

GERRISON

TO _____	DATE _____	BY _____
FROM _____	FILE NO. _____	CLASS _____
SUBJECT _____		STATUS _____

BIOLOGICAL UNIT PLAN

for the

ENTIAI DEER HERD

on the

**Entiat and Lake Wenatchee Ranger Districts
Wenatchee National Forest**

and

**Entiat Game Range
Washington State Department of Game**

August 1970

Rec'd 7/27/99

INTRODUCTION:

Objectives

Description of the Unit

Topography and Geography

Soils

Climate

Vegetation

Historical Record of the Area and Species

Fire

Timber Harvest

Watershed

Grazing

History of the Deer Herd

SPECIES DESCRIPTION:

Life History (See Appendix A)

Distribution

Population Composition

Numbers Post-Season

Numbers after Parturition

Sex Ratio

Age Structure

Harvest Ratio

ENVIRONMENTAL MANAGEMENT:

Habitat Improvement

Revegetation

Burning

Thinning

Timber Harvest

Pruning

Fertilization

SPECIAL COORDINATION JOBS:

Access

Recreation Facilities

Information and Education

KEY AGENCIES, INDIVIDUALS, AND ORGANIZATIONS:

ACTION PLAN:

Recurrent Studies

Range and Administrative Studies

Specific I&M Jobs

Habitat Improvement Projects

APPENDIX A

GRAPHIC

Vicinity Map

Work Map

Entiat Deer Herd
Biological Unit Plan

INTRODUCTION:

Objectives. This plan is designed to coordinate resource management activities of the U.S. Forest Service and the Washington State Department of Game as they relate to the Entiat Deer Herd. Cooperation between the two agencies in recommending specific management practices and accomplishing actual projects will be the ultimate goal. Management decisions will always be guided by the principles of sound multiple use.

Description of the Unit. General limits of the range and migration of the Entiat deer herd form the herd range boundary. The unit extends from the Columbia River to the Cascade Crest and includes the Entiat, Chlawa, and White River Drainages (see attached vicinity map). The herd unit includes approximately 793 square miles.

Primary winter range lies along the lower Entiat Drainage and the breaks above the Columbia River. During summer and winter the range is definite; however, the spring-fall range used during migration is less finite. Migration generally parallels the Chelan and Entiat Mountains. Drift across these summits occurs in both directions in spring and fall migrations, but is not believed to be significant. Once the migration is underway, the herd follows drainages and ridges and such cross-over is minimal.

Tenas George and Spencer Canyons were not included because wintering herds in these areas migrate to summer range south of this unit. As more knowledge is gained on migration patterns, some boundary adjustments may be necessary along the southeast part of the unit. The biological unit includes portions of three Department of Game deer management units as shown on the vicinity map.

Topography and Geography. Variability is the term which best describes the physical character of the herd unit area, and is particularly descriptive of the steep and rugged topography. Elevations range from 670 feet at the town of Entiat to over 9,000 feet at peaks like Mt. Maude and Mt. Fernow.

Folding and faulting have occurred in the bedrock of Metamorphic schist and gneiss and intrusive granodiorite. The Entiat and Chelan Mountains have been uplifted while the valley between has been downwarped. Glaciers (the Entiat Glacier has advanced and receded at least twice) and volcanic ash and pumice from Glacier Peak have left more recent evidence.

Soils. The Entiat-Ranger District received a medium-intensity soil survey during 1963 to 1966.

A detailed discussion of soils can be found in the published findings of that study, Soil Survey - Entiat Area, Washington. The survey was conducted by D. Y. Iritani, soil scientist for the Wenatchee National Forest. The discussion that follows is but a brief digest of that part of the study which has particular application.

Soils of the winter range areas merit attention because soil condition and trend will govern management decisions in this area of potential habitat improvement. The winter range is categorized into two soil management areas: (1) Tye - Morical - Dinkleman (total acreage 37,500) and (2) Ardenvoir - Tye - Chumstick (56,400 acres). Most of the soil series which comprise these two categories are rated good in deer browse productivity. However, the soils of the winter range are generally shallow, well-drained, erodible, and low in fertility.

Climate. Climate and cover types are vastly different at opposite ends of the herd unit. The seasonal precipitation pattern is similar for the entire area, occurring mostly in winter. The rain shadow effect of the Cascade Range is an important factor in controlling precipitation and vegetative types.

Annual precipitation averages ten inches along the Columbia River and rains are uncommon from June until fall. Snow depth in the lower foothills may vary from a few inches one winter to four feet the next. The Rocky Mountain Range generally protects this area from cold air masses, allowing the prevailing westerly winds to produce consecutive mild winters. On occasion, however, large continental air masses have occupied the area, sending winter temperatures to 25° below zero. Temperatures range into the upper 80's and 90's during summer, creating severe growing conditions on exposed south-facing slopes.

Snowfall in the high country can be expected in October, covering the ground from November to July, and reaching a depth of ten to fifteen feet. High intensity winter storms are common and short duration downpours are to be expected in the summer. Above 5,000 feet, freezing temperatures may occur throughout the summer.

Vegetation. The winter range forms a fringe along the Entiat and Columbia Rivers and is the lowest portion of the Semi-arid Transition Zone. Ponderosa pine and Douglas fir form a scattered overstory and are mostly restricted to north slopes along the Columbia Breaks. Bitterbrush, sagebrush, ceanothus, Eriogonums, wheatgrasses, cheatgrass, and balsam root are the primary cover species.

The Canadian Zone is principally spring-fall transition range; however, a number of deer spend the summer in this zone. The overstory is dominated by Douglas fir, subalpine fir, western hemlock, and lodgepole pine with

an understory composition of heather, huckleberry, kinnickinnick, and lupine. Fawns are dropped within this zone in June.

The Hudsonian Zone forms the primary summer range. Mountain meadows and grassy ridges are surrounded by subalpine fir, mountain hemlock, Alpine larch, and whitebark pine. Green fescue, meadow grasses and sedges, and many forbs are found on the open hillsides and meadows.

The Arctic-Alpine Zone is limited to rocky, barren summits of the higher peaks.

The condition of the winter range is the major controlling factor affecting the health and survival of the deer population. During most of the first half of this century, the vegetative trend of the range resource was downward. Deer herds exceeded the carrying capacity of the winter range especially in the 1930's and 1940's. Overgrazing by domestic stock helped cause a deterioration in condition. Reduced deer populations and regulated stock use has allowed the resource to improve, but its present condition is poor to fair. Trend is presently static. Too many stands of decadent bitterbrush plants and relatively few seedlings indicate there is need for habitat improvement.

Bitterbrush transects on the Entiat District in 1969 indicated an over-winter utilization of 31 to 78 percent. Natural improvement of bitterbrush stands will be difficult with such sustained use.

Historical Record of the Area and Species.

The strongest impacts from land use practices occur on winter range areas. Large areas of the historic key winter range in the lower canyons and flood plains have suffered from rural invasion.

A more recent impact, and a good example of man's influence on the Entiat herd, is deer fencing. Fence has been constructed cooperatively by orchardists, the Department of Game, and Chelan County P U D Number one, down both sides of the Entiat River from Ardenvoir to the Columbia and north of the Entiat along the Columbia River Highway. The fence protects the orchards from browsing deer and also prevents the deer from creating a hazard on the highways. However, these fences have interfered with historical migration patterns. Previous to fencing, substantial numbers of deer freely crossed the Entiat River to gain access to winter range areas. By blocking migration routes, the game fence has caused concentrations of deer in areas of less browse; the extent of the impact is presently difficult to measure.

Fire. Fire is a naturally recurrent impact which usually occurs more frequently with inhabitation of the area. Not all burned stands of browse species reestablish by natural regeneration. Some large fires in recent years (The Entiat Fire of 1958 is a notable example) have damaged thousands of acres of deer winter range.

Improved methods of fire prevention and suppression have allowed young timber stands to stagnate and the canopy has closed. Bitterbrush and other understory browse species cannot successfully compete for soil moisture and sunlight and are either greatly suppressed or dying. Fires may have both a positive and a negative effect of deer habitat and will continue to influence this area.

Timber Harvest. Logging was the first stable industry in the Entiat Valley. Sawmills were built a year or two after permanent settlement of the Entiat valley in 1887. By World War I, logs along the river became scarce and mills were built in the tributary drainages to harvest virgin pine stands. Logging, more than any other land use in this area, has created subclimax types which are the most productive deer habitat.

Watershed. Although some isolated cases of accelerated erosion have been attributed to wintering deer, the herd generally has little effect upon the watershed. Stream pollution resulting from winter-killed deer has been a **major** source of concern.

Grazing. Grazing began north of Entiat about 1894. People were quick to seize the opportunity of unrestricted grazing and numerous small cattle herds ranged at will. Sheepmen herded as many as 13,000 sheep through the lower country to summer them in the meadows and open ridges of the upper Entiat drainage. Bands of sheep also grazed into the upper Chlwwa, Napeequa, and White Rivers.

Half-wild horses roamed over the lower range and some pigs were grazed in the lower draws and on the benches. Worst of all, horses and cattle grazed practically year long.

Livestock grazing of deer wintering areas has been greatly restricted. One cattle allotment (Potato Creek C&H) is now open for commercial livestock. Two bands of approximately 1,000 ewes each, graze south and west of the Entiat Summit. Both bands start on the Sugarloaf, Limekiln, and Switchback Allotments and at mid-season move to the high ranges on the Lake Wenatchee District. Throughout the summer, recreation livestock graze the upper valley meadows. The conflict between grazing and wildlife has been reduced to a negligible point. Ten percent of the estimated forage capacity within stock allotments is set aside to compensate for wildlife use.

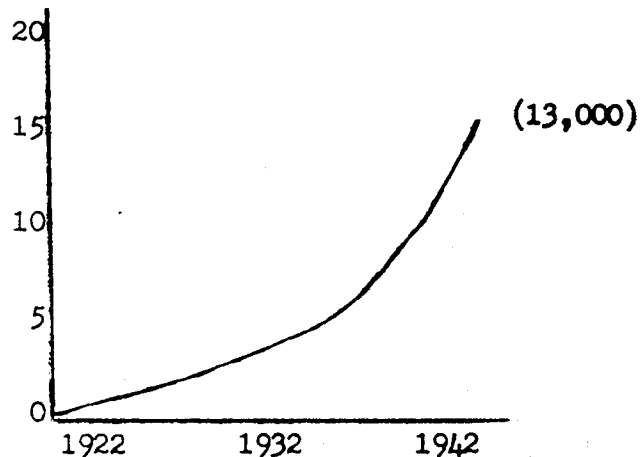
Private grazing land is located in key deer winter range and there is, of course, no control over livestock on these lands.

History of the Deer Herd. The Entiat Herd was much smaller before 1900 than it is today. Early explorers described the Indians as being rather emaciated during the winters, likely from lack of red meat. James C. Bonar's diary recorded several successful deer hunts in 1887, 1888, and 1889. However, some of these hunts required fairly long trips well up the Entiat River.¹

The deer herd was still relatively small in 1919. The Roundy Brothers reported that only an occasional hunter bagged a deer and trophy bucks were rare.²

Deer numbers were rapidly increasing in the 1920's. The "Limited Wildlife Management Plan, Wenatchee National Forest, 1954", lists deer populations for the entire Wenatchee National Forest. It provides us with an estimate of this early upward trend.

Deer
Population
(1000's)



A census in 1940 estimated the Entiat deer population to be 3350 (no count data were available for the Columbia River Breaks, McKinstry and Byrd Canyons, Oklahoma Gulch, or Navarre Coulee). This number exceeded the estimated carrying capacity of 3,200 deer. The actual population is not so important as is the recognition that the herd was outgrowing the capacity of the winter range.

¹Dow, Edson, Passes to the North. 1963, Outdoor Publishing Co., Wenatchee, Washington. pp 65-70.

²Dow, Edson, Adventure in the Northwest. 1964, Outdoor Publishing Co., Wenatchee, Washington. p 59

A large portion of the mule deer herd once wintered in the Mad River-to-Roaring Creek area. The aforementioned 1954 management plan reported a significant movement of deer during the winter of 1928, north and east across the Entiat River to Steliko, Morical, and Crum Canyons and above the town of Entiat. It is believed that range depletion forced the deer into new winter range.

Deer kill statistics for the Entiat District can be found in the "Wildlife Management Plan, Entiat Ranger District". This harvest data reflects the cyclic trend of an increase in the herd during a series of mild winters followed by a large reduction in a severe winter. The winter of 1968-69 was an example; deep snow and cold weather reduced the herd by approximately 40 percent, according to the Department of Game. Improved management should level out the highs and lows of these fluctuations.

SPECIES DESCRIPTION:

Life History. The life history of mule deer, including distribution, reproduction, mortality, and habitat requirements is presented in Appendix A.

Distribution. Deer density on the summer range is relatively light. With the arrival of cool weather and light snows some deer begin a gradual, unhurried drift to lower elevations. As snowfall deepens, there is a change from general, wide-spread drift to concentrated trailing. The migration overlay on the vicinity map closely describes this concentrated movement.

Following winter, the deer regain strength and body weight by browsing shrubs and grazing new grass and forb growth. They begin a slow north-westerly drift in April. Early June finds the herd scattered throughout the transition range.

Population Composition.

Numbers Post-Season. Following the 1964 deer season, the mule deer population estimate for the 794 square miles within the Entiat Biological Unit was approximately 8,000 animals. This population estimate was determined by using Barton Lauckhart's formula, which is based upon known field ratio count applied to the known fall buck harvest.³ The fall buck harvest is sampled by a questionnaire sent to 10 percent of the hunters in the State.

³Lauckhart, J.B. 1950. Determining the Big-Game Population from the Kill. Trans. 15th N. America Wildlife Cont: 644-650

It should be pointed out that this is the lowest population that has been carried in this unit since 1956. This is a direct result of the severe winter of 1968-69 which resulted in an estimated 40 percent winter loss of the herd. The maximum number of deer carried in this unit during the past ten year period (1959-1969) was approximately 16,000 animals, post-season.

The recommended post-season deer population would, in theory, be approximately 12,000 animals. In actual practice, however, the number of deer that can be wintered without damaging the total winter range is strictly dependent upon the severity of the winters. The post-season population should match the carrying capacity of the winter range which is used during a winter of "average" severity. This allows for maintenance of the bitterbrush stands and reduces the likelihood of a large number of winter-kills during any winter.

Numbers after Parturition. No data are presently available for this specific unit. Following the extremely mild 1967-68 winter, post-season doe:fawn ratio counts showed over a 30 percent herd increase.⁴ The average mule deer herd in Washington loses about 29 percent of its new-born fawns in summer mortality (according to Taylor, 1956, The Deer of North America). The potential productivity of an average Washington mule deer herd of 66 percent is the theoretical recommended base for estimating annual gain.

Sex Ratio. The sex ratio obtained from 1969-1970 winter field counts was 1:5 (Buck:Doe).⁵ The recommended sex ratio, following herd recovery from the effects of the previous winter, is 1:4.

Age Structure. The buck herd, excluding male fawns, normally runs 65 to 70 percent yearling animals at harvest time and after harvest. Following a severe winter, the age structure is altered to the extent that yearling composition drops to 45 to 50 percent or less of the total male population.

The recommended age structure is fairly close to the present pattern, depending again upon fawn survival from the previous winter. With high carryover of young animals, the yearling percentage could be increased to 80 percent with a heavy harvest.

⁴ Big Game Status Report. 1930. Wash. Dept. of Game Publication.

⁵ Patterson, J.R. 1969. Region Five Deer Sex Ratio Counts, Wash. Dept. of Game Files.

Since lighter hunting pressure is expended on the doe herd, the yearling percentage in the female population is proportionately smaller. It is of management importance to maintain a high percentage of female animals in the prime breeding ages of two to six years. No recommendation can be made concerning age structure of the female herd without a collection of field data over a span of several years.

Harvest Ratio. The 1969 harvest was Bucks-only to allow for herd recovery. The previous five year harvest average was about 1:0.5 (Buck: Doe), varying from no antlerless harvest to 1:1.0. The recommended harvest ratio, following herd recovery, is 1:0.7.

ENVIRONMENTAL MANAGEMENT:

The management objective is to conserve and develop suitable wildlife habitat, and to maintain the deer population at the optimum level, consistent with other uses of the land.

Habitat Improvement. Habitat improvement for the Entiat deer herd can be accomplished in two ways:

1. Specific wildlife habitat improvement projects.
2. Coordination with other National Forest resource activities.

Whenever possible, the Forest Service and the Department of Game will actively cooperate in project work. Specific wildlife project work will presently be restricted to key winter range areas. A large portion of the key winter range is in private ownership, over which public land management agencies have little control.

Revegetation. In the past, wildlife habitat revegetation has been restricted to planting bitterbrush on burned or logged-over areas. Results have been variable, but generally not successful. Range reseeding and erosion control seeding has been of some benefit to wildlife.

Future plantings of bitterbrush will be restricted to those sites where bitterbrush is most likely to survive. There is no need to restrict bitterbrush seeding to recent burns. As project funds become available, and when an effective rodent repellent or control measure is found to replace endrin, seeding will be planned for decadent stands. Bitterbrush seed will also be included in erosion control mixes at a rate of one pound per acre on all sites adaptable to bitterbrush in winter range areas.

Trial plantings of additional browse and cover species will be made as seed is secured. Recent research in Utah⁶ indicated Curl-leaf

⁶ Personal communication with Burt R. McConnell, PNW Forest and Range Experiment Station, LaGrande, Oregon.

mountain mahogany (Cercocarpus ledifolius) may be successfully seeded as a big game food and cover species. Various species of juniper (Juniperus spp.) as well as serviceberry (Amelanchier spp.) may also be of value in rehabilitating big game range. As information becomes available concerning the use of fertilizers and competition-controlling chemicals, these methods of improving establishment will be studied on a trial basis.

Burning. Controlled burning of decadent bitterbrush stands to induce sprouting has not been studied in this area. Summer fires are so hot, the entire plant is killed. However, late fall or early spring burning might kill only the above-ground portion of the shrubs and allow vigorous sprouting. Studies in Oregon⁷ showed that fire is generally destructive to bitterbrush stands; however, under certain conditions up to 80 percent of the plants resprouted. This degree of success occurred on northerly slopes of loose, coarse-textured, non-stoney soils without pumice or cinders. Very porous, fine textured, stoney soils transferred heat rapidly and killed underground parts. More investigation of the effects of burning is needed.

Thinning. Thinning timber stands will release the understory vegetation. In 1969, the Entiat District thinned 13 acres to a 20 by 20 ft. spacing to release the dying understory of bitterbrush. Insufficient time has elapsed to evaluate the results; however, based on research studies elsewhere, favorable results are anticipated. Studies in the Methow Valley to the north⁸ over an eight year period have shown a 246 percent increase in understory vegetation at a 26 foot spacing of trees. The long term benefit of thinning is shown by the increase in shrub density. Three years following thinning the understory increment was composed of 6 percent shrubs. Shrubs improved to 12 percent of the increased growth after eight years. The shrubs, mostly bitterbrush increased production by 45 pounds per acre, (1,100 percent), at the 26 foot spacing. Much greater increases are expected in future years.

According to this study, thinning beyond silvicultural standards is a justifiable way to increase winter forage. Foresters during the past 15 years have accepted spacing up to 20 feet as proper for production of crop trees within even-aged stands of commercial tree reproduction. In marginal timber stands where browse potential is high, wildlife funds should supplement TM dollars for proposed thinnings. Spacing here could exceed the TSI standards.

⁷Driscoll, Richard S. 1963 Sprouting bitterbrush in central Oregon. Ecology (4): 820-821.

⁸Personal communication with Burt R. McConnell, PNW Forest and Range Experiment Station, LaGrande, Oregon.

As pointed out in the aforementioned study, however, thinning should not be done indiscriminately because dense patches of young pine provide cover and shelter to big game as resting areas. Number, size and dispersion of thinned areas are also important from a game management standpoint.

Timber Harvest. The value of logging to expand and improve deer habitat has been stressed. By encouraging timber harvest of small, but mature, overstory trees on low elevation, low quality sites, wildlife interests could be well served. This work provides the same benefit as thinning.

Winter logging operations on deer winter range is a valuable protective measure for soils and browse. Tractor skidding of logs without protective snow cover results in reduction of understory species as much as 40 to 50 percent, as well as causing soil disturbance and compaction.⁹ Recovery of vegetation is especially retarded in skid trails. Winter operations also provide the immediate benefit of maintaining access to wintering deer.

Pruning. The Forest Service and Department of Game cooperatively pruned (topped) 43 acres of bitterbrush in 1968. Studies are underway to measure the effect. Increased production has been shown to result from pruning decadent bitterbrush in other areas.¹⁰ The effects of pruning are known to last four to five years with some plants showing continued response for 10 years or more. No damaging effects have been noted, either in shrub mortality or percent dead canopy.

A factor to be considered in evaluating a proposed pruning project is snow depth on the area. In deeper snows, pruned plants may be buried during critical periods. However, in light snow areas, pruning places the increased twig growth in reach of the deer.

Some pointers to be kept in mind when undertaking a pruning project include: (1) concentrate pruning on old plants with reduced twig growth; (2) remove not more than half the canopy; (3) complete treatment before the development of flower buds; and (4) provide for measuring the effects of the project, before and after treatment.

Fertilization. Soils of the winter range are generally low in fertility. The effect of fertilizing bitterbrush stands is currently under study by Bernie Leman in Swakane Canyon, adjacent to the Entiat

⁹ Garrison, G.A. 1960. Recovery of ponderosa pine range in eastern Oregon and eastern Washington by seventh year after logging. Proceedings Society of American Forester, Washington D.C. 10/60. pp 137-139

¹⁰ Personal communication with Robert B. Ferguson, Intermountain Forest and Range Experiment Station, Boise, Idaho.

herd unit.¹¹ The final results of this study will be of value in planning future habitat work. Additional soil analyses and literature search is recommended before any large scale projects are undertaken. Cost/benefit studies will also be made.

SPECIAL COORDINATION JOBS:

Primary Impacts upon the herd have been discussed. Coordinating requirements for less direct impacts are discussed below:

Access. Roads and trails influence the hunter pressure and intensity of the harvest. The present transportation system in the Entiat herd unit is satisfactory in this respect. Future transportation planning must consider the effect of increased access on the wildlife populations and especially the effect people may have on the deer if and when the deer are concentrated in an area.

Snowmobiling is fast becoming a major winter sport, which is often concentrated in road accessed areas that traverse deer winter range. This sport may be harmful if deer are frightened or harassed by snowmobile operators. The unnecessary expenditure of energy at this critical time may result in increased losses. Education of the public can reduce this threat.

Recreation Facilities. Developed campgrounds along the Entiat and Mad Rivers, Half-Way Springs, and the facilities at the trailheads receive significant use by deer hunters. In addition, many makeshift, temporary camps are found within the upper limits of the winter range. Despite the current "pack-it-out" program, recreation funds are expended annually for hunter camp cleanup.

Information and Education. The objectives of an I&E program are to inform the public as to the importance of adequate harvest of the annual deer "crop", habitat improvement projects proposed, and wildlife studies that are underway. Proper use of a renewable resource, sustained yield, carrying capacity, and habitat improvement are themes which will convey the message.

All Forest employees must become more knowledgeable of the wildlife program and its importance in resource management so as to convey meaningful information to the public.

¹¹Bernie Leman. 1969. 1968 annual report of the biological section of the Engineering Department, Public Utility District No. 1 of Chelan County. pp 9-23.

KEY AGENCIES, INDIVIDUALS, AND ORGANIZATIONS:

Washington State Department of Game, Region No. 5
 Regional Supervisor - John Kanz
 Regional Game Biologist - John Patterson

Washington State Department of Natural Resources
 Regional Supervisor - O. Green (Ellensburg)

Bureau of Land Management (Spokane)
 Area Manager - Dean W. Guymon

Bureau of Sport Fisheries and Wildlife, Division of Wildlife Services
 District Supervisor - Eric Peacock (Seattle)
 District Field Assistant - Roy Clennon

Public Utility District No. 1 of Cheilan County
 Biologist - Bernie Leman

U.S. Forest Service, Wenatchee National Forest
 Forest Supervisor - Andrew C. Wright
 Wildlife Staff Officer - Archie Mills
 Entiat District Ranger - Robert Benson
 Lake Wenatchee District Ranger - Dick Woodcock

Sportsmens Organizations
 Wenatchee Sportsmen's Association
 Cashmere Sportmen's Club
 Cheilan Sportsmen's Club
 Waterville Gun Club
 Quincy Sportsmen's Association
 Soap Lake Rod and Gun Club
 Moses Lake Sportsmen's Club
 Ephrata Sportsmen's Association

NOTE: Refer to the Entiat Game Range Multiple Use Survey Report for a land ownership map.

ACTION PLAN:

The action plan is organized into four components:

1. Recurrent Studies - Annual habitat or herd inventories, inspections, and meetings to aid in management.
2. Range and Administrative Studies - Short range habitat analysis and herd studies to evaluate past and future habitat improvement projects.
3. Specific I&E Jobs - To inform the public and seek better acceptance of our management policies.
4. Habitat Improvement Projects - Projects planned to improve the quantity and quality of the winter habitat. The action plan must be updated annually and used in conjunction with the annual wildlife project funds request. A brief summary of completed projects should be attached to this plan.

<u>Recurrent Studies</u>	<u>Responsibility</u>	<u>Cost Estimate</u>
<u>Browse transects</u>	USFS & WSDG	560
Six Counting Routes	WSDG	420
<u>Four Counting Routes to be established</u>	USFS	280
Annual Joint USFS - WSDG Meeting	USFS & WSDG	
Annual Winter Meeting on Entiat Deer Herd	USFS & WSDG	
<u>Annual Joint Inspection Trip of Unit</u>	USFS & WSDG	
Annual Management Recommendations for Unit	USFS & WSDG	
Aerial Investigation of Migratory Routes	USFS & PUD	500 (each)
Aerial Population Trend Counts	USFS & PUD	500 (each)

ACTION PLAN (Continued)

<u>Range and Administrative Studies</u>	<u>Responsibility</u>	<u>Cost Est.</u>	<u>Date Began</u>
Pruning Study on Oklahoma Ridge	USFS & WSDG	Annually 140	1968
Thinning Study on Oklahoma Ridge	USFS	Annually 140	1970
Big Game Range Survey - Tenas George to Tye Ridge	USFS	1500	
Seeding trials - Morical Canyon	USFS & WSDG	Initially 280 Annually 70	
Trapping and Tagging program for migration study (Pending)	USFS & WSDG	1000	

<u>Specific I&E Jobs</u>	<u>Responsibility</u>	<u>Cost Estimate</u>
Plan and organize for feature articles in Wenatchee Daily World	USFS & WSDG	---
Develop joint news releases for all local papers	USFS & WSDG	---
Operate annual District hunter information booths	USFS	---
Keep public informed of management activities through talks to local organizations	USFS & WSDG	---
Encourage material assistance and participation from sportsmen's organizations in habitat improvement projects, where applicable	USFS & WSDG	---
Develop slide program for Entiat herd unit	USFS & WSDG	500

ACTION PLAN (Continued)

<u>Habitat Improvement Projects</u>	<u>Responsibility</u>	<u>Cost Estimate</u>
Overstory thinning (refer to work map)	USFS & WSDG	
Oklahoma Gulch - 20 acres		400
Morical Canyon - 100 acres		1500
Morical Canyon - 80 acres		1200
Crum Canyon (Pending) - 200 acres		4500
Morical Canyon (Pending) - 200 acres		4500
Provide bitterbrush seed for erosion control mix (5 acres annually)	USFS	50
Bitterbrush revegetation (Pending)	USFS & WSDG	
Morical Canyon - 20 acres		600
Byrd Canyon - 10 acres		300
Pruning		
Flicker Canyon - 30 acres	USFS & WSDG	600
Fertilization (Pending)	USFS	
Oklahoma Gulch - 300 acres		
Browse Revegetation of Department of Game cultivated land (Pending)	WSDG	

SPECIAL STUDIES

*Food Requirements of Mule Deer
in North-Central Washington.
(estimate 5-year period)*

USFS & WSDG

APPENDIX ASpecies Description:

Life History. The Rocky Mountain mule deer (Odocoileus hemionus hemionus) is primarily an animal of the west. Although there are ten additional subspecies of mule deer, including the Columbian black-tailed variety, Rocky Mountain mule deer have by far the widest distribution. Its western boundary is defined by the Coast Range of British Columbia, the summit of the Cascades of Washington and Oregon, and the Sierra Nevadas of California. The eastern limit of its range includes the Badlands of the Dakotas, part of western Nebraska, and all but the eastern third of Colorado. Longitudinally, its range extends from central Alberta to central Arizona. The climatic tolerance of Rocky Mountain mule deer affords them the widest distribution of any subspecies of large game animal in North America.

Reproduction. Although the rut may begin in late October and extend through early December, the peak of breeding activity occurs in early November and lasts about two weeks. Does have recurrent heat periods about every 28 days until bred. They may experience up to four such periods of oestrus during a single breeding season. Because of these recurring periods and the polygamous nature of the bucks, there is little possibility that a doe capable of breeding would not be bred.

Mule deer does rarely breed as fawns. Yearling does normally become active breeders and generally bear one fawn. The gestation period averages slightly more than 200 days, with the peak of the fawn drop occurring in the first two weeks of June.

The productive strength of a deer herd is dependent upon quantity and quality of food available throughout the year. Yearling mule deer does on healthy range with moderate winter conditions will practically all bear fawns with an occasional set of twins. Two-year olds under these conditions, as well as mature does, will bear mostly twins with occasional triplets. Under poor range conditions or severe winters, fawn production will be decreased markedly.

Studies in Utah have shown that food conditions on summer range were the most important factor affecting the conception rate of adult does.¹ For yearling does, however, food conditions during the previous winter are equally important. An exceptionally low nutritional intake during a deer's first winter forces it to utilize its summer food for growth, thereby delaying sexual maturity.

¹ Julander, O., W.L. Robinette, and D.A. Jones, [196].
Relation of summer range conditions to mule deer herd productivity.
J. Wildlife Management 25 (1) 54-60.

We can now see there are several factors affecting the size of our annual replacement crop of deer. The nutritional value of the range is the basic factor. Under optimum herd and range conditions, a herd may average 160 fawns born per 100 does, whereas under poor conditions the deer may be only half as productive. This provides a yardstick with which to measure the breeding strength of a herd.

Mortality. To remain in balance with its environment, a basic deer herd must be subject to a mortality level equal to its annual rate of increase. The object of management is to maximize the annual removal by hunting, thereby reducing losses to other forms of mortality.

The annual peak population of a deer herd occurs with the fawn increment in June. Mortality factors immediately begin operating against the herd. Fawns normally suffer the highest mortality rate of any age group and the loss is made more impressive because fawns make up such a large percentage of the herd. Early fawn mortality occurs from birth to late fall and may run from 20 to 40 percent. These losses are dependent upon weather conditions in June, nutritive condition of the doe, predator density, and other factors. Fawns likewise are the weakest competitors for food in critical winter situations and are thus most vulnerable to winter losses. Predator losses in winter are generally not important, and in fact may not keep up with the rate of poaching in certain areas.

The magnitude of winter losses is dependent upon the size of the wintering herd and the condition of the winter range, as well as the severity of the winter. This is well to keep in mind because we have a degree of control over the first two factors. The removal of deer through hunting, including the crippling loss (normally 15 to 20 percent of the harvest, but may run over 40 percent in buck-only hunts as a result of mistaken identification), is a vital function in trimming down the herd to where it should be in balance with its winter range. By maintaining the key winter range in good condition we will be able to carry through the maximum number of deer for any given winter conditions. These two factors are the key to maintaining a healthy herd.

Habitat Requirements. The mule deer is usually considered an animal of the mountains. It is adaptable to a broad range of cover types, however, and is equally at home on plateau or desert fringe areas. It can exist without dense cover and seems to prefer open timber and brushy areas. In eastern Washington the mule deer enjoys extensive summer range in all varieties of cover. Among the most productive summer and spring-fall ranges are subclimax types resulting from fires, logging, and grazing. Extensive climax stands of bitterbrush on the lower ranges have supported the increased deer population through winter, but have sustained browsing and grazing damage during years of peak use. The capacity of the winter range is the factor most limiting to herd size.

Upgrading and maintaining our winter range areas in balance with the desired breeding herd is an important goal of management.

The relationship of nutritious, available browse to shelter, in the form of both vegetation and topography, indicates the value of winter habitat. Deer movements should not be restricted to a given area unless food supply will suffice for the numbers dependent upon it. Bitterbrush (Purshia tridentata) is the primary browse species on our winter ranges. Big sagebrush (Artemisia tridentata) and snowbrush (Ceanothus velutina) contribute a limited amount of winter browse. Smaller quantities of serviceberry (Amelanchier alnifolia), chokecherry (Prunus virginiana), and Eriogonum are components of the diet. The quantity of food available has long been recognized as an important factor in habitat requirements. Nutritive content, or quality, has only recently been considered an important factor. Practically all low deer populations under study have been shown to result from low quality or quantity of food. Nutritional deficiencies not only result in increased losses through malnutrition, disease, and even predation, but adversely affect the reproduction process so deer are lost on both ends of the life cycle. Nutritional requirements are covered in numerous publications on deer. These include:

Taylor, Walter P. (Ed) 1956. The deer of North America. N Harrisburg, Pa., The Stackpole Co.; and Washington, D.C., The Wildlife Management Institute. 668 p.

Swank, Wendell G. 1958. The Mule Deer in Arizona Chaparral. State of Arizona Game and Fish Department, Wildlife Bulletin No. 3, 109 pp.

A brief section follows on food types preferred by season of use.

1. Spring - new growth of succulent grasses which are high in protein, as new growth of forbs and shrubs become available they take the place of grass.
2. Summer - Grass use drops to five percent. Forb use reaches a peak, New growth on summer range shrubs may make up one third of the diet, where available.
3. Autumn - Grass use may occur if fall rains cause new growth. Forbs may still make up 25 percent of the diet if frost resistant or if they become more acceptable after frost than when green. Transition to heavy browse use begins to take place as the deer approach their winter range.
4. Winter - Browse use of 75 percent or more. Some forbs will be used when available as well as small conifers.