners and sportsmen to reinstate the program.

Elk depredation is controlled by focussed hunting opportunity and in extreme cases by depredation hunts. Standing crops prevention includes scare cannons, scare permits, and intercept feeding. Haystack/horticulture damage is prevented through a permanent fence program where landowners are allocated materials to build a permanent fence limited to 2500/7500 respectively.

RESEARCH EFFORTS/RESEARCH CONTACT PERSON:
1) Elk and moose habitat project

2) Elk release project

Contact Edward H. Kowal. For the Stove Creek Elk Habitat Project contact Conrad Olson (306) 787-2385.

CURRENT MANAGEMENT ISSUES:
Since most of our elk are living near an agricultural area, the most influencing factor is landowner tolerance, which is most often exactly opposite of the high demand for elk imposed by sportsmen.

Non-regulated Treaty Indian hunting further complicates elk management, as this segment of elk users is not bound by provincial sport hunting regulations or management prescriptions.

FUTURE MANAGEMENT ISSUES:
Major problems include maintaining an elk population that will meet the demands of sportsmen, but will remain within the level of tolerance of landowners affected by elk. Elk habitat retention in the farmland zone may be very difficult over the long-term.

Involving aboriginal elk users in management programs will impose challenges as well.

ELK STATUS REPORT - UTAH

SUBSPECIES PRESENT:
Rocky Mountain

CONTACT PERSON:
Wes Shields, (801) 538-4780

OVERALL MANAGEMENT GOALS:
Statewide Goal: Move the peak of elk breeding activity forward out of October and narrow the time period of breeding in order to minimize late conception and late calving dates.

Objective: On general season elk units achieve a minimum of 8 bulls:100 cows post season; 4 of these bulls must be mature bulls (3.5 years old at breeding).

LONG-TERM STRATEGIC PLAN:
A state plan must be written. A draft plan was circulated a few years ago, but was never finalized. Newly-adopted goals and strategies warrant a new approach to a statewide plan.

STATEWIDE POPULATION TREND/ESTIMATE:
The current elk population displays an expanding population that is nearing the maximum number of animals Utah law allows (about 60,000 head). Many herd units have reached legal population levels as dictated by legislative law and the respective herd unit management plan.

HARVEST DATA COLLECTION:
Limited-entry harvest is determined through a mail questionnaire. On most limited-entry units we merely determine if harvest did or didn't occur and the number of days afield. However, on certain units we also collect age data through cementum annuli, and antler measurements (main beam length, width, points, basal circumference).

General elk harvest data is obtained by telephone survey. Data includes herd unit hunted, harvest success, day of kill, days afield, area of kill, county of hunter residence, and mature bull vs. yearling bull.

"QUALITY" ELK HUNTING OPPORTUNITIES:
We offer 46 limited-entry bull hunts. Certain of these are any-weapon hunts, with others specific to archery or muzzleloader only. Nearly all of these occur during the breeding season. Six of these quality hunts occur in herd units where "spike" bull general regulations encourage development of mature bulls in the respective unit.

Another attempt at improving the quality of our general season bull elk hunts is based on capping total general season permits at 36,000 permits. Sixteen thousand of these permittees may hunt the "any bull" general units while the balance may only hunt "spike" units.

ANTLERLESS ELK HARVEST:
Antlerless elk permits are presently issued as the primary means of controlling herd unit populations or as a means of addressing depredation issues. No specific statewide goals presently apply to antlerless harvest outside of the need for population/ depredation control.

CONTROLLING HUNTER DENSITY AND DISTRIBUTION:
Hunting occurs through limited bull permits by unit and by capping general permit sales by category of "any bull" vs "spike bull" hunting areas.

We intend to focus on vehicle access management during general hunting seasons in an effort to control hunter density as well as influence hunter distribution. We are in the beginnings of these particular strategies and need time for implementation and monitoring.

Spike bull regulations have been very successful in improving mature bull numbers. This strategy is widely accepted by the public; however, there is a segment of hunters who dislike it because they prefer to anticipate an older bull. Of course the most effective regulation is limited-entry hunting, which severely limits hunter numbers.

SEASON STRUCTURE CHANGES IN LAST 10 YEARS:
Not much basic change.

DEVELOPING SEASON STRUCTURE:
We use harvest information, biological information, Department/ commission regulatory authority, and to a much lesser extent the legislature, but the legislature seems to always make innuendos toward involvement.

DATA COLLECTION METHODS:
Our methods include biannual helicopter winter trend surveys, harvest success, and bull:cow and calf:cow ratios. Winter trend surveys are closely scrutinized by regulatory authority to check against individual herd unit population objectives.

Because we now have objectives which direct us toward a specific number of mature bulls postseason, bull:cow ratios will become more meaningful as a means to index our status.

In line with our goal of moving elk breeding forward out of October, we will begin making a greater effort to obtain data to identify conception dates. Practically all of the biological data we obtain is applied in modeling efforts to assist us in maintaining population characteristics identified in herd unit management plans.

POPULATION MODELING:
We developed a model that is basically identical to models other states use, except that it has been adapted to handle data we have traditionally collected.

DEPREDATION POLICY:
By Utah law we must address elk depredation in cultivated crops and stored crops. We have been making every attempt to respond to crop damage immediately and decisively.

In many instances we attempt to remove offending animals by capture or through special public hunts. In particularly aggravated circumstances our division personnel may kill specific animals.

Until 1994, Utah compensated agriculture only for crop losses with a maximum individual annual payment of $2,000. However, in 1994 the legislature included compensation for damage to fences and irrigation equipment, and removed the maximum individual payment cap.

We now have a $500,000 pot from which we make annual payments. If damage claims exceed this amount at the end of the fiscal year, individual payments are prorated.

Also, in 1994, the legislature adopted a law which requires us to address damages to private rangelands, as well as fences and irrigation equipment on rangelands. This law does not require monetary compensation, but we do repair damaged fences and irrigation equipment.

In terms of range damage, we are required to respond to a complainant within 72 hours to review with him options for minimizing the damage (forage use) or remove the animals. The law allows us to issue him any number (determined at our discretion) of harvest permits for immediate removal of the "offending" animals.

Similar permits may also be issued when actual hunting of the animals will occur during an established season. In this case the landowner may assign a permit to a hunter who then pays a fee to access the private land area.

Permits issued under these regulations are strictly limited to antlerless animals. Male animal permits may be issued only upon approval from our director's office.

We have only administered this law for about one year. In many cases, we have improved landowner tolerance of elk on rangelands with one or 2 permits. In some cases we have issued as many as 20 kill permits with only limited harvest success; the landowners remain dissatisfied that the animals still venture onto their lands.

This year, during the harvest recommendation process, we were able to anticipate problem areas where these depredation permits would be issued and hence adjusted our scheduled harvest accordingly.

RESEARCH EFFORTS/RESEARCH CONTACT PERSON:
We aren't conducting any pure research. However, we are conducting studies to determine relative livestock/elk forage use, mostly on spring ranges. The contact person is Jim Davis (UDWR), U.S. Forest Service Shrub Science Lab., Provo, UT, (801) 377-5717.

CURRENT MANAGEMENT ISSUES:
The primary forces influencing elk management in Utah are the livestock industry, public hunting, and an overall desire by hunters and nonhunters to manage for a more "naturally appearing" elk population (in other words, citizens want a broader spectrum of bull age classes in elk populations throughout the state).

These influences are definitely affecting season setting, criteria, and goals. These are the primary reasons we established a statewide goal of moving up and narrowing breeding periods, establishing mature bull objectives, and capping general season permit numbers.

We also made our general season opening days later, away from the peak of the breeding period in Utah. In so doing we had to shorten time afield to 9 days instead of 14 days in order to avoid overlapping elk hunting with general deer hunting.

The livestock industry has been successful in getting legislation which limits elk populations in the state. These laws mandate individual elk herd management plans and within these require target herd sizes.

FUTURE MANAGEMENT ISSUES:
These issues include loss of habitat to both urban and recreational development, agricultural depredation, balancing hunter demand with expectations for quality elk populations (mostly concern for the availability of mature bulls), private elk ranching, and concurrent deer/elk use on native ranges.

ELK STATUS REPORT - WASHINGTON

SUBSPECIES PRESENT:
Roosevelt Elk (*Cervus elaphus roosevelti*)
Rocky Mountain Elk (*Cervus elaphus elaphus*)

CONTACT PERSON:
Rolf Johnson

OVERALL MANAGEMENT GOALS:
a. Maintain and enhance elk habitat to ensure productive populations.

b. Manage elk populations at current levels and manage for sustainable production.

c. Manage elk for a variety of recreational uses, including harvesting of quality branch-antlered bulls, maximizing sustainable harvest, and education and viewing opportunities.

These goals are not measured. We have objectives for habitat, population, recreation, information and education, enforcement, and research that have some quantifiable measures.

LONG-TERM STRATEGIC PLAN:
We are in the process of developing a long-term management plan for elk. We are also going through the Environmental Assessment process which will dictate the management strategies of the management plan.

STATEWIDE POPULATION TREND/ESTIMATE:
Our population goal is to maintain populations at the current levels. At the present time, we estimate an elk population of 31,500 Roosevelt elk and 24,800 Rocky Mountain elk for a total of 56,300 elk. The population trend overall is down somewhat, but individual herds are up and down. The major herds and changes are: Yakima is up and Olympics, Nooksack, and Blue Mountains are down.

HARVEST DATA COLLECTION:
We estimate elk harvest by Hunter Harvest Questionnaires sent to about 10% of the hunters. We send a questionnaire to all muzzleloader hunters and about half of the bowhunters. In addition, we have a report card system that every successful hunter must submit. We get about 50% compliance on the report card based on harvest questionnaire estimates. The report card information is used to allocate harvest to Game Management Units.

"QUALITY" ELK HUNTING OPPORTUNITIES:
We offer a variety of hunting opportunities that some may characterize as quality. We do not define quality. The opportunities some may consider quality include: (a) 3 Point Minimum Units, (b) spike-only bull units with branched-bull hunting limited by permit, (c) limited-entry units, (d) units managed under road management to preclude use of motorized vehicles, and (e) units managed under a combination of the above.

ANTLERLESS ELK HARVEST:
Our goal or objective to harvest antlerless elk varies by geographic area. Our overall goal is to maintain existing populations, so harvest strategies are variable to achieve that goal. In damage situations, our goal is to reduce the damage problem to the satisfaction of the landowner and the Department. In some cases we have liberal either-sex seasons to reduce or eliminate local herds. In other cases we try to reduce the damage problem without killing the elk.

CONTROLLING HUNTER DENSITY AND DISTRIBUTION:
We have a rather complicated system to control hunter density and distribution that alleviates some of the serious situations we had in the 1960s and 1970s. First of all we have weapon selection. A hunter must choose to buy one of 3 tags: a modern firearm, archery, or muzzleloader tag. A person can buy only one. If modern firearm is selected, the hunter must choose the B or C tag.

The B tag is for general bull hunting and the C tag is available for those who wish to apply for a special permit. The hunting season for those buying the C tag is delayed 3 days from the general season opener. This system reduces crowding on opening day about 30 to 40 percent.

Another strategy we use to control distribution and density is area tags. A hunter has to select one of 4 elk tag areas to hunt. This prevents a hunter from going to another part of the state after the season starts.

These strategies have been in place for 10 to 20 years and are working to alleviate the crowding problem. We still have crowded seasons, however, and eventually will have to restrict hunting to limited entry.

SEASON STRUCTURE CHANGES IN LAST 10 YEARS:
Our hunting season structure has not changed appreciably in the last 10 years, but hunting for branched bulls is currently far different in the eastern half of the state. The eastern half of the state is spike bull only except by permit. A quota of branched bull permits is available in each Game Management Unit.

DEVELOPING SEASON STRUCTURE:
Hunting season structure is developed in a rather complicated manner. First of all, we set the basic seasons for 3 years at one time. The year we set the 3-year package we hold a series of public meetings around the state soliciting recommendations from the public. Then after receiving public input we draft our preferred option or options.

Next, we hold another series of public meetings to describe our proposals and solicit public comment on those proposals. We then review those proposals again in view of public comment and draft agency proposals. These proposals are submitted to our Fish and Wildlife Commission for consideration. The public has the opportunity to testify before the Commission at public meetings. The Fish and Wildlife Commission establishes hunting seasons and rules.

DATA COLLECTION METHODS:
Our basic data collection methods for elk are herd composition surveys and harvest data. Herd composition surveys are conducted both pre and postseason. Most of the surveys are done by helicopter.

Harvest data is collected by harvest questionnaire, hunter report cards, game field checks, and check station monitoring. These techniques are used in a general way to monitor population status.

POPULATION MODELING:
We are working on POP 2 and SAK modeling. Regional biologists are experimenting with these techniques.

DEPREDATION POLICY:
We respond to damage complaints by sending an officer to the landowner to investigate the complaint. The landowner and the officer work together to identify a solution.

If a damage claim is made, there are several ways these can be handled. In some cases a third party (Soil Conservation Service Extension Agent) is asked to review the damage problem and determine compensation (both parties agree beforehand to accept the damage assessment of the third party). The landowner can also file a damage claim directly with the Department.

There is a limitation of $2,000 per claim for damage claims to the Department. In the past, claims in excess of $2,000 could be submitted to the Legislature. A recent Attorney General opinion indicates that the damage claim liability is limited to $2,000 from the Agency or Legislature. Damage payments for deer and elk have averaged $50 to $60,000 over the last few years, but claims have exceeded $200,000.

RESEARCH EFFORTS/RESEARCH CONTACT PERSON:
Elk Mortality Study - just completed (Jack Smith)
Blue Mountain Elk Study - Woody Myers

CURRENT MANAGEMENT ISSUES:
Elk management is influenced by tribal hunting, urban sprawl, damage claims, hunter crowding, agricultural development, and hunter desires for more quality hunting opportunities. All of these factors influence the type of hunting seasons that are adopted.

Perhaps the most significant issue in Washington is tribal hunting. Tribal membership is escalating in response to gambling opportunities and hunter demand is up. The state cannot regulate tribal harvest except for conservation closures, so tribal hunting may have a major influence on population status in much of the state.

FUTURE MANAGEMENT ISSUES:
The major factors influencing elk management in the next 20 years will be the same as those identified in recent years (See Current Management Issues).

ELK STATUS REPORT - WYOMING

SUBSPECIES PRESENT:
C.e. nelsoni

CONTACT PERSON:
Reg. Rothwell (307) 777-4588

OVERALL MANAGEMENT GOALS:
Objectives: Post Hunt Population: 72,821
Annual Harvest: 14,628
Harvest Success Rate: 25%
Hunter Effort Rate: 19.3 days/animal
Occupied Elk Habitat: 32,178 sq.mi.

LONG-TERM STRATEGIC PLAN:
Each herd has its own objective which ties into the overall strategic plan. The plan is updated every 5 years.

STATEWIDE POPULATION TREND/ESTIMATE:
We had a slight increase during 1990-92 and a slight decrease in 1992-94. In 1994, we were approximately 20,000 over the objective of 74,306.

HARVEST DATA COLLECTION:
a. The University of Wyoming Survey Research Center performs a mail survey under contract with the Wyoming Game and Fish Department (WGFD) on a statistically-valid sample of hunters.

The Center surveys total harvest, number of adult males, number of yearling males, number of females, and number of juveniles; total hunters, number of residents, and number of nonresidents; recreation days and days/animal harvested; and success rate.

b. Through check stations and random hunter checks we determine age, sex, and hunt area of harvest.

We also analyze population dynamics, assist in population estimates, determine population characteristics, and monitor recreational criteria and hunter satisfaction.

"QUALITY" ELK HUNTING OPPORTUNITIES:
We generally use male:100 female ratio (posthunt) as a guide for "special" (not trophy) management:

Elk: 30-40 Male:100 Female Range for Special Management

ANTLERLESS ELK HARVEST:
Antlerless harvests are the most effective tool to alter overall herd size and are used as such.

CONTROLLING HUNTER DENSITY AND DISTRIBUTION:
Hunt areas (one or more of which are contained within each herd unit) are used to direct hunter pressure, density, and distribution. License types, season dates and splits, and license quotas are also used.

SEASON STRUCTURE CHANGES IN LAST 10 YEARS:
- We have gotten away from point restrictions.
- In northwestern Wyoming we have gone back to general permits for any elk; previously general licenses were for antlered elk plus permits for antlerless elk; this increased male:female ratios.
- We have shortened the amount of time bull elk can be taken during the season to increase male:female ratios.
- In limited quota areas, we have replaced any elk licenses with bull only and antlerless only.

DEVELOPING SEASON STRUCTURE:
We use harvest information; biological information; and input from the public, hunters, outfitters, land management agencies, and private landowners. We also consider damage problems.

DATA COLLECTION METHODS:
We use tooth collection/cementum annual aging and sexing of harvested animals; University of Wyoming Survey Research Center harvest survey; posthunt herd classifications; and winter range trend counts.

We use this information, as well as information outlined in Developing Season Structure, to analyze present population status and its relationship with objectives and with the 5-year trend. Based on this information, upcoming year's seasons are set to move herds toward objectives.

POPULATION MODELING:
We use POP II.

DEPREDATION POLICY:

Annual Damage Payments

Year	Elk
1988	23,946.90
1989	105,311.52
1990	47,756.44
1991	29,093.59
1992	30,122.44
1993	138,888.34

Damage Prevention Costs*

1988	304,707
1989	339,503
1990	462,543
1991	384,563
1992	372,948
1993	479,909

*All species, but elk and deer comprise the largest proportion of prevention efforts. These costs include damage investigation and administrative costs associated with processing damage claims.

RESEARCH EFFORTS/RESEARCH CONTACT PERSON:

- Brucellosis/feedground research.
- Elk habitat effective study in Bighorn Mountains
- Jackson Elk Herd study/fate of calves in Grand Teton National Park - density-dependent regulation?

CURRENT MANAGEMENT ISSUES:

Management issues include competing land uses; loss of habitat; high demand in some areas of the state; and the public's expectations/desires. We are using hunting seasons, public land management planning, environmental impact commenting, habitat enhancement projects, and research to deal with these challenges.

FUTURE MANAGEMENT ISSUES:

Future issues include declining habitat quality, ORV use increases, housing development in winter ranges, change in hunter demographics, and too much demand for too few bulls.

ABSTRACTS

Abstract No. 1

LARGE UNGULATES IN AN ECOSYSTEM CONTEXT: AFRICAN PERSPECTIVES ON NORTH AMERICAN ECOSYSTEMS

SAMUEL J. MCNAUGHTON, Biological Research Laboratories, Syracuse University, Syracuse, NY 13244-1220

Abstract: This paper will synthesize 21 years of research in the Serengeti Ecosystem, Tanzania, East Africa, and 8 years of research in the Yellowstone ecosystem, concentrating on energy and chemical flows through grazing food webs in both reserves. That research reveals many similarities between the 2 regions. Although primary productivity is generally lower in Yellowstone than in the Serengeti, the relationships between consumption by the grazers and net primary productivity are virtually identical. Both have high levels of herbivory. But rather than being parasitic elements feeding on a passive plant community, many processes in both grasslands are accelerated by grazers. Thus, neither is a donor-controlled ecosystem occurring passively in a certain climatic and geological setting. Instead, the ungulates influence many properties of energy and chemical flows.

Abstract No. 2

HOW WHITE-TAILED DEER ELIMINATE MULE DEER: A HYPOTHESIS

V. GEIST, Faculty of Environmental Design, The University of Calgary, Calgary, Alberta, Canada T2N 1N4

Abstract: Mule deer (*Odocoileus hemionus*) may be eliminated by white-tailed deer (*Odocoileus virginianus*) via 1-way hybridization, with white-tailed bucks mating with mule deer does to produce hybrid offspring with incompetent security adaptations. Experimental studies indicate that security adaptations have a high genetic penetrance; hybrids have adaptations of neither parent and cannot stop, gallop fast, or avoid obstacles. They don't run from or attack dogs constrained by a leash--unlike white-tailed deer or mule deer respondents. More than 1 ethological barrier to this hybridization can be identified from field observations of mule deer and white-tailed deer social behavior. It appears that 1-way hybridization is likely to take place when there are insufficient large mule deer males to defend mule deer does in heat. White-tailed bucks appear to be interested in mule deer does, but not vice-versa.

Abstract No. 3

HABITAT CHANGES MAY AFFECT DEER AND ELK

JAMES M. PEEK, Department of Fish and Wildlife Resources, University of Idaho, Moscow, ID 83843

Abstract: A number of vegetation trends are occurring across the western wildlands which have potential effects on deer (*Odocoileus spp.*) and elk (*Cervus elaphus*). A general trend toward more shrub dominance has been occurring on steppe, based on observations of ungrazed sites from across the West.

A countervailing trend is also occurring, based on range management practices which are intended to improve grassland cover on arid rangelands, including prescription grazing and fire. On the drier pine and Douglas fir lands, large-scale wildfires, which have been exacerbated by combinations of forest succession, fire prevention, and prolonged drought, have caused extensive changes toward forb, grass, and shrub communities, or more open timber stands. On more mesic forested lands, succession toward mature forest from the earlier shrub communities created after the large wildfires in the early decades of this century is readily evidenced by the large-scale presence of second-growth conifer stands. On other areas, extensive logging, often on higher areas, has set forest succession back to early stages.

Native cervidae will exhibit lags and gradual responses to these changes which will often be masked by other factors, such as hunting, which directly affect numbers. A sequence of succession in cervid species relative to forest maturation processes has been postulated for northern Idaho, and sequences of population change relative to kinds of habitat change may also be predicted for more arid regions.

Abstract No. 4

MULE DEER, ELK, AND WHITETAILS: RECENT TRENDS AND FUTURE MANAGEMENT IN AN ECOSYSTEM CONTEXT

RICHARD J. MACKIE, Professor Emeritus, Montana State University, Bozeman, MT 59717-0346

Abstract: The past 50 years have been marked by general increases in distribution and abundance of elk (*Cervus elaphus*) and white-tailed deer (*Odocoileus virginianus*), while mule deer (*Odocoileus hemionus*) populations have decreased or fluctuated across much of the West. These trends apparently reflect individual species responses to environmental change in an ecosystem context as well as differential harvest and other wildlife management practices that influenced niche dimensions for the 3 species.

This paper reviews species trends since settlement, the environmental and management factors influencing the trends, and implications for the future in light of increased emphasis on rebuilding and maintaining complete, biologically diverse ecosystems. It suggests that unless management intervenes, elk will continue to increase their distribution and abundance as they continue to recapture and fill more of their historical niche that remains available in foothills and other prairie border environments. The niche of white-tailed deer also continues to expand as emphasis on restoration and maintenance of riparian environments combines with agriculture and other land uses to provide favorable habitat in places they could not occur historically.

Conversely, mule deer, which came to occupy a greatly-expanded niche in the absence of major predators and competing ungulates during the mid-20th century, will doubtless become increasingly restricted in distribution and fewer in number. They continue to shrink from habitats being reclaimed or claimed by elk, whitetails, bighorn sheep, and even bison and antelope in some areas. Rebuilding major predator populations and land management practices that favor elk and white-tailed deer will also work against mule deer under "Ecosystem Management."

Abstract No. 5

PREDATOR-PREY RELATIONSHIPS BETWEEN WOLVES, WHITE-TAILED DEER, AND ELK IN THE NORTH FORK OF THE FLATHEAD RIVER, MONTANA

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Abstract: As wolves continue to recolonize the northern Rocky Mountains, agencies responsible for management of deer and elk need information to predict the effects of wolves on cervid populations and to develop possible management alternatives to ensure healthy populations of deer, elk, and wolves.

We initiated a study in 1992 to examine the interactions between wolves (*Canis lupus*) and their prey in the North Fork of the Flathead Valley in northwestern Montana. Mortality, movements, habitat use, and population trends of white-tailed deer (*Odocoileus virginianus*), elk (*Cervus elaphus*), and moose (*Alces alces*) were examined.

Wolves, lions (*Felis concolor*), bears (*Ursus* spp.), coyotes (*Canis latrans*), and humans all killed radio-tagged female deer and elk to varying degrees. Lion predation was the greatest mortality factor for both deer and elk. Survival rates were 0.71 and 0.79 for deer and elk respectively. Deer and elk populations appear to be declining based on the limited population trend data available to date.

Approximately 29 wolves in 3 packs occupied the study area in April 1994. The resident mountain lion population in the study area is currently estimated at 37-44. Wolves and lions selected white-tailed deer as their primary prey item.

Wolves traveled in areas of high deer density and killed deer in areas of greater deer density than was found at random along their travel routes in winter 1992-93. Deer densities at killsites and travel routes were similar in winter 1993-94. The difference in deer density at wolf killsites and control sites was similar in 1992-93, but approached significance in 1993-94.

Wolves killed deer in areas of greater hiding cover than was available at control sites in 1992-93, but there was no difference in 1993-94. There was no difference in snow depth or canopy at killsites and control sites in either winter. Depth of prey tracks at wolf killsites was similar to control sites in 1992-93, but was greater than control sites in 1993-94. The density of deer at wolf killsites was less than deer density at lion killsites in both winters. Hiding cover was similar at lion killsites and wolf killsites in 1992-93, but was greater at lion killsites in 1993-94. There was no difference in canopy at wolf killsites versus lion killsites in either winter. The difference in winter severity between the 2 winters probably accounts for most of the differences. Deer appeared to use greater levels of canopy cover when wolves were present than they did when they were absent.

Abstract No. 6

EFFECTS OF BULL AGE ON CONCEPTION DATES AND PREGNANCY RATES OF COW ELK IN OREGON

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Abstract: Productivity of cows in many Rocky Mountain elk (*Cervus elaphus nelsoni*) populations in northeastern Oregon has declined over the last 30 years. Numbers of mature bulls declined concurrently, suggesting a potential link that accounts for declining productivity. We evaluated the influence of bull age on conception dates and pregnancy rates of cow elk within a 78-km^2 enclosure on the Starkey Experimental Forest and Range in northeastern Oregon from 1989-93. We allowed a single cohort of bulls to mature from 1½ to 5½ years and function as principal herd sires. Subsequent male offspring were reduced in numbers through hunting and trapping. We estimated conception dates, pregnancy rates, body condition, age, and lactation status of cows killed in December.

Conception dates occurred earlier as bull age increased (P = 0.0001), and were significantly different between bulls ≤2 years and ≥3 years of age. The rut became more synchronous and shortened from 71 days (n = 26) when breeding was by yearling bulls to 41 days (n = 33) when 5-year-old bulls were the principal sires. Pregnancy rates increased linearly (P = 0.03) from 89% to 97% as bull age increased. Cow body condition was highest (P = 0.004) in 1989 when breeding was by yearling bulls. Our results indicate elk hunting seasons should be designed so that older bulls (≥3 yrs) are present during the rut.

Abstract No. 7

ELK AND CATTLE RANGE RELATIONS ON THE LEMHI MOUNTAINS, IDAHO

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Abstract: An increase in elk (*Cervus elaphus*) numbers in central Idaho has come at a time when cattle (*Bos taurus*) on federal lands is being reduced as a means of improving range conditions. This has raised questions of how elk contribute to range deterioration and whether elk use will replace cattle use as cattle numbers are reduced.

To address this question, summer forage removal by elk and cattle was documented on the Lee Creek Allotment in the Lemhi Mountains, Idaho during a wet (1993) and dry (1994) growing season. Ninety-six 100-m vegetative transects were randomly established in 5 vegetative cover types in areas considered suitable range for cattle. Forage use, measured as a percent of peak graminoid and forb biomass removed, was sampled on >300 plants along each transect at 1-month intervals coinciding with cattle movement to and from grazing units.

Ungulate pellet groups were counted within 10 circular plots (0.01 ha) along the transect at the same time as vegetation was sampled. Differences in forage use among units and between years were tested using ANOVA and a paired *t*-test, respectively. Forage removal by elk or cattle was related to the presence of specific cover types, physiographic factors, and intensity of previous forage removal by the other species using linear regression.

Nearly 90% (x = 29%, 8 to 55% of peak biomass) of all graminoid forage removed across the allotment was attributed to cattle, while other herbivores removed just over 10% (3% peak biomass, 1 to 15%). Pellet group counts indicated that elk were the primary medium-large, mammalian herbivores when cattle were absent.

Differences in use occurred among units, with the rested pasture receiving significantly less elk use than other units even when cattle were absent. During 1993, cattle grazing of graminoids was negatively associated with elevation and positively associated with the presence of meadow and riparian habitats, while elk use was positively associated with slope, meadow, and forested cover types, and negatively associated with riparian communities. During the drought (1994), both elk and cattle forage removal increased within mesic areas. Elk use was related to previous cattle use, but cattle use was not associated with previous elk use. Elk and cattle diets became more dissimilar during the drought; elk selected forbs, while cattle diets did not change between years.

Since graminoid forage removal by cattle and elk averaged across the units was below objectives (50%) set by the U.S. Forest Service and elk do not congregate in rested pastures, reductions in cattle stocking levels and the recently-implemented rest-rotation grazing system are likely to promote improved range conditions in the Lee Creek Allotment.

Disturbance along roads open to motorized vehicles may have limited elk use of the unit rested during this study and additional monitoring may be needed to show whether elk congregate in other units when rested. Common use by elk and cattle was highest on wet and moist meadows (45 to 63%) rather than in riparian areas and these areas may require special management consideration.

Abstract No. 8

SURVIVAL AND SIGHTABILITY OF ADULT AND CALF ELK IN COLORADO: A PROGRESS REPORT

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Abstract: We radiocollared 73 calf elk (*Cervus elaphus nelsoni*) (6 months old) and 68 adult female elk (≥1 yr old) in December 1993 to estimate survival rates during winter and used these same elk in 110 aerial sighting bias trials to develop models for estimating degree of negative sighting bias when counting elk with a helicopter on sample quadrats.

Survival rates (±95% CI) from December 1993 to June 1994 were 0.918 ± 0.063 for calves and 0.956 ± 0.049 for adult females. Suspected causes of death were primarily malnutrition and predation for calves and shooting and predation for adult females. Observers did not count 15.4% of the elk during sighting trials resulting in a simple binomial correction factor of 0.846 ± 0.071 (±95% CI). Univariate tests, however, indicated elk age, log (ln) initial group size, log total group size, elk behavior, vegetation type, percent occlusion cover, percent snow cover, and wind conditions affected sightability of elk ($P \leq 0.05$). Step-down regression analyses produced a complex 12-parameter sighting model inclusive of elk age, elk behavior, vegetation type, log total group size, and percent snow cover. Simpler models inclusive of log total group size or log total group size and percent occlusion cover may be more utilitarian and provide acceptably precise correction factors.

We will continue to monitor calf and adult survival rates and conduct an additional 100 sighting bias trials in 1994-95.

Abstract No. 9

EFFECT OF ELK POPULATION INCREASES ON DEER IN MONTANA

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Abstract: In recent years some biologists have questioned whether increasing elk (*Cervus elaphus*) populations in Montana and other western states could be negatively affecting deer numbers. We examined circumstantial evidence provided by harvest surveys and population trend counts to determine if further intensive study of this question is warranted. Data are examined at 3 levels: statewide, regional, and local. Only harvest of males is used because regulations were more consistent for antlered than antlerless animals during 1960-94.

Statewide, the trendline for mule deer (*Odocoileus hemionus*) buck harvest has been relatively flat at about 55,000 bucks, except for a large decline in the mid-1970s to a harvest of about 22,000. Within the overall flat trendline, annual fluctuations between 45,000 and 65,000 occurred during the period 1960-94. Thus, it cannot be shown on a statewide basis that harvest of mule deer bucks has declined compared to the "good old days."

Statewide harvest trends for white-tailed deer (*Odocoileus virginianus*) bucks and bull elk have steadily increased from 1960 to 1994, increasing about 3-fold for whitetails and 2½-fold for elk. Harvest trend for mule deer has been more variable annually than for white-tailed deer or elk.

In the dense coniferous forests of northwestern (NW) Montana, harvest of white-tailed bucks has increased substantially since 1975. The trend is also up for mule deer bucks, but less than for whitetail. The harvest trend for elk in NW Montana is stable throughout the period.

For west-central (WC) Montana, a combination of dense coniferous forests and mountain-foothill habitat, the harvest trend for males of all three species is up from 1960 through 1994.

An upward trend in elk and white-tailed deer harvest is evident in southwestern (SW) Montana (primarily mountain-foothill habitat). There, mule deer harvest increased from the lows of the mid-1970s to a relatively stable plateau from 1980-94. This plateau is somewhat lower than the average mule deer buck harvest during 1960-73.

In north-central (NC) Montana (mountain-foothill and prairie habitats), mule deer buck harvest trend is similar to that of SW Montana. White-tailed deer buck harvest has been flat, and bull elk harvest has about doubled, although elk numbers are low compared to SW Montana.

In south-central (SC) Montana (mountain-foothill and prairie habitats), elk numbers are considerably fewer compared to the previous regions discussed. There, white-tailed deer buck harvest has steadily and significantly increased. Mule deer buck harvest trend is similar to that in the SW and NC regions, but has recovered in recent years to slightly higher levels. In 2 regions with substantial elk populations, mule deer buck harvest has not recovered to levels of the 1960s; however, those levels were generally not sustainable and similar current lower levels are observed in areas of SC and southeastern Montana that do not include significant influence by elk.

Trends were also examined for 2 mountain range complexes within SW Montana where more intensive elk studies were done. Total elk populations are up dramatically since the 1960s on both areas. Harvest of bull elk in the Gravelly-Snowcrest area does not show the dramatic increase evident for the total population, but an increased harvest has occurred since the 1960s. White-tailed deer buck harvest has increased, and mule deer buck harvest has increased since the lows of the mid-1970s, but not to peaks

reached in the early 1960s. For this area, one might speculate that increased elk numbers have impacted mule deer. However, in recent years harvest pressure has been increased on deer, possibly reducing their chances to reach prior higher levels. Also, the early harvests were achieved with 2 deer either-sex seasons while hunters have been limited to 1 buck since 1975. In the Elkhorn Mountains, dramatic increases in elk populations have coincided with increased harvests of males of all three species. There, average harvests of mule deer bucks are currently higher than during the 1970s. Management of the antlerless portion of the mule deer population has been more conservative than for many other populations, including those in the Gravelly-Snowcrest Mountains.

In summary, examination of harvest and population trend information in Montana does not support concern that increases in elk numbers have detrimentally affected mule deer or white-tailed deer numbers at the statewide and regional level. Responses from local interactions are less clear.

Abstract No. 10

ELK POACHING LOSSES AND OTHER MORTALITY SOURCES IN WASHINGTON USING BIOTELEMETRY

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Abstract: Rocky Mountain Elk (*Cervus elaphus nelsoni*) and Roosevelt Elk (*Cervus elaphus roosevelti*) are among Washington's most popular and valuable big game species. Information on causes and rates of elk mortality attributable to legal harvest is generally available, but was unreliable in the case of poaching losses.

In 1989, responding to questions from the legislature and public about the impact of poaching on elk populations, the Washington Department of Fish and Wildlife initiated a 4-year project to investigate elk mortality in Washington using biotelemetry. Three objectives for the study were:

(1) define poaching;
(2) develop a reliable measurement of the numbers of elk lost to poaching each year in Washington; and
(3) determine factors associated with poaching activity.

Elk were captured in 3 study areas: Colockum, Olympic, and St. Helens. Animals were equipped with brown radio collars or an internal radio (rumen transmitter) developed for this study to reduce or eliminate possible visibility bias. Elk were monitored weekly or more frequently, weather permitting, from a fixed wing aircraft to determine live/dead status. Follow-up investigations were done as soon after the mortality was detected as possible and a metal detector was used on most mortality sites to gather as much physical evidence as possible. An advisory group, made up of enforcement personnel, biologists, and personnel directly involved in the study, reviewed and classified each mortality as to cause of death.

Poaching was defined as elk killed during closed season, in a closed area, or in excess of the bag limit.

These included the taking of an illegal animal in open season (e.g., cow during open bull season or spike bulls in branched bull seasons), closed season harvest, vandalistic shooting, and persons killing more than the 1 elk bag limit.

A total of 335 elk were captured and successfully radioequipped in 3 Washington state study areas from March 1988 through September 1992. A total of 165 radio-equipped elk mortalities were documented and classified in these study areas.

Elk harvested by hunters made up 59% of all mortality. Twenty-five radio-equipped elk deaths attributed to poaching accounted for 15% of all mortality. Natural mortalities (winter kill and cougar [*Felis concolor*] predation) accounted for 15% of all deaths. Natural losses were found on the Olympic and St. Helens study areas, but were not documented on the Colockum study area. Other mortalities comprised only 11% of elk deaths, including wounding loss, an elk killed by a vehicle collision, and radios that were recovered and not classified as to cause of death.

Poaching of elk in Washington appears to be a largely opportunistic activity. We could detect no significant difference in poaching rate between bulls and cows, although the overall survival rate of bulls and cows was significantly different. That difference was largely due to hunting regulations. We did not detect a significant difference in poaching rate between yearling and adult bulls. The poaching rate was not significantly different between different types of bull elk hunting regulations. The poaching rate of radio-collared elk was not significantly different than that of elk equipped with the rumen transmitter.

Poaching was concentrated around hunting seasons, with only 12% of documented poaching occurring more than 3 weeks outside an elk season. Over half the elk poaching (56%) occurred during an open elk season. Most elk poaching occurred within 48 km (30 miles) of urban areas. Three times as much poaching occurred in the St. Helens area as in the other 2 study areas. Higher open road density and closer proximity of elk to human populations at the St. Helens area accounted for the difference. The Colockum and the Olympic study areas had equal poaching rates. Poaching mortality sites were significantly closer to open roads than legal hunting mortality sites. The vast majority of elk poaching occurred within 2.7 hm (300 yards) of a driveable road in Washington. A significant reduction in open road density in elk ranges is necessary if poaching is to be significantly reduced over current levels.

The annual statewide elk poaching loss was estimated to be almost 2,000 animals or 21% of the 1988-92 mean annual legal elk harvest in Washington.

Abstract No. 11

PATTERNS OF COEXISTENCE FOR SYMPATRIC DEER IN COLORADO

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Abstract: A 3-year study was conducted documenting the ecological interactions of mule deer (*Odocoileus hemionus*) and white-tailed deer (*Odocoileus virginianus*) on Rocky Mountain Arsenal, Colorado. A total of 160 adult and newborn individuals were marked telemetrically and monitored daily for as long as 3 years. Seasonal habitat use patterns differed only slightly whereas seasonal patterns of spatial distribution differed dramatically. Mule deer population growth was more than 3 times that of whitetail population growth. Interspecific differences in population dynamics are primarily attributed to differential effects of coyote predation on the 2 deer species. Comparative ecological aspects and potential competitive interactions will be discussed.

Abstract No. 12

MORTALITY PATTERNS OF JUVENILE ELK: LESSONS FOR THE FUTURE

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Abstract: From 1990 to 1992, 164 neonatal elk (*Cervus elaphus*) calves were captured and radiocollared in Grand Teton National Park (GTNP) and the Bridger-Teton National Forest. They were monitored through April 1994 to evaluate and compare population regulation of the elk that summer in GTNP and those that summer outside the park. The patterns of neonatal mortality (age, sex, location and cause of death) suggest several lessons pertinent to experimental design and interpretation of future investigations of ungulate ecology:

(1) Captured and marked individuals often represent biased samples of a population; (2) rates and causes of mortality may differ between the sexes due to behavioral differences; (3) temporal variation in causes of mortality necessitate capturing neonates throughout the parturition period; and (4) neonatal mortality can be only partially documented in free-ranging ungulates.

Abstract No. 13

DIFFERENTIAL EFFECTS OF ECOSYSTEM MANAGEMENT ON ELK, MULE DEER, AND WHITE-TAILED DEER WINTERING IN PONDEROSA PINE HABITATS

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Abstract: Elk (*Cervus elaphus*), mule deer (*Odocoileus hemionus*), and white-tailed deer (*O. virginianus*) spend portions of each winter in ponderosa pine (*Pinus ponderosa*) habitat types on the Blackfoot-Clearwater Wildlife Management Area in western Montana. Natural fire has been excluded from these habitats during the 20th century, allowing codominance by mature Douglas-fir (*Pseudotsuga menziesii*) and dense understories of Douglas-fir and ponderosa pine. "Ecosystem Management" prescriptions in ponderosa pine types often result in a wider spacing of mature trees, a reduction in the proportion of Douglas-fir in forest overstories, and a substantial decrease of all conifers in forest understories. We predicted effects on winter habitat values for elk and deer based on habitat use data collected in 1991-94.

Douglas-fir was the dominant forage item for both deer species throughout the winters of 1991-93, and remained the primary forage for white-tailed deer in the extremely mild winter of 1994, even though other palatable forage species were widely available. Although the importance of tree lichen (*Alectoria sp.*) in cervid diets could not be quantified by fecal analysis, heavy use by elk, mule deer, and white-tailed deer was observed. A decrease in conifers of all size classes could reduce abundance and above-snow availability of lichen. Low overhanging branches of subdominant conifers and dense clumps of conifer saplings were components of some deer bedding sites, and presumably provided shelter from cold and wind. Elk appeared least dependent upon canopy closure and coniferous forage for obtaining and conserving energy in winter.

Excluding security concerns, we conclude that elk may benefit from the ecosystem management prescription we addressed on ponderosa pine-dominated winter ranges. We expect mule deer and white-tailed deer would lose thermal cover and forage. White-tailed deer were more dependent upon canopy-rich habitats with abundant nearby coniferous regeneration. Therefore, white-tailed deer were most likely to be affected at the population level by this prescription. High white-tailed deer numbers may be an asset for current management of featured scavengers and predators such as the bald eagle (*Haliaeetus leucocephalus*) and gray wolf (*Canis lupus*).

Abstract No. 14

SURVIVAL AND CAUSES OF MORTALITY OF MICHIGAN ELK, 1981-94

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Abstract: The goal of managing Michigan's elk (*Cervus elaphus nelsoni*) herd of approximately 1,000 animals is to provide a viable population supporting recreational opportunities such as hunting and viewing for the public. This study was initiated to provide biological information necessary for making elk management decisions. From 1981 to the present, 100 radio-collared elk (38-M, 62-F) have been monitored to quantify survival and mortality factors. The Kaplan-Meier product-limit method was used to estimate the survival of elk monitored for a range of 21-4,465 days. Males and females were monitored for an average of 812 and 1,077 days, respectively.

Seven known causes of death have been identified for radio-collared Michigan elk, with legal (44%) and illegal kills (17%) being the principal causes of mortality. Seventeen percent of the animals were censored (M-12%, F-5%). Survival distributions of males and females were not different ($P > 0.10$). Twenty-four percent of the males and 20% of the females survived comparable lengths of time after radiocollaring (M-2,084 days, F-1,917 days). Of the animals that were not censored, 29% of the males died within 100 days of radiocollaring while only 11% of the females died within the same period of time. These survival estimates and contributing causes of mortality have significant implications for making population management recommendations.

Abstract No. 15

THE ECONOMIC BENEFITS OF DEER AND ELK HUNTING IN THE WEST

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Abstract: Deer (*Odocoileus spp.*) and elk (*Cervus elaphus*) hunting are popular and traditional pastimes. However, natural resource managers are increasingly called upon to defend the use of hunting as a wildlife management tool. The purpose of this project was to produce economic information to help resource managers and the public gain a better understanding of the economic contributions of deer and elk hunting on a state, regional, and national basis. This project used expenditure data from the U.S. Fish and Wildlife Service *National Survey of Fishing, Hunting and Non-Consumptive Recreation*, adjusted the data to reflect retail, wholesale, and manufacturing activities, and then analyzed the data using a U.S. Department of Commerce economic model.

The results show that deer hunting in the United States (U.S.) generates $5.9 billion in retail sales, contributing $4.2 billion in salaries and wages, and 200,000 jobs annually to state economies. Deer hunting also provides benefits to state governments by generating $182 million in state sales tax and $45 million in state income tax revenues. Nationally, elk hunting generates a relatively small economic benefit compared to deer hunting. However, for individual western states, elk hunting can be almost as important as deer hunting. For example, in Colorado the economic contribution of big game hunting is split almost equally between deer and elk.

Despite the size of the economic benefits of deer and elk hunting, these numbers have little value if not used properly or used to their maximum potential. This paper describes not only the economic size of deer and elk hunting in the U.S. and the West, but also how agencies can use economic data to derive the greatest benefits possible. When used effectively, economic data can help agencies increase funding and legislative, public, and media support, and help agencies understand the impacts on communities from wildlife management plans and programs.

Abstract No. 16

SEXUAL SEGREGATION OF ELK IN NORTHERN IDAHO

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Abstract: Most elk (*Cervus elaphus*) habitat research in the western United States has focused on cow elk, resulting in the development of management guidelines that may not provide habitat considerations for bulls. Behavioral differences have been observed between bulls and cows by several authors, and hypotheses have been postulated to explain these differences. These hypotheses, in most cases, have not been tested. We used an extensive Geographic Information System database and obtained elk radio locations from 1988-94 to address specific elk habitat use hypotheses in the Coeur d'Alene River basin of Idaho. Multivariate statistical techniques were used to examine habitat selection of "compound variables" (security cover, thermal cover, foraging areas, water availability) between bull and cow elk.

Abstract No. 17

DETECTING DENSITY DEPENDENCE IN MULE DEER POPULATIONS

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Abstract: Detection of density dependence in mule deer (*Odocoileus hemionus*) populations is complicated by variation in overwinter fawn survival rates. For 30 year*area estimates of overwinter fawn survival on 3 areas in Piceance Basin in northwestern Colorado, the mean fawn survival rate was 0.357 with a variance of 0.040 (95% CI 0.024 - 0.076). The variance estimate represents only process (temporal) variation, as sampling variation was removed. If the fawn survival rate for each year is drawn from a normal distribution with a mean of 0.357 and a variance of 0.040, 95% of the true survival rates would occur in the interval -0.035 to 0.749.

For experiments without spatial controls to remove process variation, the power to detect density dependence is low. For example, suppose fawn survival in a deer population is monitored for 5 years with 50 radio-marked fawns/year. The population density is then reduced and monitored for another 5 years, again with 50 radio-marked fawns/year. A test of density dependence would be whether the mean survival rate for the second 5-year period (low density) is greater than the first 5-year period (high density). Power of this experiment to detect a 0.1 change in survival from 0.357 to 0.457 is 11%. To detect a change from 0.357 to 0.557 or 0.2, power increases to only 25%.

As this power calculation exercise demonstrates, even a planned experiment with a large number of radio-marked animals to estimate survival only has a small chance of detecting a reasonable (0.1 - 0.2) increase in survival. Hence, it is apparent that density dependence will rarely be detected by merely observing a deer population. Lack of a large treatment effect to increase power, lack of spatial controls to remove temporal variation, and lack of large sample sizes will preclude detecting density dependence even when strong density dependence may be operating in the population.

Abstract No. 18

COMPARISON OF ELK HOME RANGES AND CORE AREAS BEFORE AND AFTER 10 YEARS OF TIMBER HARVEST

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Abstract: Elk (*Cervus elaphus*) location data are being collected in the Chamberlain Creek area as part of a 3-year study to examine the effects of forest fragmentation on elk habitat use and home ranges. We have completed 2 of the 3 years proposed for this study. The home ranges of 2 elk herds using the drainage were well documented from 1977-83 as part of the Montana Elk Logging Studies. Elk herds in the area have had over 10 years to adapt to their changing environment. In both the old and new studies, radio-collared elk have been aerially located weekly from May through November. The current home ranges and core areas of these two elk herds will be compared to those found in the earlier study using the adaptive kernel home range estimator. Comparisons of the distribution of elk locations will be made using Multi-Response Permutation Procedures. Home ranges and core areas will be examined yearlong (May-Nov), as well as seasonally (summer, rut, and hunting season).

Abstract No. 19

ENVIRONMENTAL AND DENSITY-DEPENDENT EFFECTS ON UTAH MULE DEER POPULATION DYNAMICS

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Abstract: Multiple linear regression analysis of a mule deer (*Odocoileus hemionus*) population suggested that previous winter mean snow depth and population density during the prior 2 years explained much (R^2 = 0.85, P = 0.003) of the variation in summer mule deer density on the Deseret Land and Livestock ranch, 1982-94. Similarly, deer density, summer precipitation, winter snow depth, and coyote (*Canis latrans*) abundance explained much of the observed variation in deer condition, fawn production, and recruitment. Harvest-year summer precipitation and deer density best explained variation in mass of field-dressed adult does (R^2 = 0.92, P = 0.002). Mass of 4- to 6-year-old harvested bucks was best explained by summer precipitation and prior-year density (R^2 = 0.75, P = 0.004). Fawn production was best explained by coyote abundance, summer precipitation, and prior-year density (R^2 = 0.71, P = 0.016). Fawn recruitment (fall yearling bucks:100 does) was best explained by mean snow depth, prior-year density, and fawn production (R^2 = 0.79, P = 0.01.) Annual variation in deer density (N_t/N_{t-1}) was significantly correlated with year N_t yearling buck:doe ratios (R^2 = 0.72, P = 0.002), and weakly correlated with spring fawn:adult ratios.

This analysis suggests that check station and classification count data can be useful in determining the condition and status of deer herds relative to available resources. Regression models built from analyzing population time series may also be useful in projecting future dynamics of deer populations.

Abstract No. 20

EFFECTIVENESS OF SEASON TIMING AS A TOOL TO MANAGE BULL ELK MORTALITY RATES AND HARVEST AGE STRUCTURE

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Abstract: In 1991 Idaho implemented a new statewide elk (*Cervus elaphus*) management plan. A key element of that plan was the shifting of most rifle elk hunts to later in the year to avoid the elk rutting period when bull vulnerability to hunting was believed to be high. The season was delayed by 7 to 11 days, opening on October 10 under the new plan. The objective was to extend the bull elk age structure by reducing mortality rates of mature bulls.

We evaluated the effectiveness of this change in 5 big game management units in northern Idaho for the period 1987-94. Harvest data showed no reduction in the mean annual number of bull elk killed under the new plan. For the 4 years post-plan the total annual bull kill has been higher than the pre-plan period by 2% (mandatory check) to 8% (telephone survey). However, regression of annual harvest against time under the old plan indicated a significant positive slope ($F = 62.99$, $P < 0.02$). This was different ($t = 8.35$, $P < 0.001$) than the post-plan slope of the regression of annual harvest against time which was not different than 0 ($F = 0.93$, $P = 0.44$).

These results suggest that increasing bull elk harvest leveled or stabilized coincident with the implementation of the new plan. Telemetry-based hunting season survival rates from ongoing research in 1 of the 5 units we evaluated indicated bull survival increased from 0.57 during 1987-90 to 0.71 during 1991-94 ($t = 1.45$, $P = 0.08$). This increase occurred across all age classes and there was no evidence to suggest that adult bull survival benefitted more than other age classes. The age structure of harvested bull elk is older than prior to the implementation of the new elk plan.

Excluding 1991 as a transition year and 1994 (data unavailable), the mean age of harvested bull elk increased from 2.56 to 2.69 years old (square root transformation, $t = 2.73$, $P = 0.007$). Antler point data from harvested bulls were also used to index changes in the bull age structure. Harvested bull elk were classified as 1-2 points, 3-4 points, 5 points, and 6+ points. Chi square rejected the null hypothesis of no change in the frequency of occurrence of bulls within these groupings ($x^2 = 17.44$, $P = 0.001$). A Bonferroni Z test on the cell proportions demonstrated that the only significant change was an increase in the proportion of 6+ point bulls in the harvest.

We conclude that the plan changes resulted in increases in overall bull elk hunting season survival rates, but that the plan failed to increase adult bull hunting season survival rates disproportionately to other age classes. The bull elk populations we examined are experiencing a modest shift toward an older age structure. However, there is no clear evidence linking this change to bull vulnerability associated with the rutting period. The mechanism(s) that led to these changes could not be identified at this time.

Abstract No. 21

INVESTIGATIONS OF ELK CALF MORTALITIES IN THE BLUE MOUNTAINS, WASHINGTON: A PROGRESS REPORT 1992-94

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Abstract: This report summarizes activities and preliminary findings from field investigations of mortality rates and causes in calf elk (*Cervus elaphus*) from June 1992 through July 1994. One-hundred neonatal calf elk (12 in 1992, 35 in 1993, and 53 in 1994) were captured and instrumented with radio-telemetry equipment. Sex ratios of captured calves varied between years; observed ratios were 233 males:100 females, 70 males:100 females, and 132 males:100 females in 1992, 1993, and 1994, respectively. Mean weights also varied by year and sex; observed means were 24.2 kg in 1992, 23.4 kg in 1993, and 26.5 kg in 1994, with 1994 means somewhat higher ($P = 0.06$), and males averaging 1-9 kg heavier than females. Radio-marked calves have been monitored for 10,344 radio-days.

Various sources of death (N = 37) were observed including predation by black bear (27%), cougar (41%), coyote (5%), and kills by state-licensed hunters (5%) and legal tribal hunters or poachers (3%). The causes of 11% of the mortalities were unknown. Predation rates were higher in male calves ($P > 0.10$). Summer (June-July) mortality rates varied by year: 0% in 1992, 9% in 1993, and 36% in 1994. Mean daily survival rates were 0.9924, 0.9964, and 0.9920 for 1992, 1993, and 1994, respectively. Annual survival rates were 0.064 in 1992 and 0.273 in 1993.

Empirical evidence suggests differences in precipitation levels and temperatures (near-record high precipitation and low temperatures in 1993 and near-record low precipitation and high temperatures in 1994) may have influenced elk movements and habitat use, and subsequently impacted vulnerability levels.

Abstract No. 22

ELK POPULATIONS AND MANAGEMENT ON 6 MONTANA INDIAN RESERVATIONS

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Abstract: The sovereign nature of Native American governments, and their various histories, cultures, and resources often dictate elk (*Cervus elaphus*) management goals and objectives that differ from adjacent state programs. In Montana, elk management programs on Fort Peck, Fort Belknap, Rocky Boy's, Blackfeet, Crow, and Northern Cheyenne Reservations all differ from the state's. This paper addresses numbers, harvest, seasonal distribution, habitat, and work planned on these 6 reservations.

Except for occasional immigrants, elk do not occur on Fort Peck or Northern Cheyenne Reservations. Maximum elk populations on other reservations are ~100-200 on Fort Belknap, ~300 on Rocky Boy's, ~800-1300 on Blackfeet, and ~800-900 on Crow.

Elk hunting on all reservations is open to tribal members only. Fort Belknap limits members to 45 permits, allocated by random drawing. Rocky Boy's, Blackfeet, and Crow allow any member to hunt. Fort Belknap, Rocky Boy's, and Blackfeet tribal wildlife departments set hunting seasons. Seasons generally start in September and run through November or December. Harvest is monitored on Fort Belknap and Blackfeet, but not on Rocky Boy's or Crow. Estimates of legal harvest are 20-25 elk at Fort Belknap, <15 elk at Rocky Boy's, <300 elk at Blackfeet, and <50 elk at Crow. No estimates of illegal harvest are available. Elk immigration to Fort Peck and Northern Cheyenne lands is limited, and all immigrants are harvested very quickly, preventing recolonization of these 2 reservations.

Elk herds on Fort Belknap and Rocky Boy's spend spring, summer, and fall on montane tribal lands, and most migrate off-reservation to winter. Blackfeet and Crow have resident elk, but the majority move on to the reservations to winter.

No habitat studies have been made on any of the reservations. Subjective habitat evaluations suggest neither quantity nor quality is limiting. We anticipate conducting some quantitative measurements of winter range and calving areas this year on Blackfeet.

Additional aerial surveys to clarify seasonal distribution, habitat use, and population characteristics of elk are planned on Blackfeet and adjacent lands. Proposals have been prepared to investigate seasonal distribution and habitat use of elk on Fort Belknap and Rocky Boy's Reservations. This information will facilitate better data collection on population characteristics, permit better coordination of harvest between the tribes and the state, and let us identify and address any habitat deficiencies.

Although current knowledge of elk population characteristics on these reservations is inadequate, there is some cause for optimism. Basic harvest management appears adequate, data quality and quantity are increasing, and most tribes show a strong commitment to increasing elk populations and improving elk management.

Abstract No. 23

RELATIVE CHANGES OF ELK, MULE DEER, AND WHITE-TAILED DEER POPULATIONS IN IDAHO, 1960-90

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Abstract: Distribution and relative number of elk (*Cervus elaphus*), mule deer (*Odocoileus hemionus*), and white-tailed deer (*Odocoileus virginianus*) have changed in Idaho during the last 30 years. These changes are important to the Idaho Department of Fish and Game, land management agencies, hunters, and private landholders. Elk populations have increased or remained stable over much of the state. Mule deer populations have increased and decreased in local areas, but several traditionally important mule deer populations have declined. Little is known about white-tailed deer populations, but it is believed that populations have remained stable with some increases in range.

Several hypotheses have been offered to explain relative changes in big game populations. These include competition, habitat change, vulnerability to hunting, management emphasis, predation, and changes in weather. We explore some of these hypotheses through a landscape level analysis using a statewide Geographic Information System (GIS).

Abstract No. 24

AN OVERVIEW OF ECOSYSTEM MANAGEMENT CONCEPTS

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Abstract: Ecosystem management has its roots in the work of scientists who began articulating its principles as long as 60 years ago. The current emphasis on ecosystem management began with efforts to define and manage the Yellowstone ecosystem. Recent landmarks have included announcements from the Secretary of the Interior that federal policy would shift to an ecosystem approach, and the adoption of ecosystem management as a ruling paradigm by the U.S. Forest Service. These recent events have spurred many efforts to define the concepts and application of ecosystem management.

A review of these efforts reveals many areas of agreement, along with a few areas of significant disagreement. Areas of agreement include:

- a need for management to consider actions within both spatial and biological hierarchies;
- an emphasis on ecological boundaries as opposed to administrative boundaries, with a corresponding emphasis on interagency cooperation;
- a strong focus on ecosystem sustainability defined through the diversity of ecosystem elements and processes; and
- adoption of an adaptive management approach which emphasizes improved basic information and the need for monitoring to refine management over time.

The most significant area of disagreement involves the role of human needs and human uses of ecosystems. Some contend that human uses are central to ecosystem management, and that the overall objective should be to determine what portion of human needs can be met within the constraint of ecosystem sustainability. Others contend that management must be driven by the needs of the system, and that human needs should be met only as a by-product of activities meant to restore and sustain ecosystem function. These 2 schools of thought would likely hold different views of elk (*Cervus elaphus*) and deer (*Odocoileus spp.*) management objectives, but in either case there is likely to be a new emphasis on the dynamics of the entire ecosystem.

So what does ecosystem management mean for elk and deer management? We can expect land managers to review their objectives for elk and deer in light of overall objectives for restoration and maintenance of ecosystems. This is likely to have different implications in different areas. For example, federal land managers in western Oregon and Washington will likely have reduced expectations for the number of elk that can be sustained on federal land due to reduced emphasis on clear-cutting and the rapid succession of existing clear-cuts to a closed canopy condition. In the fire-dependent ecosystems of the eastern Cascades and the Rocky Mountains, there may be opportunities to recreate stand structures with open canopies and large trees, but this will come at the expense of closed canopy stands. In all areas, there is likely to be new emphasis on the contributions of all ownerships to the accomplishment of elk and deer objectives.

Abstract No. 25

MANAGING DEER AND ELK AS FEATURED SPECIES: INTEGRATION WITH NONGAME AND THE REST OF THE WORLD

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Abstract: How are landscapes used by functionally dissimilar species and groups, especially when 1 species or group is "featured," perhaps to the detriment of others? This question is fundamental to the problem currently faced by deer (*Odocoileus spp.*) and elk (*Cervus elaphus*) biologists: if deer or elk are featured, what are the effects on a myriad of nongame species, many of which are sensitive, rare, unique, threatened, or endangered?

Answering this question demands fresh thinking and novel approaches. New knowledge must be gained and implemented about the trade-offs of managing deer and elk in relation to a multitude of species. Analysis tools must evolve to facilitate our understanding of these multi-species relationships, and help us gain insight about how best to integrate our new knowledge with traditional game management. In general, attempts to model multi-species relationships have focused on indicators of the complexity: indicator species, indicator guilds, keystone species, flagship species, coarse- and fine-filter species management, expert systems, species-habitat matrices, ecological and taxonomic groupings, and management of species with the most stringent requirements all have been used. All have notable strengths, but few have proven satisfactory in and of themselves.

Despite these problems, managers of deer and elk must begin to employ these and related tools to explore, model, design, and modify prescriptions for featured species in tandem with explicit considerations for a variety of faunal groups and species. To illustrate, I present 2 techniques, distance band analysis and watershed analysis of guilds, as case examples of landscape evaluation and planning for elk in relation to wildlife species and groups having highly disparate needs.

Abstract No. 26

ECOSYSTEM MANAGEMENT IN ALASKA: IS THE TANKER TURNING?

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Abstract: The supertanker *U.S. Forest Service*, operating on autopilot, was headed for dangerous shoal waters. Recognizing the peril, Captain Robertson signaled the bridge, "Change course. Head for New Forestry . . . I mean, New Perspectives . . . that is, head for Ecosystem Management." The helmsman looked at the chart and found no such place. It was an old chart. Slowing the engines to half speed, the officers debated how to respond. Meanwhile, below decks, crew morale was low. Some feared sailing uncharted waters; others, especially the newer (green) crew, longed for change. Advice was radioed from the distant research vessel, *Conservation Biology*, whose officers thought they could see ecosystem management on the horizon. As discussions swirled about the tanker's bridge, the helmsman set course for where he thought ecosystem management lay. Communication between the bridge and the crew was intermittent and broken. Below decks the crew wondered, was the tanker really turning? Facing decreasing visibility and increasing seas, the captain radioed his position and intended course to all mariners. Immediately alarms sounded on vessels in its path, including the commercial trawler *FV Wise Use*. The captain told commercial boats that course adjustments were needed to avoid collisions (also known as "train wrecks"). The fishermen remained skeptical, knowing that "adjustments" usually meant "less fishing." The captain, peering through rose-tinted binoculars, assured them that production of goods and services was an integral part of ecosystem management--when ecosystem management was reached, there would be fish enough for all vessels. Few believed him.

In Alaska, ecosystem management is still mostly illusory. Planning documents prominently mention ecosystem management, but convey little sense of how that translates into "different" management. "Eco-teams," organized and charged with providing ecological input on timber sales and making recommendations for maintaining viable wildlife populations, have had little or no influence on final decisions, and have recently been disbanded. Timber harvest levels in southeastern Alaska are bound by 50-year logging contracts from the 1950s. Cutting unit layout and logging methods (100% clear-cutting) are largely dictated by silvicultural and economic concerns.

Given these overarching constraints, ecosystem management in southeastern Alaska has proven to be little more than old management with a new name. The main impediments to true ecosystem management are social--not technical or scientific--in nature. These include: (1) failure to define ecosystem management in specific, measurable objectives that the public and agency personnel understand; (2) unclear or conflicting messages about the how human and economic needs factor into ecosystem management; (3) reward systems (e.g., funding and evaluations) that are tied to commodity outputs; (4) erosion of public support in the wake of a growing wise-use movement; and (5) a contrary ideology in the new Congress.

These obstacles are sizable, but not insurmountable. The success of ecosystem management will require improved education at all levels, an ongoing commitment to change by agency personnel, and clear, consistent leadership at the policy level. Reaching ecosystem management will, like turning a tanker, take much foresight, effort, and time.

Abstract No. 27

ECOSYSTEM MANAGEMENT: A PARADOX

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Abstract: Like any good paradox, "Ecosystem Management" is true in one context, but false in another. In the small and short-term we manage components of ecosystems, but fundamentally human beings are intrinsically a function and product of ecosystem dynamics. To further compound the issue, we really don't know where 1 ecosystem ends and another begins or even if there is a beginning and an end.

Forty years ago most states and provinces were managing wildlife based on a concept called "Game Management," while some federal natural resource agencies were managing wildlife based on a concept called "Multiple Use." Both of these management concepts focused on natural resource commodities such as "game animals" like elk (*Cervus elaphus*) and deer (*Odocoileus spp.*) and recognized the importance of maintaining good-quality wildlife habitat. This was all done within a branch of science known as ecology, where ecosystems were generally considered, but not "managed" per se. Jay Forrester, a professor of management at the Massachusetts Institute of Technology, wrote and lectured extensively in the 1960s about the concepts and dynamics of urban, ecological, corporate, and other complex systems. So understanding or considering natural resource management within a context of ecosystems was being done over 3 decades ago.

About 20 years ago or in the early to mid-1970s, some bureaucratic philosophers adopted a concept called "Holistic Resource Management" (HRM). After the novelty of holistic resource management wore off, many natural resource managers and academicians started to emphasize conservation biology with a concurrent subset called "Biodiversity."

Now in 1995 ecosystem management (EM) is in vogue. Ecosystem management has been defined as, "The appropriate integration of ecological, economic and social factors in order to maintain and enhance the quality of the environment to best meet our current and future needs." Like space exploration, I think the concept of ecosystem management is great, but I think the way ecosystem management is being "marketed" is impractical, academic, and pompous. Maybe it should be called "Egosystem Management," since it implies that resource managers are now going to try to "manage" entire ecosystems based on satisfying their egos and on how they think an ecosystem should look and function, including weather patterns and the carbon and water cycle? The next concept could well be PM (Perception Management), since some top-level natural resource managers have proclaimed that "Perception is Reality." This concept could very well lead to VRM (Virtual Reality Management).

Whatever the case, we must keep "new" ideas and concepts in perspective and manage ourselves, our environment, and its components within practical, tangible, attainable, and accountable goals that are reality based. I think the major difference between game management in the "good old days" and ecosystem management today is our fascination with the notion that as John Muir once said, ". . . everything in the Universe is Connected." Ancient philosophers also purported this, but they did not have the illusion that they could "manage" the dynamic connectivity of entire natural systems. Just because we have electronic technologies such as Geographic Information Systems, Global Positioning Systems, and the Internet doesn't mean we have the power, authority, and knowledge to manage whole ecosystems. It seems that because of these technologies, political "soothsayers," and our collective ego, we have somehow come to believe that we are responsible for entire ecosystems and can now manage and keep them functional for their own (or our own) good.

Trying to impress ourselves with this "management scenario" is one thing, but trying to sell it to the people we serve is another. What happens to our professional credibility when we have to admit that like other grandiose natural resource management schemes, ecosystem management will also turn out to be a "Cheshire Cat"? It too will fade away except for

its satirical grin. Let's be honest and tell folks that we are attempting to manage our natural resources based on CM (Commodity Management). However, unlike before, we are attempting to manage these commodities with an acknowledged awareness of ecosystem dynamics as they may affect the health and welfare of various species, including our own. So rather than ecosystem management, let's call it "Ecosystem Awareness."

Graeme Caughley (1979) asserted, "As I see it, the function of hunting is hunting. People hunt for reasons no worse nor better than that they enjoy hunting. Cloaking the pursuit in ecological theology does little to help our understanding of the effect of hunting on the dynamics of the plant-herbivore system." This statement also applies to all other natural resource uses. So herein lies the paradox: Humans are managers of their environment, but they really aren't. Francis Bacon said it well in the 16th century, "Nature, to be commanded, must be obeyed." So in the "big picture," nature is really the manager, and humans are products of nature--unless you are a strong believer in and disciple of EGOMAN (Egosystem Management). By the way, if you are a champion of EGOMAN, I know of an ED (Ecosystem Developer) who has some oceanside property for sale near Boulder, Colorado. I think you can reach him somewhere on the Internet. His name is Paul Bunyan.

Abstract No. 28

INTEGRATING RESEARCH WITH MANAGEMENT: HOW DO WE DEVELOP RELIABLE KNOWLEDGE?

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Abstract: In mule deer (*Odocoileus hemionus*) and elk (*Cervus elaphus*) management, the need for reliable and credible data is at an all-time high. The consequences of unreliable knowledge are high. Yet when we review the existence of formalized research (learning) efforts by western states, the picture is not encouraging. Few states have specifically-assigned research personnel. For various reasons, biologists and managers have been unsuccessful at convincing decision makers that maintenance of research is necessary.

A major reason for this problem is lack of consideration for the process necessary to obtain reliable knowledge. Many believe research is done for research alone. Management and research are often viewed as being in opposition to each other. To obtain reliable knowledge, we should conduct management experiments or practice adaptive management. This process requires *both* management and research. Researchers are necessary to bring discipline to the process. They are trained in study design, statistical methodology, and writing skills. Managers are necessary because they are responsible for recommendations that impact deer and elk populations and their habitats. When researchers and managers work together, management studies can be designed, evaluated, and published to ensure that knowledge is obtained with each iteration of the management process.

Representatives at the Western States and Provinces Joint Deer and Elk Workshop should develop a policy statement encouraging each state to practice adaptive management strategies. States should also be challenged to standardize terminologies and methodologies in communicating their management experiences.

Abstract No. 29

INTEGRATING RESEARCH WITH MANAGEMENT: IDAHO'S APPROACH TO ANTLERLESS ELK HARVEST

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Abstract: We initiated a management experiment in 1992 to investigate the effects of different cow elk (*Cervus elaphus*) harvest rates on elk population dynamics. Three levels of harvest were targeted for 11 Game Management Units (GMUs) from 1992 through 1996 using the controlled-hunt permit system: very low harvest (2-5% harvest rate) in 3 GMUs; low harvest (7-10%) in 4 GMUs; and moderate harvest (15-30%) in 4 GMUs. Actual harvest rates are estimated annually using the statewide random hunter telephone survey. Changes in elk population size and sex and age composition are estimated by postseason aerial surveys corrected for visibility bias. We are also analyzing statewide harvest and elk population data for the 70 GMUs that have antlerless elk hunts by controlled permits.

We present preliminary results on the effects of antlerless harvest rates on calf recruitment as measured by postseason calf:cow and spike:cow ratios.

Abstract No. 30

ALLOCATING FORAGE AMONG WILD AND DOMESTIC UNGULATES: A NEW APPROACH

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Abstract: One of the most challenging aspects of range management is allocating forage among domestic and wild ungulates. Many methods have been used, but none have proven satisfactory. Past problems of forage allocation were related to the difficulty of combining static and dynamic environmental factors on a seasonal basis to quantify and predict distributions of ungulates and vegetation. Environmental factors that do not change within a year include slope, aspect, elevation, and distances to roads, water, fences, and cover. Dynamic environmental factors, such as weather and forage quality and quantity, change on a seasonal basis.

We present a case study using computer-aided spatial analysis models and linear programming formulation to allocate forage among elk (*Cervus elaphus*), mule deer (*Odocoileus hemionus*), and cattle (*Bos taurus*). Animal responses to interactions of static and dynamic environmental factors were modeled to predict distributions of ungulates on a landscape on a seasonal basis. Those predicted distributions were combined with the distribution, quality, and quantity of forage and the diets and energy requirements of mule deer, elk, and cattle to allocate forage. Results were then displayed on 3-dimensional computer-generated images to show where forage was removed by each species on a monthly basis.

Abstract No. 31

DEER MANAGEMENT IN WESTERN COSTA RICA: IMPACTS OF CHANGING TECHNOLOGY ON WILDLIFE HABITAT

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Abstract: White-tailed deer (*Odocoileus virginianus*) were abundant on the Pacific Coast of Costa Rica when the Spanish explored the area in the 1500s. Numbers probably peaked in the 19th century as native dry tropical forest was converted to shrubland and secondary forest. Overhunting and conversion of forest and shrubland to crops led to declines in deer through most of the 1900s. Current population levels are low, but restoration efforts may succeed partially as a result of incursions of modern technology into rural Costa Rica.

Power lines were built along several roads in the southern end of the Nicoya Peninsula of western Costa Rica in the 1970s and 1980s, bringing electricity to the area for the first time. Comparisons of topographic maps based on 1945 aerial photos with ground observations in 1989-90 indicated that: (1) the average density of occupied houses outside of villages in the study area was lower in 1990 than in 1945 despite population increases in Costa Rica; (2) the area covered by closed canopy tree cover may have increased as much as 4-fold between 1945 and 1989; and (3) rural housing density in 1989-90 was negatively related to distance from power lines.

Availability of electric power likely influenced both changes in human distribution (people moved to areas where electricity was available) and changes in attitude (access to television increased their awareness of environmental issues). Changes in distribution of humans, attitudes towards wildlife, and land use created conditions that increased wildlife habitat and local tolerance of several species of wild vertebrates. The improvements in wildlife habitat that occurred would not have been predicted by models of the environmental impacts of development in the tropics proposed by opponents of technology.

These results lead me to 2 conclusions: (1) not all development is bad, and (2) unforeseen consequences likely follow virtually any change in the relationship between humans and their lands.

Abstract No. 32

TOO MANY ELK, TOO LITTLE HABITAT: CURRENT CHALLENGES IN WILDLIFE MANAGEMENT

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Abstract: Approximately 24,000 elk (*Cervus elaphus*) are supplementally fed in winter at 23 locations in western Wyoming. Government-funded winter feeding of elk to maintain large numbers in the face of diminishing winter habitat began with the establishment of the National Elk Refuge in 1912. Land acquisitions increased the size of the Refuge from its original 713 ha (1,760 acres), amid a patchwork of homesteads and ranches, to its current size of 10,000 ha (24,700 acres). Likewise the Refuge has evolved from a place where elk were fed to a winter range where elk are supplemented with alfalfa hay as standing forage becomes depleted.

The Refuge has been successful in reducing elk depredations and mortality and maintaining a herd size in excess of winter range carrying capacity. However, the negative consequences of maintaining artificially high densities of elk have become increasingly apparent and have both ecological and political implications. In an era of increasing human demands on the land and waning recruitment of the "traditional" support base of wildlife management, our goals of wildlife stewardship need reexamination. As wildlife populations become dependent on food supplementation, they also become subject to new threats to their long-term welfare. Some of the threats are a product of societal values. Some result from the increasing contact of wildlife with livestock and humans. Others bear out the pinings of Aldo Leopold, who recognized that wild things are a product of their habitat.

As wildlife managers take steps to enhance the short-term survival of wild animals, the public may perceive that humans, not healthy habitats, are responsible for the long-term welfare of wildlife populations. Wildlife management and animal husbandry are very different disciplines. The second is fraught with a host of moral, emotional, and legal trappings that could threaten the process of professional wildlifers using good science and public input to formulate and implement management programs. The Jackson elk herd in northwestern Wyoming may serve as a harbinger of what lies ahead.

Abstract No. 33

QUALITY AND QUANDARY: THE STATUS OF TEXAS WHITE-TAILED DEER MANAGEMENT

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Abstract: While Texas has over 3.5 million white-tailed deer (*Odocoileus virginianus*), less than 5% of the land is in public ownership. Much of the state is leased for hunting, creating an economic incentive for landowners to produce deer. In addition to management and research biologists, Texas employs Technical Guidance Biologists to provide deer management expertise to landowners.

I discuss the seasons, bag limits, and special permits used by Texas Parks and Wildlife Department (TPWD) to deal with different habitat and population conditions. These include Landowner Assisted Management Permits, a computer-based permit issuance technique; Antlerless Deer Control Permits, a legislatively-mandated deer control scheme; Wildlife Habitat and Harvest Annual Recommendation Permits, which require assistance from a TPWD biologist; and Managed Lands Buck Permits, a program designed to award landowners for good management. The expense and relative success of these permit issuance schemes are discussed briefly.

In a quest to improve genetic quality, many private Texas landowners import deer from other states or obtain deer from the South Texas Plains, an area renowned for large-antlered deer. At the same time, the number of high "deer-proof" fences is increasing as landowners attempt to manage their herds for quality. Regulations allow private individuals to trap and move white-tailed deer by permit if certain conditions are met. The implications and problems associated with private deer herd management are discussed.

Abstract No. 34

ELK, ELK HABITAT, AND ECOSYSTEM MANAGEMENT

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Abstract: Recent shifts in resource management have focused analysis on a more holistic look at natural systems and the cumulative contribution of the individual parts. This new focus is generally referred to as "Ecosystem Management." Providing a shift from analysis that dealt with single resource values or inputs, ecosystem management seeks to analyze a specific proposal or allocation of resource in the context of how it affects dynamics of the natural system. It also expands what was most often an artificially-constrained analysis area to one defined by a natural boundary such as an individual watershed. This provides a more complete picture of outputs at the bottom of the watershed by considering all of the inputs within a drainage.

The Humboldt National Forest has recently completed 2 major analysis efforts that included elk (*Cervus elaphus*) and their role in ecosystem management on National Forest lands in northeastern Nevada. The potential for reintroduction of elk was an integral part of each analysis. Affecting over 141,700 ha (350,000 acres), the Jarbidge Wilderness Elk Re-introduction Analysis and the Bruneau River Area Analysis both analyzed multiple resource allocations through a focus on habitat values and vegetative health, including elk as a native element of the ecosystem. The Bruneau analysis was triggered by a need to improve habitat values for fisheries within the Bruneau watershed. Ecosystem management decisions were based on Geographic Information System (GIS) generated analysis of habitat suitability and productivity for use by elk and other ungulate species, including domestic livestock.

Each analysis effort resulted in decisions to reintroduce elk with long-term objectives defined in terms of ecosystem health and desired future condition. Both demonstrate that elk are an integral component of natural systems and ecosystem management decisions.

Abstract No. 35

STATE-REGULATED QUALITY DEER MANAGEMENT: A GEORGIA EXPERIMENT

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Abstract: Quality white-tailed deer (*Odocoileus virginianus*) management (QDM) has been gaining popularity throughout much of the southeastern United States. The Georgia Department of Natural Resources responded to the demand of sportsmen by developing extensive QDM programs on public lands.

While successful on public lands, private landowners have had a difficult time implementing QDM. This is largely because landholdings are relatively small and are easily influenced by surrounding management. To address this problem, the Georgia Department of Natural Resources and the University of Georgia investigated the feasibility of implementing harvest regulations to protect 1.5-year-old bucks on a county-wide basis. Dooly County, Georgia was selected as the study site based on various biological and social parameters. Landowners and hunters expressed their opinions about the proposed experiment through public hearings and a mail survey. The survey, mailed to 234 hunters and 200 landowners, indicated 66% of the 258 respondents supported the experiment and the decision was made to proceed.

Antler data collected during the 1992 hunting season revealed that a minimum antler spread of 15 inches (≥ear tip to tip) would protect yearlings from harvest and be relatively easy for hunters to judge. A 15-inch outside spread regulation was adopted in 1993 and will continue through the 1995 hunting season. The regulation also increased opportunities for antlerless deer harvest to regulate population parameters. Age, weights, antler development, and reproduction are being monitored with harvest data.

Initial results indicate an increase in 2.5-year-old males and good hunter compliance. Hunters, farmers, and landowners seem pleased with the experiment's progress. Experimental design will be described and the first 2 years' results presented.

Abstract No. 36

TRACKING ELK HUNTERS WITH GLOBAL POSITIONING SYSTEMS

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Abstract: As a part of a study of elk (*Cervus elaphus*) hunting techniques and hunter behavior, we used battery-powered Global Positioning System (GPS) units to record hunter locations at 15-second intervals during 30 hunting expeditions in 1993. The GPS units were carried in a backpack with the antenna protruding on a short cable. At the end of the hunting day, data were downloaded to a personal computer (PC) and converted to Universal Transverse Mercator (UTM) coordinates. Subsequent analysis within a Geographic Information System (GIS) enabled us to determine time and motion budgets for hunter effort, estimate the departure distance from roads and hunting camps, and evaluate the influence of closed roads on hunting technique. Hunter locations were overlaid on other GIS layers to determine time spent in different vegetation types, and topographic situations selected for hunting.

In this paper we discuss logistics and limitations, and present some preliminary results. Although our sample size is very limited at this time, we expect to detect differences in hunting technique between bow hunters and rifle hunters, evaluate the influence of various vegetation types and topography on hunters, and eventually develop mathematical models to predict the influence of hunter density on elk vulnerability.

Abstract No. 37

EFFECTS OF INCREASED ANTLERLESS HARVEST ON WHITE-TAILED DEER SURVIVORSHIP

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Abstract: A study began in January 1988 to investigate the population ecology of white-tailed deer (*Odocoileus virginanus*) in the coniferous ecosystem of northwestern Montana, administratively known as Montana Department of Fish, Wildlife & Parks Region 1. Determining population response to hunter harvest strategies is 1 primary goal of this project. White-tailed deer are the most abundant and widely-distributed big game species in Region 1, accounting for about 85% of the deer harvest during the 1993 general big game season (15,346 deer). Furthermore, antlerless deer accounted for 38% of the total regional white-tailed deer harvest.

A hunting regulation change increasing antlerless whitetail harvest in 1 of 2 hunting districts was implemented in 1991 to test hypotheses regarding the effects of increased antlerless harvest on various population parameters. Six hundred antlerless-B permits were issued for Hunting District (HD) 102 through a random drawing for the 1991 and 1992 seasons and 700 permits were issued for 1993 and 1994. Permits were valid for antlerless whitetail during the rifle season. Survival probabilities and mortality sources of a radio-marked sample were compared between hunting districts and between time periods (PRE B-permits and POST B-permits) using the software MICROMORT. Additionally, hunter numbers, total harvest, hunter success, and time period of kill were also compared to appraise any changes in hunter behavior.

No significant differences in adult female survival were detected between HD 102 and control district HD 101 or between PRE or POST time periods (P = 0.49). PRE and POST survival in HD 102 was 0.87 and 0.88, respectively. PRE and POST survival in HD 101 was 0.79 and 0.88, respectively. Similarly, the apparent survival of radio-collared male whitetails between PRE and POST time periods and between HDs was not significantly altered by the additional B-permits offered in HD 102 (P = 0.38). Hunting harvest accounted for approximately 6.0% of the mortality of the radio-collared sample of adult females and approximately 34% of males over all years. B-permit hunting in HD 102 did not significantly increase mortality attributable to hunting for either HD or sex class. Adult males and females experienced natural mortality rates of 4.0% and 2.0%, respectively, over all years. Increased antlerless harvest in HD 102 did not significantly alter natural mortality rates for either HD or sex class. Other population parameters have also been examined and will be discussed briefly.

The issuing of antlerless B-permits in HD 102 over a 3-year period corresponded with an average increase of 33% (634 deer) in total whitetail harvest, while hunter numbers over the same period increased an average of 22% (1,015 hunters). In the control district, HD 101, total whitetail harvest increased 7.0% (93 deer), while hunter numbers increased 5.0% (213 hunters). Issuing of B-permits in HD 102 also corresponded with a 3.0% increase in overall hunter success, whereas in HD 101, the increase was 1.0%. B-permit holders averaged 43% success in making a kill and apparently were opportunistic when doing so. The additional harvest of antlerless deer by B-permit holders averaged 272 whitetails (range 240-318 deer), accounting for approximately half of the overall average increase of 634 deer. Issuance of B-permits in HD 102 corresponded with a slight increase (2.0%) in total kill by A and B license holders during the middle 3 weeks of the general rifle season, whereas in HD 101, total mid-season kill increased by 0.5%. The number of antlerless whitetails harvested on B-permits in HD 102 is likely insignificant relative to total population size.

White-tailed deer populations in most northwestern Montana HDs should be able to sustain an increased harvest of 200-300 antlerless whitetails over time. However, other results indicate that the issuing of B-permits increased the number of hunters afield, which may, in turn, increase hunting pressure and subsequent harvest of the antlered segment of the population.

Abstract No. 38

TWENTY-SEVEN YEARS OF SUCCESSION IN GRAND FIR FORESTS OF THE BLUE MOUNTAINS: INFLUENCES OF WILD HERBIVORES

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Abstract: It is widely recognized that wild herbivores can influence the plant communities on which they graze, but disagreement persists regarding the practical significance of such influences on game management. In western states and provinces, quantitative research has been largely limited to parks and other protected areas that are not subjected to the disturbance regimes regularly imposed on more intensively-managed landscapes. Understanding how the selective foraging of wild ungulates interacts with other "disturbance factors" (e.g., logging, fire, livestock grazing) to influence the development of forest communities in managed landscapes could be crucial to development of credible ecosystem management plans.

We present repeated-measures data from a series of wild herbivore exclosures in northeastern Oregon. Spanning 27 years, these data provide the most complete descriptions available of how big game may be interacting with other factors to influence the development and productivity of forest communities in this ecoregion. Herbivory by wild ungulates should not be discounted as a "disturbance factor" capable of substantially influencing the structure and function of managed ecosystems. More intensive management of wild herbivore density and distribution than is currently practiced may be requisite to achieving some ecosystem management goals.

Abstract No. 39

THE WHITE-TAILED DEER: "THE MOST MANAGED AND MISMANAGED SPECIES"

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Abstract: Rangewide population estimates for 45 states indicated in 1993 the United States white-tailed deer (*Odocoileus virginianus*) population was >26 million. We examined management and population trends from prehistoric to present. Harvest data were acquired from deer biologists in each state. Research reports and federal aid to wildlife restoration project reports were searched for statewide population data and trends.

Major fluctuations in white-tailed deer habitat and populations have occurred since man first occupied North America. Overpopulation of deer has changed forest communities. State harvest records indicate population growth for this species has not been controlled. Translocations have altered phenotypic and physiologic parameters, and it is doubtful some subspecies are intact. Overexploitation of males has caused truncated age structures, with few mature males. Distorted sex ratios have caused delayed breeding and fawning.

We propose that sport hunting is the most efficient and viable means of controlling deer populations; however, management should control population sex and age ratios as well as numbers. Substantial increases in antlerless harvest (to >50% of total) is needed in most states. Reduced buck harvest is required to obtain mature age class bucks and allow deer populations to function as they had evolved prior to man's exploitation.

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Abstract No. 40

EFFECTS OF RESTRICTED HUNTING ON AGE, BODY SIZES, AND ANTLER SIZES OF MULE DEER IN CENTRAL NEW MEXICO

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Abstract: The Corona Range and Livestock Research Ranch (CRLRR) was purchased by New Mexico State University (NMSU) in February 1989. The CRLRR was hunted intensively in 1988 prior to being purchased by NMSU and the "quality" of male mule deer (*Odocoileus hemionus hemionus*) may have suffered.

The objective of this study was to document changes that occur in the quality of mule deer males harvested during limited fee hunts. These changes would be documented from 6 body and 8 antler measurements taken from field-dressed deer brought to a mandatory check station. An incisor (I_1) was removed to determine age from cementum annuli counts. Mule deer hunts on the 11,400 ha (28,160 ac) CRLRR have been monitored by NMSU since 1989. Twenty to 25 permits, at a cost of $600.00 (1989-91) and $700.00 (1992-94), have been sold to hunters annually. The hunter population has not involved the same individuals each year.

Hunter success over the past 6 years has averaged >90% (130/140) and there appear to be general trends toward larger-bodied and antlered deer. However, the greatest increases occur between 1 and 2 years of age. Near-maximum sizes have been reached, particularly in body size, by ages 4 to 5. Mule deer herds managed for trophy qualities need to have a large portion of males in the 4- to 7-year ages. However, hunter biases and selection of a trophy appear to be independent when left unrestricted.

Abstract No. 41

EFFECTS OF HOLISTIC MANAGEMENT ON WHITE-TAILED DEER, LIVESTOCK, AND ENDANGERED SPECIES

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Abstract: Many Texas landowners desire to produce more white-tailed deer (*Odocoileus virginianus*) and bigger deer with larger antlers. Management techniques by landowners often include introducing "superior" strains of deer from locations where deer are known to produce antlers that score well on the Boone and Crockett scale, feeding deer high-protein feed, planting supplemental food crops, and providing mineral supplements. At the Kerr Wildlife Management Area (KWMA) in the Edwards Plateau region of Texas, we use a low-frequency, high-intensity grazing system and controlled burning to produce optimum deer habitat. We utilize hunters on a drawing permit system to keep the population in check and to manipulate sex and age ratios.

The KWMA was originally a private ranch with deer and livestock numbers that exceeded carrying capacity. A high fence encompassing 2,227 ha (5,500 acres) of the area was constructed in 1968 to prevent deer from entering. After consistent management of livestock and deer, we have seen an increase in cattle weights, deer weights, and antler measurements of deer. The effect of management techniques on the endangered black-capped vireo (*Vireo atricapillus*) and implications of deer and livestock management on other endangered species are discussed.

Abstract No. 42

MORTALITY OF BULL ELK AND BUCK MULE DEER IN SOUTHWESTERN MONTANA: COMPARATIVE IMPLICATIONS FOR MANAGEMENT

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Abstract: Radio telemetry was used to study survival patterns and causes of mortality among bull elk (*Cervus elaphus*) in the Gravelly-Snowcrest (1984-94) and Elkhorn Mountains (1981-90) and buck mule deer (*Odocoileus hemionus*) in the Bridger Mountains (1990-94) of southwestern Montana. Several capture methods were utilized, depending on animal distribution, terrain, and vegetation characteristics encountered on specific study areas. Ninety-seven percent of male elk were captured by drive-netting, darting, and net-gunning with a helicopter; 3% were captured as newborns with hand-held hoopnets. Approximately 62% of male mule deer were captured by the same 3 helicopter-assisted methods. Clover traps were used to capture the remainder.

On all 3 study areas, timing of capture and collaring of male calves and fawns facilitated assessment of mortality rate and cause during 2 time periods: 15 January-1 June and 1 March-1 June. During the former time period, sample sizes of males calves and fawns were 28, 46, and 91 for the Gravelly-Snowcrest, Elkhorn, and Bridger Mountains, respectively. Mortality rates of male elk calves during the 15 January-1 June period on both elk study areas were 0% compared to 48% for male mule deer fawns. During 1 March-1 June, sample sizes were 176 and 71 male elk calves in the Gravelly-Snowcrest and Elkhorn Mountains and 146 male fawns in the Bridger Mountains. Mortality rates were 1% on each elk study area compared to 37% among male fawns.

Proximate causes of death during winter and spring included 1 elk calf tangled in a fence, an apparent coyote (*Canis latrans*) predation of a calf with 1 blind eye, and an unknown natural death of a calf in poor condition that had been scavenged by a black bear (*Ursus americanus*). Among male mule deer fawns, proximate causes of death during 15 January-1 June were determined for 70 individuals. Coyote predation or suspected coyote predation accounted for 60% of recorded deaths. Mountain lions (*Felis concolor*), bobcats (*Felis rufus*), and unknown predators were responsible for 12% of deaths. Winter malnutrition, accidents, and unknown natural deaths accounted for 17, 6, and 6% of deaths. The temporal distribution by month of fawn mortality during the January-May period was 18, 18, 25, 25, and 14% of deaths.

Differences in causes of mortality of adult bulls and bucks (≥1 yr) throughout the biological year were generally compared. Among radio-collared adult bulls, legal hunter harvest, wounding loss, illegal kill, and natural mortality accounted for 80, 6, 13, and 1% of 148 recorded deaths in the Gravelly-Snowcrest Mountains compared to 72, 10, 15, and 3% of 123 deaths in the Elkhorn Mountains. These same causes accounted for 48, 2, 9, and 41% of 90 deaths of radio-collared adult mule deer bucks in the Bridger Mountains.

Natural losses of adult bulls were limited to 5 cases combined across the 2 elk study areas. Two were emaciated bulls (ages 2½ and 3½) that died of unknown causes in September. A 6½-year-old bull apparently died of fighting-related injuries. Limited evidence indicated losses of 2 yearlings to unidentified predators. Among mule deer bucks, natural losses were significantly higher. Predation by coyotes, mountain lions, bobcats, and bears was the proximate cause in 26 (70%) of 37 documented natural deaths. The remainder included 4 cases of winter malnutrition, 1 fighting-related death, 1 road-kill, 1 dog-kill, and 4 unknown causes.

Management Implications:

- Compared to elk, mule deer populations exhibit significantly higher rates of natural mortality among ages 6 months and older.
- Annual trends in mule deer population size are considerably more variable compared to elk populations across the habitat spectrum.
- Greater stability in production and survival of elk will require a consistently liberal harvest of the antlerless segment in order to dampen current elk population increases occurring across Montana.
- Opportunity for natural mortality of mule deer to become additive to hunter kill may be significant and could result in unexpected changes in population trends.
- Ungulate managers often utilize the same concepts and approaches in designing both mule deer and elk hunting seasons. Therefore, fundamental differences in rates of natural mortality between mule deer and elk for all age classes can result in significantly different responses to the same management strategy.

Abstract No. 43

ROLE OF GENETICS IN WHITE-TAILED DEER ANTLER FORMATION

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Abstract: A controversy exists in Texas among many hunters, landowners, and deer managers as to the advisability and/or effectiveness of removing spike bucks from the wild herd. Genetic and nutrition studies on captive white-tailed deer (*Odocoileus virginianus*) on the Kerr Wildlife Management Area span over 20 generations of deer in a closed herd and offer insights into proper management direction.

Management was kept as constant as possible. Deer were fed a 16% protein ration *ad libitum*. We compare the number of antler points at 1.5 years of age to the number produced at age 3.5, and analyze the frequency of occurrence of spikes that produced large antlers as compared to those that produced small antlers.

Results indicate that (1) antler characteristics and body weight respond directly to diet quality; (2) antler characteristics and body weight are phenotypic characters influenced by genetics and nutrition; (3) yearling spike-antlered deer weigh less than fork-antlered yearlings and most will remain so in future years; (4) most deer in our study that were spike-antlered yearlings were not spike-antlered in succeeding years, but had fewer points and smaller antlers than fork-antlered cohorts; and (5) body weight and antler characteristics are highly heritable characteristics.

Abstract No. 44

RESTORATION OF A TROPHY MULE DEER POPULATION

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Abstract: The Jicarilla Apache Indian Reservation encompasses 340,080 ha (840,000 acres) of prime mule deer (*Odocoileus hemionus*) and elk (*Cervus elaphus*) habitat in north-central New Mexico. During the 1950s and 1960s the reservation supported a substantial mule deer population that produced exceptional trophy bucks. The herd declined in the late 1960s, concurrent with deer population declines throughout the West, and remained low until investigations were begun in the early 1980s.

From 1983 to 1987, a radio-telemetry study was conducted to determine mule deer migration and mortality factors. The major mortality factors for radio-collared deer in descending order of magnitude were illegal harvest, coyote predation, and legal harvest. During this study, midwinter fawn:doe ratios were in the 30-50:100 range, buck:doe ratios were in the 18-20:100 range, and total deer numbers were low.

After completing the study in 1987, the Jicarilla Tribe's stated goals for the mule deer herd were to increase the total population; increase the buck:doe ratio and number of trophy bucks; and increase hunter success.

Management actions taken to attain these goals began with closing all mule deer seasons for 3 years. The Tribal Game and Fish Code was rewritten to include an increased number of citable offenses, increased fines, a seizure and forfeiture statute, and a civil restitution schedule. The law enforcement staff was doubled and roads which crossed the reservation boundary were closed or gated to limit access. A coyote management program was initiated which included increased bounties for coyotes, limited aerial gunning, and employment of a full-time trapper. Deer hunts were reopened in 1990 under a limited-quota, permit draw system.

Annual aerial surveys and pellet transect data indicated an increasing trend in deer since 1987. Fawn:doe and buck:doe ratios also have increased steadily and hunter success has exceeded 85%. The proportion of trophy bucks in the population and average age of deer harvested have also increased.

Abstract No. 45

A STRATEGY FOR MANAGING WHITE-TAILED DEER WINTER RANGE ON COMMERCIAL FORESTLAND

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Abstract: Major winter range areas for white-tailed deer (*Odocoileus virginianus*) in western Montana are located on lower-elevation commercial forestland and are dominated by a checkerboard public/private ownership pattern. This results in a challenge to private commercial timber companies to maintain winter range values within a managed landbase. Plum Creek Timber Company responded to this challenge by developing and instituting a planning process that balanced these dual objectives. This strategy involved intensive research in the Swan and Thompson River valleys. Research results were used to develop an operational strategy that included harvest deferral areas, partial cut harvest techniques that maintained winter range values, and thinning treatments designed to accelerate desired stand structures. A program was developed to monitor white-tailed deer response to harvest activities. An internal auditing program was begun to educate field personnel, examine harvest alternatives, and insure success of the overall program.

Abstract No. 46

EUROPEAN MANAGEMENT FOR TROPHY DEER AND ITS CONSERVATION IMPLICATIONS

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Abstract: The Quality Deer Management (QDM) movement is currently addressing issues that were addressed about a century ago in central Europe. That movement, however, soon identified the restructuring of deer (*Odocoileus spp.*) populations to a semblance of normalcy as managing for trophy males. There were successes and the European QDMA movement saw its policies enacted into law by 1935. Managing for world-class trophies was done systematically by several practitioners following different hypotheses. The upshot can be summarized as follows: no buck engaged successfully in breeding and confronting other bucks is likely to grow trophy antlers. Such antlers grow primarily on males who have been excluded from breeding and the costs associated therewith. Managing for luxury-type populations manages for "dispersal phenotypes." Such types are not likely to remain if food becomes less than abundant--for any reason. Genetic diversity is conserved by maintenance phenotypes. Managing for trophies raises serious policy issues.

Abstract No. 47

HISTORIC AND CURRENT DISTRIBUTION OF WHITE-TAILED DEER IN WYOMING

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Abstract: We estimated white-tailed deer (*Odocoileus virginianus*) distribution in Wyoming before settlement by European man from historical records, including journals of early explorers, trappers, pioneers, and military officials, and archeological records. Historical distribution was documented from early publications, agency records, and interviews with longtime residents and current and retired agency employees. Current distribution was based principally on Wyoming Game and Fish Department records augmented by information provided during interviews.

By the early 1900s whitetail populations had been extirpated or severely reduced over much of Wyoming. Whitetails began to rebound first in the northeastern part of the state. By the late 1940s whitetails were again abundant in the Black Hills, and the state began a transplant program that resulted in 346 whitetails being moved to areas of their former range between 1948 and 1953. Populations in areas receiving these deer appear to have begun their growth soon after the transplants. Whitetails radiated from population centers along river systems during the 1960s and early 1970s, and by the late 1970s they once again occupied most of their pre-settlement range.

Historic and current distribution of the white-tailed deer in Wyoming largely reflect the activities of man. Fire suppression, market, sport, and subsistence hunting, timber harvesting, agriculture plantings, livestock husbandry practices, and water control efforts have influenced the distribution of white-tailed deer in the state.