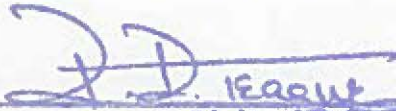


UNIVERSITY OF CALIFORNIA
AGRICULTURAL EXTENSION SERVICE

DAVIS, CALIFORNIA

TO: Wildlife Habitat Symposium Members

FROM:


Richard D. Teague
Extension Wildlife Management Specialist

Gentlemen:

At long last, here is your copy of the abridged transactions of the Wildlife Habitat Symposium held last June in Klamath Falls, Oregon. As I recall, I promised to get this into each member's hands by "late summer". How much later in the summer can you get?

I appreciate the liberty you gave me to edit the recordings. Quite frankly they were not the easiest things to sift. My hope is that I have not left out any important substance nor changed the true meaning of individual remarks. I have included a few items sent to me after the Symposium that I felt would be important reference material for each of us.

RDY:jw
enc.

WILDLIFE HABITAT SYMPOSIUM

Klamath Falls, Oregon

June 9-10, 1965

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Klamath Falls, Oregon - June 9-10, 1965

Dick Teague	University of Calif.	Davis, California
Harold Harper	Calif. Fish & Game	Sacramento, California
Dillard H. Gates	Oregon State University	Corvallis, Oregon
Bill Longhurst	University of Calif.	Hopland, California
Don McIntosh	B.L.M.	Carson City, Nevada
Mayo W. Call	B.L.M.	Salt Lake City, Utah
Wendell Miller	S.C.S.	Sacramento, California
Bob Harris	Forest Service - PNW	Portland, Oregon
John McKean	Oregon Game Com.	Portland, Oregon
Carl W. Simpson	U.S.F.S.	Lakeview, Oregon
Mel Cummings	Oregon Game Com.	Portland, Oregon
Harold Winegar	Oregon Game Com.	Prineville, Oregon
Ed Smith	B.L.M.	Sacramento, California
John E. Schwartz	U.S.F.S.	Portland, Oregon
Bob Jennings	B.L.M.	Redding, California
T. A. Phillips	U.S.F.S.	Twin Falls, Idaho
Arnold W. Coleman	Idaho Fish & Game	Jerome, Idaho
Thomas A. Leege	Idaho Fish & Game	Kamiah, Idaho
Robert K. Sherwood	Idaho Fish & Game	Rigby, Idaho
Everett R. Doman	U.S.F.S.	San Francisco, California
William Dasmann	U.S.F.S.	San Francisco, California
R. M. Brown	National Park Service	Crater Lake, Oregon
Lary Barney	National Park Service	Crater Lake, Oregon
Weldon O. Shepherd	U.S.F.S.	Ogden, Utah
Donald L. Neal	Forest & Range Exp. Sta.	Berkeley, California
Dick Riegelhuth	National Park Service	Sequoia Nat. Park
Gary E. Bunney	National Park Service	Mineral, California
Gus Markgraf	B.L.M.	Lakeview, Oregon
Al Steninger	B.L.M.	Lakeview, Oregon
O. V. Deming	Hart Mountain Refuges	Lakeview, Oregon
Charles H. Rouse	U.S.F.W.S.	Portland, Oregon
Edward J. O'Neill	U.S.F.W.S.	Tulelake, California
William A. Nettro	B.L.M.	Medford, Oregon
Don Niven	U.S.F.S.	Klamath Falls, Oregon
Dan Eastman	Oregon Game Com.	Klamath Falls, Oregon
Richard S. Hubbard	U.S.F.S.	Berkeley, California
Bill Cooperrider	U.S.F.S.	Alturas, California
Jim Gordon	U.S.F.S.	Alturas, California
Jim Reeher	Oregon Game Com.	Ontario, Oregon
Bob Kindschy	B.L.M.	Vale, Oregon
Paul Bonn	Oregon Game Com.	Bend, Oregon
Paul R. Osbagie	Citizen	
Andrew R. Gigler	4230 S. 6th St.	Klamath Falls, Oregon
Levi Mohler	Idaho Fish & Game	Boise, Idaho
Frank Stanton	B.L.M.	Portland, Oregon
Ed Dealy	U.S.F.S.	Portland, Oregon

Welcome - Don Niven - U. S. Forest Service, Klamath Falls, Oregon.

I would like to welcome you to Klamath Falls. We hope you will be comfortable and enjoy your stay. There will be more announcements later. With that brief welcome, I will turn the symposium over to Chairman Dick Teague.

TEAGUE: It is indeed a pleasure for me to welcome all of you to this symposium. Hopefully the word symposium embodies the objectives that each of us envisioned when the proposals were made for such a gathering. To the ancient Greek the symposium followed the dinner and was characterized by the drinking of wine mixed with water, by intellectual or entertaining conversation, music, dancing and other amusement. It was a collection of comments, opinions or brief essays brought together on the same subject by different writers. We cannot vouch for the wine, dancing and other amusement but feel that a meaningful exchange of ideas can certainly be our 'meat and drink' as a result of this gathering of experts in wildlife habitat work.

Acknowledgment of those individuals and agencies whose efforts and time went into this symposium is most difficult since it has been a cooperative effort to gain and disseminate knowledge in a vital segment of wildlife management. Special thanks is due, however, to our hosts here in Oregon -- specifically the Oregon Game Commission, Regions 5 and 6 of the U. S. Forest Service and the U. S. Fish and Wildlife Service.

The interrelationships of man and animals have become increasingly complex as human populations have increased. Man's demand for additional food, fiber and recreation have required more intensive use of lands and waters. Most habitats for wild creatures have become so altered that many forms have suffered large population reductions. Other animals, finding these alterations to their liking, have substantially increased, often creating problems that adversely affect man's interests and welfare. Federal, state and private land management people have been shot into the 'habitat management orbit' -- whether they are prepared or not -- because this seems to be the answer for providing greater habitat carrying capacities for our desirable wildlife species.

This symposium has several objectives, which are honorable ones. These are:

1. Exchange information and policies on active programs in the field of wildlife habitat work among interested agencies and organizations.
2. Discuss and observe habitat management problems.
3. Discuss and observe current habitat research programs.
4. Explore areas of needed research.
5. Discuss how agencies and organizations can correlate their work in habitat management, research and education to provide the best overall program without duplication of effort.

6. To improve communications in this field of wildlife habitat.

I'm sure we share a common desire to see as many of these objectives explored in the next two days as is humanly possible.

TEAGUE: asked for the agency reports of those represented at this symposium.

COLEMAN: Idaho Fish & Game Department. I am Arnold Coleman and I work with habitat improvement in Idaho.

During the past 10 or 15 years, Idaho has been carrying on various programs of big game range improvements with the use of bitterbrush, other species and treatments. Also other programs of water development, work with sharp-tail grouse, sage grouse and pheasants. Varying degrees of success have been obtained.

An early attempt was the transplanting of bitterbrush seedlings. In spring plantings there apparently was not enough moisture remaining to carry the plants through the summer. In fall plantings frost heaving in the winter tended to lift the plants out of the ground and allowed them to dry out early. Also rodent and insect damage was a problem.

Hand planting bitterbrush seed following range fires has had some success but is a costly operation. Approximately 200 acres of National Forest Land near Lowman, Idaho, was scalped and hand planted with bitterbrush seed by prisoners from the State Penitentiary. This was rather costly and the success was varied due to several factors.

The drilling of bitterbrush seed in grass plantings has not been too successful because of the competition of dense stands of grass. More successful seeding has been accomplished with a modified John Deere Flex-O-Planter which scalps ahead of the planter.

Other treatments of old bitterbrush stands are mashing, ralling and dozing. This tends to release a tremendous regrowth the first two seasons and then the annual growth declines rapidly in succeeding years.

Mountain mahogany has been treated by dozing and cutting, by chain saw, with some success of regrowth and new plants coming in. A project scheduled for this summer is the chaining of juniper and mountain mahogany on Juniper Mountain in Owyhee County.

Bob Sherwood has been working on a project in eastern Idaho near St. Anthony on elk, deer and moose wintering area known as the "Big Grassy," in cooperation with private land owners. This is a range improvement project of planting various shrub species (bitterbrush, chokecherry, hanson rose and caragana). A 90% survival was obtained and shows some promise.

Another project Bob Sherwood is working on is on the Sand Creek Wildlife Management Area near St. Anthony, Idaho, which is a big game transitional range. Some areas have been planted to bitterbrush, caragana, american plum,

golden willow, chokecherry and sandcherry. The survival of these species has been varied; reportedly american plum is being taken by big game species rather heavily.

Tom LEEge is working on a new habitat program in North Idaho on the Clearwater drainage. It is a project to study the effects of spring and fall burning on elk range. The history of this area is tremendous forest fires from 1910 to the mid 1930's which allowed dense regrowth of browse species. This brought on the large elk herds Idaho has had for a number of years. Now the conifers are beginning to come back in and the browse species are going out or are not available to the elk. The purpose of the project is to see if controlled burning will bring back the browse species.

During the past winter Bob Sherwood and I have been making maps of each big game hunting unit in the state and indicating on the maps of big game winter range, critical range, potential winter range, private land, Bureau of Land Management land and state land. The maps are a preliminary step in inventorying big game habitat and more detailed mapping and classifying of big game habitat will be done in the future.

Bob Sherwood has been doing some habitat work for sharp-tail grouse in southeastern Idaho which includes making plantings of chokecherry, hanson rose, bitterbrush, hairy vetch, common vetch, sainfoin and nomad alfalfa.

Duane Pyrah has been doing considerable work on sage grouse habitat in connection with his sage grouse study. This work has been mainly in relation to sagebrush spraying and plowing.

Another habitat program is water development. Watering devices or guzzlers have been installed for antelope, chukar partridge, hungarian partridge, quail and sage grouse. Several spring and seep developments have been made in these areas also.

Our primary habitat program in the past has been the tree and shrub planting program for improvement of pheasant habitat. In cooperation with the Soil Conservation Service, windbreaks, woodlots and wildlife plantings of trees and shrubs are made on private farm lands for food and cover for pheasants. In return the private landowner agrees to allow public hunting to those who ask permission to hunt.

CALL - BLM - Utah

Since the Utah Fish & Game representative wasn't able to be here, I would like to say that we work very closely with the Utah Fish & Game Department. I would hope we could have better communications of projects in all states by various agencies. We are planning a cooperative research project between Jess Low of the Cooperative Wildlife Research Unit in Logan, Julander of the Intermountain Range and Experiment Station and the BLM on sage grouse, and the effect of various sagebrush manipulation practices in south-central Utah. Only one reference has been found in this type of work.

Even though we know other states are doing work in this area, Idaho, Utah, Montana and Colorado -- so it would be a good idea if we could get better communications among agencies on research being done.

SHEPHERD - Intermountain Experiment Station

On behalf of the Utah Fish & Game Department they have been very active in habitat work, and in cooperation with us furnished two men on a wildlife habitat improvement project. The project leader has been active in planning for improvement of 125,000 acres.

McKEAN - Oregon Fish & Game Department

Gentlemen, I will make this brief -- because some of our people will be going into greater detail on various practices and cooperative efforts we have had with other land use agencies. We welcome this opportunity to exchange ideas with other people in this field, but are extremely humble about our lack of knowledge and our lack of ability to know ahead of time what effect our manipulation and working in environmental controls will have on wildlife populations. In Oregon we have one objective and that is to produce maximum numbers of game and fish and to provide the greatest harvest possible for our people. We have gone through a period of evolution in history from many game animals, to exploitation, to a period of ultra protection of game, and in more recent years we have gone into a program of protection of the environment. In the last twenty years we have tried better utilization of the resource, better educational efforts. As we approach an era of more intense management we must know more about what we have. Since Mel Cummings will go into detail later, I will close with that short statement. (Written report submitted by Mel Cummings.)

Oregon's habitat development practices in the Great Basin area are confined primarily to water developments and browse and forage seedings. Cooperative developments with the U. S. Forest Service and the B.L.M. are initiated at every opportunity. Normally, the Commission provides materials and the cooperating agency provides labor for cooperative projects.

Water developments for big game consist of the annual cooperative construction of two to four deer cisterns, cooperative development of five to ten seeps and springs, and the construction of two to three waterholes. Cistern materials cost \$200 to \$250 each. Two hundred fifty to three hundred dollars is contributed for materials for each spring development.

Upland game water developments consist of the placement of five to fifteen plastic cisterns per year in chukar habitat and the tapping of B.L.M. pipelines during construction for placement of small float-valve-operated ground-level cisterns.

Big game browse seedings include the annual planting of bitterbrush with two Hansen browse seeders on as many acres as are available -- up to 250 acres. Other methods of seeding, generally with a range land drill, are also cooperatively employed. This past fall a 3,000-acre B.L.M. chaining project was seeded with bitterbrush prior to chaining. Seeding

methods included airplane seeding, seeding with an endgate seeder, a range land drill, and the browse seeders. Evaluation of the various seeding methods is planned. Root cavities on all chained junipers were also hand seeded to bitterbrush.

Hand seeding bitterbrush on timber thinning projects where the thinned trees may be pulled over the seed spots is also pursued cooperatively with the U. S. Forest Service. This fall a project involving cooperative participation of sportsmen doing this seeding is planned. Bitterbrush seedings will be increased on deer winter ranges where there is a reasonable chance of success.

Funds for emergency seeding of areas ravaged by fires are budgeted. Both browse and forage seed are utilized on these areas depending on the site and conditions.

Forage seedings include B.L.M. cooperative seedings of nomad alfalfa on desirable revegetation sites for antelope use and the trial plantings of early growing grasses on deer winter ranges.

Research in this habitat type consists of determining the effects of large scale livestock range rehabilitation practices on antelope, deer, sage grouse, and chuckar partridge. This five-year research project was initiated two years ago to determine sage range rehabilitation practices that are definitely detrimental to wildlife and to determine practices that may be beneficial. Evaluation will be based primarily on information obtained from pellet group sampling.

HARPER: - California Fish & Game Department

I. Scope of Activities

A. Public land agencies

U. S. Forest Service, Bureau of Land Management, State Lands, U. S. Army Corps of Engineers, Bureau of Rec., U. S. Navy, Air Force, Coast Guard, Marines, Fish and Wildlife Service, Department of Fish & Game lands.

B. Private Landowners

Farmers, hunting clubs (duck, pheasant, deer, quail) timber and lumber companies, utility companies (P.G.& E., Edison, S.M.U.D.), railroad lands, oil company lands.

II. Types of Programs

A. Water developments -- Springs, seeps, guzzlers, windmills, etc. (1963).

1. 2,144 small game guzzlers installed throughout California.

2. 12 big game guzzlers (deer and sheep).
3. Numerous springs developed and maintained.
4. Windmills installed where possible, such as Beal's Well in Imperial County.
5. Sumps developed for deer in northern California.
6. Levees, canals, sumps built and maintained on waterfowl management areas.

B. Vegetation manipulation

1. Brush burned, chemically treated, mechanically cleared, cut by hand, prepared for burning amounted to 1,205 acres.
2. Brush lands cleared and seed was 351 acres.
3. Seed collected -- Atriplex and bitterbrush 4,300 lbs.
4. Trees and shrubs planted 1,889.
5. Brush piles -- usually around each guzzler.
6. Exclosure -- 68 miles maintained.
7. Eelgrass planted along coast.
8. Shoalgrass planted in Salton Sea which was obtained from Gulf of Mexico through Texas.
9. Experimental plots -- Started in 1965 with S.C.S. Pleasanton Plant Materials Center.

III. Department Lands

A. Deer, waterfowl management areas, upland game.

111,547 acres under Department ownership.

B. Expenditures

\$631,374 in 1964 for habitat work.

IV. Policies

- A. Policy to cooperate with all agencies, both public and private, in habitat preservation and development.

WILDLIFE LANDS OWNED BY THE DEPARTMENT OF FISH AND GAME

<u>Area</u>	<u>Acreage</u>
<u>Big Game (Deer Ranges)</u>	
Doyle	13,503
Tehama	<u>42,965</u>
	56,468
<u>Waterfowl Management Areas</u>	
Honey Lake	4,819
Sheepy Ridge	320
Gray Lodge	6,738
Grizzly Island	8,600
Suisun	1,887
Lower Sherman	3,100
Los Banos	3,000
Mendota	9,003
Imperial-Wister	<u>8,162</u>
	45,629
<u>Deer and Upland Game</u>	
Spenceville	9,450
TOTAL	<u>111,547</u>

Development and Maintenance Expenditures for 1963-64

Big Game	\$ 49,331
Waterfowl	398,613
Pheasant	13,553
Quail and other	<u>169,877</u>
TOTAL	<u>\$631,374</u>

SMITH - BLM

Report of BLM, Sacramento, for California area. - I would like to give a brief summary of the work in wildlife habitat and where BLM stands in this picture. We now have wildlife specialists on the state staff in all of the western states. Most districts now have a wildlife coordinator. These men will be responsible for integration of the wildlife program in the total district effort. Since 1964 we have important legislation called the "Classification and Multiple Use Act." Fish and wildlife work is now recognized as a legal field of management in BLM. Reorganization is another thing that is going on in BLM offices in the last two years. There are now six pilot districts, one in each of six different states trying out a new reorganization system. Also, a unit planning system. Sacramento district is one of the pilot districts. Our district managers now correspond to the forest supervisors in the forest service, and the districts are broken down into resource areas. There are resource area managers that roughly correspond to district rangers. Decentralization will probably come at a later date. Under the unit plan the wildlife and the wildlife resources will be considered under the total unit plan. For the first time we have funds in the bureau specifically for wildlife use. We are getting into somewhat of a research program in wildlife in the future, not the type that the bureau will do itself, but cooperative type research with the State Fish & Game people, Universities, Forest Service, Experiment Stations and others. We have cooperative projects now with state departments of fish and game in Montana, Idaho, and Colorado on sage grouse studies.

CALL: - BLM - Utah (recorder malfunctioned and we were unable to record his statement.)

Also the report from Bob Kindschy, Wildlife Specialist, BLM from Oregon was not discernible on the recorder; however, the written report from the Vale District Manager is as follows:

1. Land Treatment Evaluation - Involves a detailed study by the District Wildlife Specialist of all proposed range seedings and herbicide brush control projects. He determines the pre-treatment vegetation and wildlife use of each site. He then recommends any necessary modifications of the project to safeguard or enhance the wildlife values. The Oregon Game Commission is consulted on each site and their approval is obtained prior to treatment. During 1964 a total of 26 projects were so analyzed; in 1965 there are 43 sites to study under the Vale Project range improvement program.

2. Browse Transects - Have been established in important big game ranges within the district. Forage production, plant vigor, and both livestock and game use are noted.

3. Winter Census is made of the wintering pronghorn antelope herds in cooperation with the Game Commission. The 52 rangeland seedings, totaling approximately 142,500 acres, seem very attractive to antelope. It is believed the BLM seeding and water development programs will directly benefit antelope.

4. Float ramps are being installed in all new BLM water tanks. These ramps rise and fall with the water level within the tanks. The ramps have proven effective in allowing birds' access to the water; they also allow escape for rodents which would otherwise drown and pollute the water.

5. Small water cisterns are being installed along pipelines for small animal water supply. These precast concrete cisterns are float valve controlled and are fenced within a small plot to exclude larger animals.

6. Summer water is maintained in the seedings for wildlife. Most seedings are supplied with water from wells and large (average 18,000 gallons) storage tanks. Pipelines distribute the water to float valve controlled troughs. Water is left in several lines throughout the summer drought even though livestock are not grazing the seeding.

7. Spring developments are being modified at twenty projects during 1965 to include a small, fenced livestock enclosure which will collect overflow water. The sites will be planted to wildlife cover and forage plants, especially attractive to birds.

8. Browse seedings have been made during the past two years. In 1963 about one thousand small erosion check dams or gully plugs were hand seeded to bitterbrush, nomad alfalfa, fourwinged saltbrush, and crested wheatgrass. The results were encouraging and in 1964 approximately 185 acres of critical deer winter range were seeded to bitterbrush, fourwinged saltbrush and nomad alfalfa. Such seedings will be closed to livestock use unless future studies indicate such use to be in the best interests of the wildlife resources.

9. Several sites are being developed as "wildlife areas." These generally include an abundant water source about which plantings of Russian Olive, caragana, black locust, and Chinese elm are made. The State Game Commission plans to introduce game fish; the sites are fenced to exclude livestock. Recreation facilities are planned at one such site this year. The sites are from 100 to 200 acres in size. They create an oasis in the upland desert which is very effective in attracting and holding small game and song birds.

10. Waterfowl habitat improvement is being experimentally done at a large reservoir near Jordan Valley. Several aquatic plant species have been established to provide forage and cover for waterfowl. This program may hold a significant potential for creating desirable waterfowl habitat in the numerous perpetual reservoirs of the Great Basin upland desert area.

McINTOSH - BLM - Nevada

As it has been pointed out in the past, the BLM has overlooked wildlife, but perhaps inadvertently has assisted wildlife in some of the programs; specifically in the restriction of livestock numbers and range reseeding work as well as water development. We have a number of projects in cooperation with other agencies as for example our work with goose nesting platforms, and water developments with the Fish and Wildlife

Service. We have also cooperated in research projects with the Nevada Fish & Game Department and the University of Nevada. We have one on evaluation of big game range.

PHILLIPS - U. S. Forest Service

The Forest Service manual defines wildlife as "all the wild mammals, birds, and fishes, whether classed as game or nongame, predators or rodents, beneficial or detrimental." The National Forest objective is to manage the habitat for all wildlife; but in actual practice, in Region 4 at least, the emphasis has been placed on management of big game habitat rather than the total habitat. The future trend in Region 4 will be toward managing habitat for all species. This will be accomplished through multiple use planning and coordination. For example, a multiple use survey and report are required for any project or activity that results in the disturbance of soil or vegetation. This means that the land manager must go out on the ground before a project is initiated and determine how the project will affect all species of wildlife found on the area involved. Where the impact of any species exceeds tolerable limits, the project must either be abandoned or modified to reduce the impact on the affected species. Other measures taken to improve nongame habitat are spot or strip spraying on brush eradication projects and fencing a considerable area around springs or other watering places to provide cover for wildlife.

A game range inventory is being made in conjunction with the range allotment analysis program being conducted at the present time. The game range analysis consists of designating the herd or management unit boundaries; the mapping of seasonal use range; the designation of key areas for game; and the establishing of inspection units on the key areas. The key areas are classified as to condition and trend, and studies such as browse utilization transects, pellet group transects, fenced exclosures, and 3-step transects are installed.

There are many big game range problems in Region 4. Much of the critical winter game range in the region is in poor condition. Juniper invasion poses a problem on thousands of acres of range. Considerable rehabilitation work is being conducted in the piñon-juniper type by the various Fish and Game Departments, the Bureau of Land Management, and by the Forest Service.

Bitterbrush, one of the most valuable browse species in the region, appears to be fading out of the picture in many areas. A rather intensive age survey conducted on bitterbrush on the Sawtooth National Forest in southern Idaho showed an average of a trace of seedlings, 5 per cent young plants, 65 per cent old plants, and 30 per cent decadent plants. This lack of reproduction is especially serious in view of several other factors. During the past few years, nearly 20,000 acres of bitterbrush range have been destroyed by fire. There have been two mouse population explosions during the past six years which have resulted in extensive damage to bitterbrush stands in some areas. The tent caterpillar population appears to be increasing rapidly at the present time.

DASMANN - Region 5, U. S. Forest Service - San Francisco

During the last sixteen years we have treated some 25,000 acres for improvement of habitat for wildlife. The first eleven years of the work was financed principally by Fish & Game funds and from county fish and wildlife fine monies. About 1950, the Forest Service began getting funds for habitat improvement. In 1959 our region received \$11,000 of wildlife project money. In 1965 we get \$141,000. This will give you an idea of how things have progressed. We have nine wildlife biologists in the region now. A big share of their time goes into analysis of big game range. This includes mapping of seasonal ranges, transects and key areas. About half of our big game management plans are completed now. The units cover more than national forests in many instances; therefore, we cooperate with the agencies that are involved. Much of our money has gone into chapparel type conversion. We have also done a lot of brush work in the east side as well as release of browse by piñon and juniper control. In the last five years we have treated about 14,000 acres in vegetation manipulation of one kind or another, over 300 water developments and considerable miscellaneous work.

SCHWARTZ - Region 6, U. S. Forest Service

We are happy to participate in this organization and feel a real need for this sort of thing, hoping that something really results from it. As we get into wildlife habitat work we realize how weak we are in having specific information. Region 6 consists of 26 million acres in Washington and Oregon. We have quite a variety of habitat types all the way from the upper sonorian to the alpine and precipitation up to 200 inches in some areas. Our work in wildlife has accelerated in the last 8 years starting with a rather modest budget as Bill Dasmann has pointed out and we are currently receiving about the same amount of money as Region 5. About half of our money is going to personnel. At present we have about 15 full-time biologists. Every forest of the region has one or more technical people trained in wildlife. Much of our efforts are coordination of use to protect various cover plants and help the overall utilization of our range. We are also protecting stream courses recognizing important fishing values in many of them. Range analysis work is constituting a large portion of our program. Coordination and planning of timber management and cutting practices are worked out to benefit wildlife as much as possible. We have the greatest fisheries resource in Region 6 of any place outside of Alaska. Briefly some of the things we are engaged in are as follows: Direct seeding of browse species (principally bitterbrush), various water developments, trails through brush fields, fertilization, fencing of streams, sagebrush spraying -- this rounds out our direct habitat management pretty well.

HARRIS - Pacific Northwest Range Experiment Station - Portland

Speaking for the three experiment stations represented here, I would like to say that our entire program is cooperative in every respect. Contributing manpower, money and other services as a cooperative effort. In

general, the Experiment Stations' work is directed towards studying the physiology and ecology of the plant species making up important wildlife habitat. Secondly, the program involves research in the interrelated programs of timber, watershed, wildlife and other resource values. The third general area is research in the field of habitat improvement. Our work is set up primarily on a project basis, staffed by scientists working on a specific mission. At the Pacific Southwest Station we have one project on fish and game habitat. Their efforts for probably the next five years will be toward the great basin habitat problems. They also are working with fisheries habitat at the station. The Intermountain Station has three habitat wildlife projects. The first one is the deer winter range, Idaho project, the second is the northern rockies forest wildlife project, and the third project of game range restoration and wildlife livestock relations. At the Pacific Northwest Station in Portland there is currently one wildlife habitat project. It deals with big game habitat, principally in Oregon and Washington, with a current staff of four scientists and a projected level of six scientists by 1972. The Intermountain Station has five scientists and a projected staffing of 18 while the Southwest station has three scientists and a projected level of five. We expect in the future to have a number of scientists working on the west side problems of the Olympic Elk and Black-Tail deer as well as fisheries projects. We have another project which is animal related. This is the animal damage project at Olympia, Washington, with four scientists now and projected at a level of six.
(Written reports submitted by R. W. Harris and W. O. Shepherd.)

HARRIS - Pacific Northwest Forest and Range Experiment Station

LINE PROJECT REPORT FOR YEAR ENDING APRIL 30, 1965

1. Line Project Number: FS-PNW-1801
2. Line Project Title: Big-game habitat -- Pacific Northwest.
3. Titles of Studies Concluded or Terminated.
 - a. Cyclic levels of carbohydrate reserves in bitterbrush.
 - b. Subalpine species adaptability trials (Bald Mountain).
4. Titles of Studies Begun:
 - a. Effects of trampling, utilization, and competing vegetation on growth and survival of bitterbrush (Silver Lake and Elder Flat).
 - b. Use of legumes on logged areas for improving grouse habitat.
5. Other Approved Studies:
 - a. Total Number: 16

b. Important Studies:

- (1) Effect of ponderosa pine thinning on understory (Methow and Pringle Falls)
- (2) Understory vegetation response to five levels of growing stock in young lodgepole pine.
- (3) Effect of physiographic factors on bitterbrush production.
- (4) Pellet group distribution and sampling techniques.
- (5) Effect of grazing on density, spatial distribution, and age structure of bitterbrush.
- (6) Foraging habits of mule deer and cattle and factors affecting them on the Silver Lake herd range.
- (7) Seasonal habitat use by deer and elk in the central Blue Mountains of Oregon.
- (8) Ecological distribution of antelope bitterbrush and curl-leaf mountain mahogany in eastern Oregon.

6. Significant Findings During the Year:

a. Published:

- (1) Klemmedson, James O. and Justin G. Smith.
Cheatgrass (Bromus tectorum L.). The
Botanical Review, April-June: 226-262. 1964.
A comprehensive review of the literature and
current status of research on cheatgrass.

b. Unpublished:

- (1) Seasonal habitat use by deer and elk in the central Blue Mountains of Oregon.
Mule deer and Rocky Mountain elk are among the important users of forest and range areas in the central Blue Mountains. A knowledge of their habitat requirements will aid administrators in coordinating management of big game habitat with that of other uses.

The study was expanded during 1964 to include each of the three habitat types found on the Starkey Experimental Forest and Range, and the combined diet of deer and elk was determined for the spring and summer periods of use. The technique used was not adequate to give meaningful results for the fall period and is being revised. Seasonal big game diet is summarized as follows:

Forage Class	Grassland		Open Forest		Dense Forest	
	Spring	Summer	Spring	Summer	Spring	Summer
- - - - - Per cent of Diet - - - - -						
Grass and Grasslike	1	6	9	87	Trace	10
Forbs	99	94	50	9	2	2
Shrubs	--	--	41	4	98	88
	100	100	100	100	100	100

Big game diet reflected the marked seasonal changes that occurred in the availability of palatable forage. During the spring the grassland produced the most forage and received the heaviest use of the three types. Common camas (Camassia guamash) and bicolor biscuitroot (Lomatium leptocarpum) were the major species in the diet. Important open forest species were heartleaf arnica (Arnica cordifolia), a spring forb and common snowberry (Symphoricarpos albus). Big whortleberry (Vaccinium membranaceum) and grouse whortleberry (Vaccinium scoparium) dominated the dense forest diet.

As the succulent spring forbs matured in the grassland, big game shifted most of their diet to grasses and shrubs in the two forested habitats, and use increased in both. The open forest led the three types in summer use and production with elk sedge making up 87 per cent of the diet and 47 per cent of the vegetation in the type. Whortleberries again dominated the dense forest diet. Forbs produced over 40 per cent of the dense forest vegetation in each period but the species apparently were unpalatable.

Regardless of season or habitat type, big game use of the area was light. Only a small percentage of the total available forage of the most important species in the diet was used. The results infer that the amount of forage competition between livestock and big game on adjacent range was probably small during the spring and summer of 1964.

- (2) A study to investigate the foraging habits of mule deer and cattle, and factors affecting them on the Silver Lake herd range.

First-year observations of deer feeding during the fall-winter-spring period on range not used by cattle showed a sudden partial shift from bitterbrush to green Sandberg's bluegrass in April and another sudden shift to new inch-long leaders of low sagebrush in mid-May. Hereford cattle, grazing in an area with year-round protection from deer, preferred low sage flats and seasonal drainages during the first part of the spring period. Then they gradually moved to the surrounding bitterbrush-bunchgrass habitat. Only light use occurred in timber-browse types. Bitterbrush use by cows on the bitterbrush-bunchgrass type reached 55 per cent by mid-June and 63 per cent by late June.

In an area open to deer and cattle, cow-use patterns were as indicated above except for bitterbrush which had been completely used by deer during the winter. Instead of bitterbrush, the cows in this area used 30 per cent more herbaceous forage than they used in the area where bitterbrush was available.

This information on patterns of use by deer and cattle will provide guidelines for proper seasons and intensities of grazing by these two kinds of animals. Ultimately, this work should provide a basis for efficient range management to obtain compatible use by big game and livestock on the same winter ranges.

(3) Understory vegetation response to five levels of growing stock in young lodgepole pine.

Experience has shown that reduction of competition from trees produces changes in understory vegetation, but the specific nature of these changes is not well understood. Land managers need them defined in qualitative and quantitative terms because these changes can materially influence livestock and game management practices.

Two growing seasons after initial thinning, herbage production decreased 38 and 47 per cent under 18.5 and 12.5-foot tree spacings respectively and there were no detectable changes under 7.5 or 6.0-foot spacings. Slash was left on the treatments for one growing season before being removed. This resulted in the deposit of a thick layer of needles on heavily thinned plots. It is likely that this slash and extra litter cover was an important factor contributing to the decrease in production; similar treatment applied to ponderosa pine with slash removed immediately showed an increase in understory following thinning.

Results from this study will provide guides for further detailed research, and a basis for developing management plans to fit the specific forage production and cover changes that occur when pine stands are opened up.

7. Plans for Next Year:

Wildlife Habitat Research being conducted from Wenatchee, Washington, and Bend, Oregon, will be partially phased out and reoriented because of the transfer of project personnel to La Grande, Oregon.

a. Studies to be started or terminated:

(1) To be started:

- (a) Effect of clearcutting mixed-conifer species on deer and elk use in northeastern Oregon.

(2) To be terminated:

- (a) A habitat study of the South Silver Lake deer herd range.

b. Manuscripts:

- (1) Effect of grazing on density, spatial distribution, and age structure of bitterbrush stands. Burt R. McConnell. (Jour. of Wildlife Mangt.)
- (2) Understory response three years after thinning pine. Burt R. McConnell and Justin G. Smith. (Jour. of Range Mangt.)
- (3) Spatial distribution of deer and elk pellet groups in small uniform habitats. Burt R. McConnell. (Jour. of Wildlife Mangt.)
- (4) Bitterbrush nutrition levels under natural and thinned ponderosa pine. J. Edward Dealy. (PNW Res. Note)
- (5) Spotlighting deer as a management technique in western Oregon. J. Edward Dealy. (PNW Res. Note)
- (6) Seasonal variations of available carbohydrate accumulations in bitterbrush. Burt R. McConnell and George A. Garrison (Jour. of Wildlife Mangt.)

8. Assignments:

<u>Professional</u>	<u>Man-months</u>
David F. Costello	3.50
Justin G. Smith	10.76
Burt R. McConnell	11.05
J. Edward Dealy	11.05
Paul J. Edgerton	11.38

Non-professional

Number

Clerk	1
Aides (summer only)	2

9. Cooperators and Their Contributions:

Washington State University	Technical assistance
Washington State Dept. of Game	Land, labor, material
U. S. Soil Conservation Service	Technical assistance
Oregon State University	Technical assistance
Oregon State Game Commission	Technical assistance, labor, material
National Forest Resource Management	Labor, material, equipment, land

SHEPHERD - Intermountain Forest and Range Experiment Station

LINE PROJECT REPORT FOR YEAR ENDING APRIL 30, 1965

1. Line Project No. FS-INT-1801
2. Line Project Title: Deer Winter Range - Idaho
3. Titles of Studies Concluded or Terminated: None
4. Titles of Studies Begun: None
5. Other Approved Studies:
 - a. Total Number: Eight
 - b. Important Studies:
 - (1) Natural revegetation of browse species on granitic soils of Idaho game winter range.
 - (2) Effects of game use on survival and growth of seeded bitterbrush.
 - (3) Selection of adapted browse species for revegetating big-game winter range in Southwest Idaho.
 - (4) Investigation of methods to increase survival of bitterbrush seedlings.
 - (5) Effect of high temperature (dry heat) pretreatment on the germination of bitterbrush (Purshia tridentata) seed.
 - (6) Twig diameter-length-weight relations of some browse species.

- (8) Site potential of granitic soils in southwestern Idaho for bitterbrush production.
- (9) Bitterbrush seedling establishment as affected by soil moisture and environmental temperatures.

6. Significant Findings During the Year:

a. Published:

- (1) Basile, Joseph V., and Robert B. Ferguson. 1964.
Say stink bug destroys bitterbrush seed. Jour. of Range Mangt. 17(3):153-154.
The Say stink bug (Chlorochroa sayi Stal) was proved to feed on ripening bitterbrush seed. Feeding by this insect blackens and shrivels the seed and renders it non-germinable.
- (2) Basile, Joseph V., and Robert B. Ferguson. 1964.
Six-legged seed eaters. Idaho Wildlife Review XVII(3): 5-7. Nov.-Dec.

A popular account of research on insects affecting bitterbrush flowers and seeds in southwest Idaho. A narrow-winged thrips (Frankliniella occidentalis), a gall midge (Phytophaga sp.), a moth (Plutella sp.), and a stink bug (Chlorochroa sayi) destroyed about one-third of the potential seed crop in the year of study. A sucking insect, probably Psylla spp., is suspected as the cause of additional damage to seed.

b. Unpublished:

Study (9)

Grasshoppers -- a menace to bitterbrush seedlings

After considerable preparation in spring 1964 to establish a controlled field experiment to determine the effect of moisture and temperature on bitterbrush seedling establishment, first year results were all but lost due to grasshopper damage. Ninety-six of 180 experimental bitterbrush seedlings were lost to grasshoppers despite grasshopper control measures in cooperation with the Pest Control Division of A.R.S. Data on the 64 surviving seedlings did not provide conclusive results on moisture or temperature effects. The established installations were replanted in fall of 1964 for a second attempt at positive results with a more elaborate grasshopper control program. Certainly the 1964 results are dramatic evidence of the potential grasshopper damage to seedling bitterbrush.

7. Plans for Next Year

a. Studies to be Started: None

b. Studies to be Terminated: None

(Study [6], "Twig diameter-length-weight relations of some browse species" has been supplemented instead of terminated as reported in last year's report. Studies [2], [4], and [5] have been concluded but will not be terminated until final reports or manuscripts have been prepared.)

c. Manuscripts:

(1) Ferguson, Robert B., and Joseph V. Basile. Survival of spot-seeded bitterbrush in Idaho. (Station Research Paper)

8. Assignments:

Professionals:

J. O. Klemmedson	9.6 man-months
R. B. Ferguson	12.0 man-months

Non-professionals:

Biological Aids	6 man-months
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9. Cooperators and their Contributions:

The Idaho Department of Fish and Game financed approximately one-half of the project's costs.

1. Line Project Number: FS-INT-1802
2. Line Project Title: Northern Rockies Forest Wildlife Habitat
3. Titles of Studies Concluded or Terminated: One
 - (3) Relationship between numbers and amounts of twigs utilized for two key winter browse species in western Montana.
4. Titles of Studies Begun: Four
 - (8) Comparison of plant aerial volume and forage production.
 - (9) Measuring microclimate with simple inexpensive equipment (joint study with Project FS-INT-1702(9)).
 - (10) Studies of the influence of silvicultural thinning on wildlife environment.
 - (11) Identification of northern Rocky Mountain shrubs using morphological characteristics of the woody stem. Cooperative study with Montana State University.
5. Other Approved Studies:
 - a. Total Number: Five
 - b. Important Studies:
 - (1) Influence of logging and slash disposal practices upon resulting seral vegetation (Badger Creek elk winter range browse study).
 - (2) Clearwater browse rehabilitation study.
 - (5) Vegetal succession following fire in the Douglas-fir zone western Montana.
 - (6) Ecological response and community development following a fire in western Montana.
 - (7) An examination of the relative accuracy and efficiency of quarter methods in determining plant densities.
6. Significant Findings During the Year:
 - a. Published:
 - (1) Mueggler, Walter F., 1964. Ecology of seral shrub communities in the cedar-hemlock zone of northern Idaho. Ecological Monographs 35:165-185, illus.

Large areas of native forest in northern Idaho have been modified by fire and logging. Burning has destroyed both climax and seral vegetation, and logging disturbance has produced important ecological changes.

The seral shrub communities which follow fire or logging are of particular interest to both the forester and game manager. The forester wants rapid tree regeneration and therefore wishes to speed plant succession. Conversely, the game manager wishes to maintain the areas in the seral shrub stages because they produce palatable browse for deer and elk on critical winter range.

This article discusses the relationship of 24 shrubs and 69 herbs to environmental variables. Numerous species were found to be significantly associated with types of disturbance, exposure tree canopy, years since disturbance, latitude and soil potassium. Several species were associated with particular levels of shrub cover, elevation, position on slope, per cent slope, soil parent material, and soil organic matter. A few species were associated with levels of soil phosphorous, pH, soil moisture, capacity, and soil depth.

Seral shrub communities cannot satisfactorily be classified into discrete groups based on statistical appraisal of interrelationships because of variability in species composition under similar environmental conditions.

Tall-growing shrubs are most abundant on sites that have been broadcast burned; primary shrubs are likely to be Salix scouleriana, Packistima myrsinites, Vaccinium spp., and Rubus parviflorus. Ceanothus Sanguineus C. velutinus, Prunus emarginata, Alnus sinuata, and Spiraea lucida are more abundant on burned areas than on unburned areas.

Tree overstory influences the amount and composition of shrub understory: Tall and intermediate-height shrubs decrease in amount as the tree canopy increases.

b. Unpublished:

- (1) Lyon, L. Jack, 1964. Estimating serviceberry forage production from crown volume measurements. Paper presented to Northwest Section, The Wildlife Society, Missoula, Montana.

A method was devised by which the volume of a cylindroid superimposed on a shrub crown can be converted to grams forage production. The regression of forage production on crown volume was found to be strong on individual sites. However, by clipping 10 random plants it is possible to

establish a reliable regression line appropriate to the site under examination.

- (2) A known-parameter bitterbrush stand in the Bitterroot Valley of western Montana has been examined using a variety of sampling techniques. For density estimates, quadrat samples proved to be the most accurate, but 1100 random replicates of a 5' x 5' quadrat were required to produce a sample mean within 10 per cent of the true mean (P: .95). Neither Morisita's nor Cottom and Curtis' version of the point-centered quarter method was considered accurate, and a variable-length rectangle method was found to be completely inaccurate -- despite a high level of statistical precision. Crown-cover estimates using line-transects and the angle-gage did not produce comparable answers, and statistically reliable samples using either method were considered impractically large.
- (3) A total of 852 serviceberry twigs from 110 plants on 11 sites have been examined to determine relationships between length, weight and diameter. Weight analyses are incomplete, but the regression of length on diameter was found to be sufficiently consistent for field use in determining browse utilization. A sample of 30 random twig diameters can be used to predict twig length before browsing within 10 per cent (P: .95). When combined with postbrowsing measurements and converted to percentage utilization, estimates are apparently no more than 12 percentage points in error. Further analysis, and refinement of the field technique, are required.

7. Plans for Next Year:

a. Studies to be terminated:

- (2) Clearwater browse rehabilitation study.

b. Studies to be started:

- (12) Recovery of a Douglas-fir forest community in Idaho following a prescribed crown fire.

c. Manuscripts:

- (1) Stickney, Peter F., 1964. Note on winter crown-kill of Ceanothus velutinus. Proc. Manta Acad. Sciences, Butte (in press).
- (2) Stickney, Peter F. Browse utilization based on percentage of twig numbers browsed. (Submitted to Journ. Wildlife Management.)

- (3) Lyon, L. Jack. Wildlife habitat problems and research needs in the northern Rocky Mountains. (Forest Service Research Paper)

8. Assignments:

Professionals:

L. Jack Lyon	12 man-months
Peter F. Stickney	12 man-months

Non-professionals:

Range aid	3 man-months
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9. Cooperators and Their Contributions:

Curtis H. Halvorson, Wildlife Research Biologist, U. S. Fish and Wildlife Service, provides technical cooperation investigating animal population development following fire, FS-INT-1802(6), and on study FS-INT-1802(1).

Melvin S. Morris, Professor of Range Management, Montana State University, provided technical assistance and labor in establishing parameters for a bitterbrush stand; and cooperates in sampling studies.

National Forest Administration: Silviculture Branch R-1, and Bungalow R. D., Clearwater N. F., provides labor and technical assistance in thinning study, FS-INT-1802(10): Darby R. D.; Bitterroot N. F.; and Ketchum R. D.; Sawtooth N. F. provide protection of study plots in burned areas.

Reuben A. Diettert, Professor of Botany, Montana State University, and Mrs. Arlene Dale, graduate student, conduct laboratory phases of study 1802(11), under cooperative agreements between INT and NSU.

Bureau of Land Management, Missoula office, are providing labor and technical assistance in a study of understory response following silvicultural thinning of ponderosa pine; part of study FS-INT-1802(10).

1. Line Project Number FS-INT-1803
2. Line Project Title: Game range restoration, and wildlife-livestock relations.
3. Titles of Studies Concluded or Terminated: None
4. Titles of Studies Begun: None
5. Other Approved Studies:
 - a. Total Number: Five
 - b. Important Studies:
 - (1) Game forage restoration.
 - (3) Determination of forage preferences, grazing patterns and other range relations of deer and livestock on spring, summer, fall, and winter deer range grazed by cattle in summer in central Utah.
 - (4) Evaluation of deer and elk habitat in relation to livestock summer range in Utah.
 - (5) Effect of deer, rabbits, and livestock on development and persistence of seeded species in the juniper-piñon zone.
 - (6) Relation of deer, elk, and cattle grazing to regeneration of aspen, and permissible degree of use on aspen range.
6. Significant Findings During the Year:
 - a. Published:
 - (1) Plummer, A. Perry, Donald R. Christensen and Stephen B. Monsen. 1964. Job Completion Report of Game Forage Revegetation Project. FS-INT-1803(1), Department Information Bulletin No. 64-14, 25 pp. Utah State Dept. of Fish and Game, March 1, 1963, to Feb. 28, 1964.

Shrubby forage species have shown marked variation in height growth and herbage yields among young cultivated plants produced from seeds from different locations. Fourwing saltbush provides an example of such variation on two favorable sites.

Growth of Fourwing saltbush from different sources.
Average gram yield and height in inches at end of second growing season

Source	<u>Irrigated*</u>		<u>Non-irrigated</u>	
	Yield	Height	Yield	Height
New Mexico	287	36	68	24
Delta, Colorado	261	33	70	23
Wales, Utah	200	36	40	21
Tuba City, Arizona	170	30	55	24
St. George, Utah	150	30	48	23
Ephraim, Utah	125	30	87	25
Jackson Springs, Utah	125	22	38	21
South Emery, Utah	125	30	32	21
Nevada	120	30	70	21

* Irrigated twice each year.

On the irrigated area, plants from seeds of the highest yielding source (New Mexico) produced 2.4 times more herbage than those from the lowest yielding source (Nevada). On the non-irrigated area yields from these two sources were nearly equal, and plants from the local seed source (Ephraim) yielded highest. On this drier site the highest producing strain was more than double that of the lowest.

Irrigation greatly increased both yield and height growth. These preliminary results indicate that limited irrigation and cultivation provide a real opportunity for increasing seed yield and quality by shortening the period between planting and seed production and increasing size and vigor of shrubs.

Other browse species have shown striking growth variations between locations and within localized areas. Differences in seedling establishment, drought and frost resistance, palatability and seed production have also been observed, indicating hopeful prospects for improvement by selection and breeding of browse for game range.

- (2) Julander, Odell, and Duane E. Jeffery. Deer, elk, and cattle range relations on summer range in Utah. Proc. Twenty-ninth North Amer. Wildlife Conf. 1964. pp. 404-414. (Study 4)

A preliminary report of factors affecting deer, elk, and cattle use of mountainous summer range at Willow Creek, Fishlake N. F., showed that vegetation type had a major effect on distribution of cattle and deer, but little on elk.

Preference of deer, elk, and cattle for vegetation types as
indicated by use calculated from fecal counts

Preference	Deer ^o		Elk NS		Cattle**	
	Veg. type	Days' Use/ac	Veg. type	Days' Use/ac	Veg. type	Days' Use/ac
First	Mixed shrub	6.4	Mixed shrub	3.9	Grass-forb	16.2
Second	Oak	5.3	Aspen	2.8	Mixed Shrub	10.3
Third	Aspen	4.2	Oak	1.8	Aspen	7.7
Fourth	Conifer-shrub	3.7	Grass-forb	1.8	Aspen-conifer	4.9
Fifth	Aspen-conifer	2.1	Aspen-conifer	1.7	Oak	3.0
Last	Grass-forb	0.7	Conifer-shrub	1.7	Conifer-shrub	1.3

** Differences in animal days' use significant at the 1 per cent level.

o Differences in animal days' use significant at the 10 per cent level.

NS Differences in animal days' use non-significant at the 20 per cent level.

Mixed shrub and aspen types were among the three most preferred types for deer, elk, and cattle. These are the two highest forage-producing types on Willow Creek range. Mixed-shrub type was first choice for both deer and elk and second choice for cattle. Aspen and oak types were either second or third choice for both deer and elk. First choice for cattle was the grass-forb type, which was the last choice of deer and one of the 4 types used least by elk.

Steepness of slope was another important factor affecting animal distribution on summer range, particularly for cattle.

Index of animal days' use per acre and percentage of total use for
deer, elk, and cattle in relation to steepness of slope.

% Slope	No. of 10-acre Study Sites	Index of Animal days' use per acre			% of total		
		Deer*	Elk ^{NS}	Cattle*	Deer	Elk	Cattle
0-10	10	2.9	3.4	17.1	13	27	43
11-20	20	4.3	2.8	7.7	19	22	20
21-30	18	3.5	3.0	8.0	16	24	20
31-40	10	5.2	2.1	4.8	23	16	12
41+	7	6.5	1.4	1.9	29	11	5
Totals	65	22.4	12.7	39.5	100	100	100

* Differences in animal days' use significant at the 5 per cent level.

NS Differences in animal days' use non-significant at the 20 per cent level.

Over half of the total deer use, but only 27 per cent of the total elk use was on steep slopes of 30 per cent or more. Most of the cattle use (83 per cent) was on slopes of less than 30 per cent. Deer preferred the edges of types to their interiors. This "edge effect" also influenced elk, and to a lesser extent, cattle, in their use of the range. Areas of dense browse, which were little used by cattle because of inaccessibility, provided favorable habitat for deer.

b. Unpublished:

Study 1. Many planted shrubs do well on the more favorable sites on winter game ranges. Very few species are successful where soils are shallow and precipitation low. After 9 years, big sagebrush and rubber rabbitbrush are outstanding in percentage survival, growth and rapid development on less favorable sites. Others showing good promise on severe sites are: Common lilac and Russian olive from Nebraska, Siberian peabush, Peking cotoneaster, tartarian honeysuckle, Russian mulberry, Western sandcherry, dahurian buckthorn, skunkbush sumac, Fendler woodsrose, and mountain snowberry. In younger plantings black sagebrush, winterfat, fourwing saltbush, yellowbrush, budsage, and bladdersenna are doing well.

Recommendations for game range restoration were developed for approximately 125,000 acres on Utah State Fish and Game Department, U. S. Forest Service, Bureau of Land Management, and private lands.

Study 4. Studies of deer, elk, and cattle grazing are being made on the Jebo unit of the Cache National Forest and Four-Mile unit of the Uinta National Forest as well as at Willow Creek. Here the following interactions were significant: steepness of slope and grass volume, steepness of slope and total forage, steepness of slope and rock cover, rock cover and browse volume. These interactions aid in interpreting some of the complex relations between habitat factors and animal distribution; e.g. large amounts and kinds of forage influence the greater intensity of deer grazing on steep slopes.

Study 5. Preliminary examination of data indicate that deer and cattle seriously damage aspen regeneration in many parts of Utah. Damage is closely correlated with intensity of big game and cattle use separately or in combination. Presence or absence of adequate amounts of forbs, grasses, and browse determine to a large extent the severity of aspen damage. In all cases of severe damage to aspen, overutilization and deterioration of better forage plants were evident. Lack of certain age classes in many aspen stands were traced back to the time of large build-ups in deer populations.

7. Plans for Next Year:

- a. Studies to be started: None
- b. Studies to be terminated: None
- c. Manuscripts:

- (1) Julander, Odell, Mont E. Lewis, and O. C. Olson. Aspen climax and disclimax communities of the Intermountain Region and problems of multiple use management. Submitted to the Journal of Forestry for publication.
- (2) Plummer, A. Perry, et al. Restoration of game ranges in Utah. To be published as a Utah State Fish and Game Department Bulletin.

8. Assignments:

Professionals:

Odell Julander	11 man-months	
A. Perry Plummer	10 man-months	
Donald R. Christensen	12 man-months	(Cooperators Utah
Stephen B. Monsen	12 man-months	State Fish & Game Department)

Non-professionals:

2 range Aids	6 man-months
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9. Cooperators and their Contributions:

Utah State Department of Fish and Game assigns two professional assistants, some labor help, equipment, material, seed, and land for research in game range restoration.

A livestock operator, Robert Rasmuson, is furnishing 20 acres of fenced land for intensive game range planting trials near Ephraim.

The Utah Cooperative Wildlife Research unit and the Botany Department of Brigham Young University furnishes consultation and advice to graduate students on thesis studies of wildlife-livestock relations studies.

The Fish and Wildlife Service, Research Branch, and Utah State Department of Fish and Game cooperate in long term deer-livestock relations studies in central Utah.

Various national forests in Utah furnish study areas.

MILLER - Soil Conservation Service - Sacramento

THE SOIL CONSERVATION SERVICE'S POLICIES
AND PROGRAMS FOR WILDLIFE HABITAT WORK IN CALIFORNIA

- I. The Soil Conservation Service is primarily involved in furnishing technical assistance on Soil and Water Conservation problems to private landowners in Soil Conservation Districts. This includes Wildlife Habitat Work.
- II. We also provide technical assistance through the Agricultural Stabilization and Conservation Service's Agricultural Conservation Program (A.C.P.), which provides some cost sharing to farmers and ranchers for certain Wildlife Habitat Practices - The "G" practices.
- III. We can also provide some financial assistance for Wildlife Habitat Enhancement through the Small Watershed Program, where projects are planned and approved.
- IV. The Service also cooperates by making up-to-date Soil Surveys. These should be essential to most Wildlife Habitat improvement work.
- V. We cooperate with other agencies in the selection and testing of improved plant species for conservation work.

Much has been accomplished along this line, at our Plant Material Centers, with Range grasses and Legumes. We are confident that similar results can be obtained with Waterfowl and Upland Game food plants.

This work is being done in cooperation with the State of California Department of Fish and Game and The Division of Soil Conservation, along with the Bureau of Sports Fisheries and Wildlife Refuge Branch.

- VI. We believe that real progress in wildlife habitat improvement work will occur on a broad scale only when it is economically justified. That is, when the landowner realizes sufficient return from his investment monetarily or otherwise.

This has been demonstrated in California with Waterfowl habitat for some time. It is now being done with quail habitat in prime areas in California, and some day soon it will be done with deer habitat on private land.

- VII. The Soil Conservation Service maintains recommendations in our local Work Unit Technical Guides for most wildlife practices, including adapted plant species and planting rates.

We try to keep these current and up to date and appreciate this opportunity to work with all of you and to exchange ideas and information.

MANAGEMENT-DEVELOPMENT PROGRAM ON SHELDON-HART
MOUNTAIN REFUGES

The management program is based on range surveys from which grazing capacities were determined for antelope, mule deer and mountain sheep as well as for livestock. Range allocations of forage and for areas of use by wildlife species were made first, after which the range available for livestock use was considered. Present big game populations are well below the capacity of the range. Livestock grazing is also limited to less than capacity to provide for inequities in distribution of use and for range improvement.

The purpose of management is to restore the grassland-browse type of range which occurred here prior to the recent alteration caused by excessive livestock use, drought, erosion and invasion of more arid plant species from the south, insofar as climate and soils will allow.

The development program is designed to aid management in this accomplishment. Invading plant species along roadways and similar disturbed areas are controlled by herbicides and by mechanical means. These include halogeton, whitetop, rabbit-brush and similar species.

Reduction of invading plant species on the open range is being effected by rotobating, spraying with herbicides, and controlled burning.

Fertile bottom lands, invaded by sage and rabbitbrush, are being restored to grasslands by seeding and controlled use after reducing the brush cover. By creating better livestock forage on these bottom lands, the midsummer and fall grazing pressure on bitterbrush and other important deer foraging areas by livestock can be reduced.

Although this program has been applied to only a small part of the area to date, some effects are quite evident.

The reduction of excessive brushy growth has allowed the grass-forb complex to increase and to stay green up to six weeks longer in the summer largely because of reduced competition for moisture. This provides a high protein diet for young antelope and sage grouse for a longer period.

Brush control and restoration of a better balanced grass-forb cover has changed the use pattern of some wildlife species. A fire burned about 5,000 acres of heavy sage growth across the top of Hart Mountain in 1954. Perennial grasses and forbs replaced much of the sage following the burn. Prior to the fire few antelope used this range. In 1964, 93 antelope spent most of the summer and fall season in the area.

In Deer Creek Basin, a controlled burn reduced the heavy sage stand on about a section. Perennial grass and forbs made a strong increase in the cover following the fire and a number of antelope used the area the past summer. Antelope were seldom seen in this part of the refuge prior to the fire.

A seeding trial was fenced in Wire Corral Flat. The grasses developed to tall and dense stands to be attractive to antelope and sage grouse. Controlled grazing by livestock removed much of the tall growth, after which both antelope and sage grouse found the area attractive. Prior to seeding, the area supported a sparse stand of rabbitbrush with very little grass or forbs in the understory.

Portions of these refuges are being opened for greater public use. Last year the western slope of Hart Mountain was opened to hunting for chukars, quail and waterfowl. This was done without greatly affecting the primary refuge program.

RIEGELHUTH - U. S. Park Service

As you know we are not a great manipulator of vegetation in the National Park, but we have our foot in the door a little. We are not a brush or cover manipulation organization but we do a little bit of it where we have to. We have joined in the last few years with other organizations in development of wildlife management plans and we have also our own internal wildlife management plan. Most of our management deals with managing animal numbers where necessary. We have a small reduction program on deer in the Kings-Sequoia National Park. This is confined to only 12 square miles of the park area, and is a concentration area where deer have been protected for seventy years and have done considerable damage to the plants in the area. In Death Valley we have done water development work and have put in a few springs for desert bighorn. Original water holes were pre-empted by early mining activity in the area and in order to hold desert bighorn in this range water development is necessary. For the first time we are actually doing some burning in the National Park within this region to determine the effects of burning on Sequoia tree production. This study will also determine such burning treatment on wildlife populations. For years we have done soil and moisture work in National Parks where erosion and other use have caused problems in various meadows. We have done considerable meadow study in Sequoia-King since 1941 and have enlisted the Southwest Station to do work in studying of our meadows. The Advisory Committee appointed by the Secretary of the Interior headed by Dr. Starker Leopold made certain recommendations that we are pretty well implementing in the park as far as habitat and ecology is concerned.

LONGHURST - Hopland Field Station - University of California

The University of California is primarily an educational institution working with students. However, another function is that of Extension work. At the present time we are sorry to say wildlife work carried out within the University is on a very limited scale. We have wildlife training programs at Berkeley and at Davis, but the total effort involved is quite small. There is however quite an emphasis now on ecology at Davis. From the experiment station side there has been habitat work carried out for years centered primarily in the range work at Berkeley, Department of Vertebrate Zoology at Berkeley and in the Agronomy and Animal Husbandry Departments at Davis, and at the various field stations. One of these programs has been carried out at the Hopland Station since 1951, with efforts devoted primarily to deer investigations. The Wildlife field is an area in which the University has a definite obligation to become more deeply involved.

GATES - Extension Range Specialist - Oregon State University

I cannot speak for the Fish & Game Department of the Oregon State University, but will say that within the range management field we are doing principally ecological relationships when it comes to wildlife. We are definitely interested in the use of all our resources and wildlife, of course, is a part of that resource.

GENERAL CHAIRMAN TEAGUE

It looks as though all of the agencies are tooling up for a big job ahead trying to prepare themselves for more intensive management of our wildlife resources. Ed Smith has asked me to comment on just what a wildlife extension specialist does, and I will be happy to do so. First of all, there are two extension wildlife management specialists at the University of California and many of the universities throughout the United States have such positions filled at this time. At the University of California, we conduct an extension program that involves both control and production phases of wildlife management, and we work very closely with experiment station and extension livestock, range, forestry and crops specialists as well as research staff of the Zoology Department, with various land-use agencies and organizations throughout the state. The program includes conveying the results of research in wildlife management to public and private land managers and other interested audiences, training of our county farm advisors, establishment of field demonstrations, direct teaching through meetings, publications, news articles, radio and television. Also, we develop educational programs in the county with farm advisors and encourage them in carrying out such programs. We make every effort to maintain close contact with sportsmen organizations, livestock, range and other farm groups, public agencies, boards and commissions.

McKEAN

I wonder if there is anywhere in the world a coordinated effort to find plants that will work in some of our critical big game ranges, similar to the world search for grasses for livestock?

MILLER

To my knowledge there is no such effort, but there does exist the machinery. At Beltsville we have a plant introduction program of plants from all over the world. This is primarily for plants for livestock. There is no reason why we couldn't put the same group of individuals on this Big Game Food problem and come up with something that would work. We should make our wants known on the subject to the right people. Every third year we have the research needs inventory where we invite other agencies to throw into the hopper projects that need to be worked on. These are worked on, primarily through the ARS (Agriculture Research Service). This would be one approach, of course, the other would be to ask for this information there in Portland, Oregon and get the ball rolling from that end of SCS's activities at our Portland office. You might also contact the Agricultural Research Service in Portland. That's the best I can say right now.

SHEPHERD - Intermountain Station

To the best of our knowledge no one in the United States has done any work in improving of browse plants. As you know, John, there is a committee known as W-6 that has to do with the introduction of new plants. However, primary interest has been working with cereals, legumes and others until last year. We joined this committee and the Intermountain Station of the Forest Service is now a part of that committee. We are now encouraging the introduction and testing of plants that are useful to wildlife. Also we have a project that we are pushing that is involved in genetics of plants. We hope, we will have about nine scientists on this project with the main emphasis on developing plants for wildlife habitat. There is a terrific variation in the browse plants that we now have and among the wildlife plants known to us considerable improvement could be made just through selection alone. In short, we are going to move into this area to develop better plants for wildlife habitat.

LONGHURST - Hopland Field Station

We are just on the threshold of understanding some of the plant-animal relationships. In other words, what is it that makes a plant a good forage species? This is one phase of research that I am personally interested in at the moment. We also suspect that the relationships are tied up in the physiological abilities of animals to utilize certain plants. The micro-organisms and bacteria in ruminants may be involved here. There has been some work done in Fort Collins, Colorado, which shows us that certain plants may be quite inhibitory to bacteria while others may stimulate bacterial growth. It behooves us to get right down to the fundamentals of ruminant physiology to understand some of these relationships. There appear to be genetic differences in one species of plant to digestibility as well as genetic differences among animals of the same species or sub-species to digest certain plants. It is quite conceivable that in plant selection we can do our work toward development of plants that fill a need in habitat work. We have to be able to define the desirable qualities of the plant. In agronomic circles it has been a tendency to develop species that grow in good conditions. These are not always the best for wildlife. An example is the grass smilo which is beautiful from the agronomic standpoint and will flourish throughout California, but it is almost entirely unpalatable to wildlife and domestic livestock. I believe that crested wheatgrass may have some tendencies in the same direction. Much work has been done and can be done with blood types also.

DEMING - Fish & Wildlife Service

It is a known fact that the recession of the glaciers have caused a northward migration of plants and animals. Quite often the northern movement of the animal is ahead of that of the plants. Silver sage, for example, which pretty much originated down in Mexico during the last alluvial and the Wisconsin glaciation, has moved northward into British Columbia and our big sage has moved north into the Frazier River drainages. Nature is replacing many of our browse plants that are in critical conditions, but she is doing it very slowly. We should also do considerable work with the cliff rose, Cowania sp. and it can certainly be extended beyond its present range to the north.

DASMANN - U. S. Forest Service

You might like to know that some years ago we put an ad in the paper for the Inyo Forest, for seed; fresh clean bitterbrush seed. We offered to pay 75¢ per pound and received all the seed we could use as a result.

HUBBARD, Panel Chairman - Research Problems in Wildlife Habitat

The panel on research problems in wildlife habitat can pretty well be discussed in length by researchers and research people, but we feel an open discussion of the problems of research and suggestions for research would be more fruitful. I have asked as lead-off man, Bill Cooperrider, of the Forest Service, as Bill is perhaps the best critic that I know of concerning research. He once told me that he expected nothing from research.

COOPERRIDER

I am quite critical of the research program particularly in this area of wildlife habitat development. To some individuals we are making big progress in this area but I don't believe it. The progress we are making and what we see on the ground does not bear this out compared to the job to be done. With all the emphasis, money and manpower we are still not getting the job done. There is more interest today in hunting and fishing than there has ever been before. As an example, most Californians know Modoc only has a mule deer, upland game bird, and waterfowl area. Yet the Modoc forest harvests considerable timber and is the largest grazing forest in Region 5.

We have more money and manpower than ever before and yet our actual progress on the ground comes in thimble-fulls. The interstate deer herd, for example, has fluctuated up and down and yet the habitat that supports that herd has continually gone down. There are many such areas. I admit that research is not the total answer but we must have a positive program. The program can't be totally one of cutting numbers of game or livestock. We must have a positive program of range and habitat rehabilitation. In the field of livestock range improvement we have made considerable progress both in the tools that we use and in public support. Today we are enjoying outstanding public relations with our landowners and ranchers. This is the so-called positive approach and I am sure that it would work with game and wildlife habitat management. As a matter of fact it has worked in some places, even though they are emotional subjects. The case is not hopeless if people such as some of you in this room will give us the information and tools on which to build a positive program, and in addition, if those of us who are administrators have the guts to go out and make a positive program out of it. If some action isn't taken we will find ourselves making a measurement on the last surviving browse plant as the public imposes a hunting closure. We are just about there now in some of our areas in Modoc, and have a partial deer closure due to political pressures by the uninformed.

DOMAN - U. S. Forest Service

I don't agree entirely with Bill. I think there are many areas in wildlife habitat work where we have made outstanding progress. I think Bill's charges here stem from our inability to manage big game. We must ask ourselves why is the range going down or continues to go down? Because we lack the know-how, or is it because we lack the tools to do the job? I think we know a lot more about big game management and management of big game ranges than we are able to apply. I am not saying we don't need more research; I firmly believe we do. We are actually failing in our salesmanship -- we need to get into more programs such as the one Dick Teague is in. We need to educate our people.

HUBBARD

There is much we need to learn on rejuvenation of winter ranges. The Modoc is clearing a lot of juniper in an effort to release pressure on various browse species. We can't tell from the research standpoint what the results will be. Perhaps as Idaho had mentioned earlier, there are certain ranges that we can do work with by use of fertilizer. We will also do some work in the use of livestock to set back succession and to favor browse species. We will see this on our field trip tomorrow. We have a project that we will be starting on that will evaluate various grazing intensities of domestic livestock and its effect on bitterbrush stands and other browse species. We shouldn't kid ourselves, research is not yet geared to handle the questions of managers in wildlife and habitat. In California there are two organizations who are specifically charged to work in this area. One is the University of California and the other the Pacific Southwest Station. We have only three people working in this area at the Pacific Southwest Station and in the University; if I understand it correctly, there is only one person with the direct charge of this work and that is Bill Longhurst. It is hopeful that an organization such as this symposium could be effective in energizing research that is needed.

LONGHURST

The computer also should be used to more fully evaluate the economic value of wildlife and various range conditions. The computer offers many possibilities and many answers to the evaluation of our habitat and wildlife problems.

COOPERRIDER

I have just noticed here in the anticipated appropriations for next fiscal year in the Forest Service -- perhaps this will answer some of the questions and things that have been brought out here this morning. For reforestation and timber stand improvement in the Forest Service, approximately 17 million dollars; recreation and public use, 25 million; wildlife habitat, less than 4. This may be somewhat of a clue as to why we are not getting more done on the ground in wildlife habitat work.

HUBBARD

I am not sure that browse reseeding which has received much of research attention and many dollars is the right approach that research should be working on.

UNIDENTIFIED SPEAKER

I think there are many projects now going on, such as the Vale Project in Oregon, where we can learn much in relation to wildlife if only the programs were better coordinated in that direction.

SHEPHERD

Even though we are quite dissatisfied with the amount of specific research work going on in wildlife habitat development, we should recognize that there are many good research projects in ecology and range. We can learn and apply much of these findings to wildlife management as Bill Longhurst has pointed out. There are many projects and many departments that we should not be bashful about working with or familiarizing ourselves with.

CALL

I know the many times I run into research projects quite by accident that are beneficial and that we can learn much from. I just wish there were some way or someone who could assemble all of the information on wildlife habitat research and distribute it to individuals who are working in this field. Perhaps this organization could be the focal point and the stimulus for such coordination.

STANTON - Panel Chairman, Wildlife Habitat Development Practices

I would like to now set down some guidelines that we might consider in dealing primarily here with the great basin habitat type. We should remember at all times that habitat improvement is no substitute for management. Since the actual scope of this symposium is undefined, whether we should discuss game birds, non-game birds, fisheries or big game, we will follow the general trend and stay mostly within the area of big game and big game ranges. I'm of the opinion that we should concentrate our efforts in sites where we can get the most return for our effort and then work on the rougher sites later. One thing perhaps that we have overlooked and is very important is the evaluation of our work. I noticed yesterday that the University of Nevada has an excellent range report out, dated April 1965. The Experiment Station is planning to employ an assistant to study range improvement practices and its impact on the big game resource.

GATES

Oregon State University has had a person working on evaluation of wildlife habitat for a number of years.

STANTON

Another thing we should consider is the use of various pesticides for control of insects that damage range species. Another thing that I would like to mention is a new chemical for selective control of green rabbit brush. I think in Nevada they have used this particularly in stands of sagebrush getting not over a 20% kill on big sage. This chemical is known as Piclorun. Another question is the effect of chaining on big game ranges. Is it good or bad? Another is the question of the necessity of sagebrush to antelope. Is it necessary in their diet? Can we evaluate and can we improve ranges for sage grouse?

And now we have asked several of the fellows to discuss some of the practices they are carrying out in their agencies to improve wildlife habitat. First I am going to ask Mel Cummings of the Oregon State Game Commission.

CUMMINGS

I will use slides as the quickest and best way to show you some of the things we are doing in Oregon. We have many thousands of acres of this great basin type. From the east side of the Cascades to the Idaho border, the southeastern quarter of Oregon is principally our great basin type. Land ownership is primarily federal land governed by the BLM. In Oregon there is something in excess of 15 million acres. Big game water developments have been done in this area by creating cisterns. This has been done in cooperation with the forest service. We have used 1500 gallon surplus wing tanks. We have also used concrete tanks and have installed from three to six a year. The plastic pipe shown here goes into the cistern and there is a float valve which keeps the water level where the deer can get at it. One nuisance is that the float valve has to be removed and replaced each spring.

QUESTION - What is the cost of one of these developments?

CUMMINGS

From \$250 to \$300. We supply the materials and the forest service supplies the labor to install them. This shows the plastic cistern used for upland game bird development. These plastic game bird guzzlers cost about \$125 each. We have also used these plastic guzzlers for chukar development. The cistern itself holds about 250 gallons of water. Evaluation of these water installations has not been complete even though we know the chukars are using these installations. We are not sure that it has materially increased the distribution of the birds. Bob Kindschy mentioned earlier the BLM stock water developments where radiating pipes go out from the central water source or tank development. In cooperation with them we have tapped on to the long extension lines and developed upland game water from them. This is a very inexpensive installation. The key is to get together with the BLM when they are laying their plastic pipeline and plan the program from that time. This provides upland game bird water over quite an extensive area where these pipes radiate out.

QUESTION - Have you tried any surface film chemicals to reduce evaporation?

CUMMINGS

We have used "evapotrol" from Arizona and it works real good on a restricted area but we haven't had much luck with it over larger areas. In cooperation with the other land use agencies, we have been developing anywhere from six to ten water developments a year. This is an example of one that has been developed for multiple purpose use for wild animals as well as human consumption and is used by campers. This slide shows the browse seeder that has been developed cooperatively by the intermountain research stations and the Hansen Machine Company. Perry Plumber has been instrumental in developing this. We have had real good luck with this piece of equipment. It costs around \$700. There has been experimental work with plantings in sagebrush areas where after the seeder goes by, the sagebrush is pulled back over the top of the seedlings to protect them. This equipment is designed for use on a jeep or a rubber tired tractor. It is not designed to be used on a caterpillar-type tractor but has been used with this equipment. Bitterbrush seed was drilled in with a regular grain drill, in one of the better sites and is an excellent stand of bitterbrush.

I have to disagree somewhat with Frank Stanton in the statement that these are the areas we should work with first because it's the rough inaccessible areas that get the heaviest use and the areas that are most critical where we need revegetation. When the chips are down the deer are not on these easy sites but are out on the rocky points. This bitterbrush seeding is in an 18-inch rainfall area near Mt. Hood. It's a four-year-old seeding. This is some work in timber cutting areas where we have planted bitterbrush plants and then put slash over the top of them for protection. It has worked out very well, but are not the real critical range areas. We hope to have some interesting information on how effective different methods are after chaining. Perhaps we should try broadcasting seed first and then using a chain to help get the seed into the ground. This slide shows an area that has been chained where the juniper had not been touched by deer when standing but you can see after they had been tipped over that they have been well utilized by deer. We also get right in behind any new fires and reseed areas that have been burned. This is intermediate range in central Oregon. Another cooperative project we have with the BLM is the seeding of nomad alfalfa. This is a lake bed in Lake County. We provided the seed and the BLM provided the labor to plant the seed. It is strictly for antelope. We are also encouraging the BLM to make crested wheatgrass plantings near the boundaries of our deer winter range. These plantings get early deer use and have a real potential for taking the pressure off of our browse in the late winter and early spring. We hope in the future to evaluate the effect of these wheatgrass plantings on our deer winter ranges. This slide is a takedown fence. It is a simple fence with a loop at the top of the center post and a loop at the bottom. You take it down just like you go through a wire gate. The forest service says a man can take down or put up about five miles of this type of fence a day. In this particular area the cattle will only be in the area for a month or so and the fence will be up to protect the meadow and then the fences let down as

this is an area of heavy elk use. Rock jacks are used here to good advantage. We also are doing work with goose nesting platforms, but it took a couple of years before the nests were fully utilized by the geese.

QUESTION - What site preparation did you give that particularly good stand of bitterbrush?

CUMMINGS

This was a cultivated field that had been worked up. It was put in with a stand of grass. In the Camp Creek project this year we are working with the BLM and are cutting off a couple of the flukes on the range land drill so two openings out of ten will have bitterbrush seed in them.

UNIDENTIFIED SPEAKER

We have some areas where we have planted bitterbrush together with grass and have not had too good results. Would it help to leave two vacant flukes on either side of the bitterbrush?

CUMMINGS

We have been thinking about getting the BLM to do some of this work with bitterbrush seed to try and determine whether or not there is heavy grass competition. We could cut off various combinations of flukes for drilling of grass and bitterbrush.

HUBBARD

We have found that if you keep your bitterbrush from 18 to 24 inches from the crested wheatgrass we got emergence of bitterbrush but not good development, so we recommend at least a minimum of 24 inches each way from the bitterbrush row.

DOMAN

In New Mexico and Arizona they have discontinued using the cable in piñon-juniper stands unless they are mature stands as they are not effectively pulling over the young trees. The young trees left are stimulated to grow, so in order to do an effective removal job it must be a mature stand of trees. We are still confronted with the problem of heavy deer populations right where we want to do our bitterbrush development.

SIMPSON

After Mel's presentation I don't have a lot to say, but I would like to elaborate somewhat on a few things. We have done some pretty good work cooperatively with the Oregon Game Department. We've gone into manzanita

fields about as high as your head and have opened up 12-foot strips with a dozer creating a lot of edge effect. For every mile we have two miles of edge. The amount of wildlife monies that we are getting on the Fremont Forest is very insignificant. Wildlife benefits are coming through the back door. We all know that much of the deer's diet in the spring is grass and therefore delayed grazing at this time of the year can be very beneficial to deer. The spacing of our trees is important in order to grow good timber and to give release to the browse and forbs in between. On the west side of the Cascades we have some interesting information from our cutting procedures. In the past, the clear cuts have been pretty good sized. On a 160-acre square clear cut you have two miles of edge. This is good deer habitat, but if you take 16 ten-acre clear cuts you get eight miles of edge and yet you produce as much timber so the size of these clear-cut areas is gradually coming down and this of course is better for habitat of wildlife.

UNIDENTIFIED SPEAKER

I think we should give more consideration to fences and fencing of new seedings with deerproof fence. On a large scale this can be done rather cheaply over the long haul and can be done in some areas for as low as \$8 per acre. At Silver Lake we find that livestock is a very important part of proper utilization of the deer winter range. The problem is to know when to put them on and take them off. We need to have the proper timing of putting of livestock on these grass-bitterbrush ranges in order to remove the grasses but yet not get livestock use on bitterbrush. This we are working on. We realize the answers are coming out in thimblefuls because we only have a thimbleful of money and thimbleful of man power, but we are going to get some interesting information from the Silver Lake studies.

DEMING

We have found on the refuge that it is when the grasses begin to dry up on the open range that the cattle turn to bitterbrush.

McKEAN

It seems from our trapping and marking program that we keep catching the same individuals from one winter to the next, indicating that they do have a fixed area they come to. I am wondering if it wouldn't be possible, therefore, to selectively reduce certain populations, perhaps precisely enough to protect a given development, without eliminating an entire population of deer. This is something we would like to try and demonstrate. In Oregon, I believe this can be done.

SHEPHERD

In Montana they claim they have definitely done this selective control of elk herds and have been able to pull out those animals that they want to.

LONGHURST

It has been pretty well demonstrated by our studies at Hopland and along the coast where we have tagged and trapped animals that we know their movements and that with a small buffer zone established we can pretty well select and harvest animals that are causing problems if the public will accept such a program. In California we can't get the public to accept the amount of kill that would be effective in this regard.

TEAGUE

I think to help answer John McKean there are numerous cases throughout the western United States where man through history has done this very thing, i.e., killed out individual herds. I think the next step of re-establishing a herd if we once eliminate them must be given consideration. Another thought I want to throw out at this time is a temporary study that was started in Colorado some years ago where in deep snow country browse plantings were made on the lee side of temporary snow fence. The theory behind this was to establish new seedlings under snow drifts and let the snow drift actually protect the young plant from browsing until it had a chance to be more fully developed. This idea may be stimulating to someone in this group. To my knowledge, this program was never fully evaluated.

UNIDENTIFIED SPEAKER

We made our nomad alfalfa plantings primarily for antelope, but we found that sagegrouse were using it considerably and deer to a lesser extent. We did make a few mistakes, however, and first of all we did not inoculate our plantings. We also made them in the fall. Most farmers make those plantings in the spring. We planted the crested wheatgrass right in the same drill rows with the nomad so there is competition. We hope in the future to plant inoculated seed in the spring and on prepared ground. This one nomad stand is four years old right now.

McKEAN - Chairman Wildlife Habitat Ecology

As you know, this word ecology refers to an organism and its environment and I know of no one better qualified than the man I have asked to speak to you and serve on this panel today, Dillard Gates, Extension Range Management Specialist from Oregon State University.

GATES

One of the main problems that we have facing us today is the fact that we just don't understand the environment we are working with. We know where we want to be perhaps but we don't know where we are now. We don't know the road or how to get where we want to go. Before we can make any progress we must have a full understanding of all of the elements we are working with: the plants, the animals, the soils and all of the various components and then how each of these may respond to various management

treatments. Until we understand this concept any management treatments we try are merely shots in the dark. It would appear from what has gone before here today that we have made many shots in the dark in this wildlife habitat work. In other words, unless we fully understand the ecology of an area we won't make much progress. If the situation is as black as I have painted it, then is it not surprising that we have made many errors. As a matter of fact, we now accept errors as a part of our management. The less we know about ecology the more mistakes we will make.

A habitat type is a plant community. It includes vegetation, soil and other things that are associated but is named primarily by the vegetation that occurs. It can be recognized either by vegetation at its climax or in one of its successional stages. We don't need a climax in order to understand the habitat type we are dealing with. We have very few climax-type plant communities to work with. We are usually working with other stages of succession. We can't single out any one factor in the environment and fully understand what we are working with. We must know all factors. We must recognize that fire and grazing and other things are a part of the total picture. As plant communities deteriorate more and more, that is, they go downhill from the climax, it becomes more important to place emphasis on the soil and other factors in the environment than on the vegetation itself. The understanding of this habitat-type concept is also quite important in sampling for research purposes. It eliminates many duplications and is more meaningful in the data that are used. This is one reason that people are questioning the Parker 3-step method because it crosses over a number of habitat types and the information cannot be easily interpreted. If we understand the habitat type we are able to better manage what we are working with because we fully understand all of the small components and are therefore able to put this vegetative mosaic back together. We are able to take what we understand in one area and apply it to another. We also have a basis then to predict response to management. It is valuable to us for setting up adaptability trials. I would hope we are getting beyond the old shotgun stage approach that we have used in many of our nurseries for adaptability selections. If you have information on tolerance limits of most of the plants we are working with, if we have a better understanding of habitat types I think we can do a better job of matching up likely plants to likely sites. I would suspect that much of our work with bitterbrush, as brought out here today, was the old shotgun approach and if we had pulled all the deer and all the cows off of some of these areas the bitterbrush would not have grown because it just wasn't adapted to the site. I don't mean to be critical of this; I suppose this is just part of trying to get a job done, but what I am pleading for is a better understanding of what we are working with before we start some of our projects. If we understand the plant communities, we can also understand better the geology of an area. We can understand animal movements; if we understand the habitat type we can understand better why the animals are in this community. This, of course, would lead to control of the animal movement. (Gates demonstrates the habitat type through a series of slides.)

STENINGER

This intensive research is fine except it's pretty difficult to bridge the gap between it and practical management on large acreages. We have

tried to take the best out of a number of studies and work up our own method. Many of these research projects look wonderful. Our problem is how in the world do you apply them? We find that much of this intensive work reflects one winter's use on the browse and not the overall trend of the range.

DOMAN

We are using the overall trend idea on most of our analysis work rather than the current annual use of browse as an indicator of range conditions.

McKEAN

I think most of us will recognize that we do not want the climax-type for good deer management purposes. In fact, it's the last thing that we do want for good deer management. I think at the Silver Lake Project Ed Dealy has some work that may explain what we are talking about. Ed, would you give us a rundown of some of your work?

DEALY

Very little of our present habitat is at the climax type. It's usually at one or several stages below the climax. Right now management does not have the information to know exactly where in succession a range may presently be, where the climax stage is, where it can be potentially, or where a range might end up if succession continues to go downhill. Depending upon the species of game we are managing for will depend upon what stage of succession we want to attempt to achieve. If we can get these various habitat types analyzed and categorized, we might be able to interpolate between and recognize the successional stages when we are in the field. At Silver Lake we have a series of pastures or exclosures with known stocking rates of deer and livestock. We are getting interesting information from these series of exclosures. We are using our pellet group counts for analysis to help determine use. We have two of them deer-proof, one that is cow-proof. In one we have deer only; in one cows only; in one there is a known number of cows with free access for deer. We have a very thorough soil vegetation survey of the area. We have not had a chance yet to analyze the data statistically from these exclosures. We are beginning to obtain some interesting information on the various competition between livestock classes. It is in deer winter range along the edge of the timber where we have the best stands of bitterbrush. In the cows-only exclosure where the cows were turned in on May 21st with six to eight inches of bitterbrush leader, the cows immediately started in on the bitterbrush. We had bitterbrush use by mid-June of somewhere around 40%, where we had no competition from deer. By July 1st the bitterbrush was used up around 60% which is probably as much as it should be used in its fairly good habitat. In the exclosure where there were cows but free access by deer and where the browse had been eaten down to nothing before the cows came in, was 90% utilization on the bitterbrush and heavy use on forbs. In most of our allotments in this area, this is the typical situation. The cows come in late May and there is no bitterbrush left for them. In order to get good compatible use,

we want to have the cattle utilize the grasses and then remove them before the leader growth gets to the point on the bitterbrush where the cattle eat it, leaving the bitterbrush for the deer.

GATES

You are forcing the cattle to utilize the grass growth. Have you been able to get a clean-up on the old trash grass such as is left the the various fescues?

DEALY

Yes, I think we will see this. I studied this last summer, and I think we will see greater use on fescue. In the deer-only enclosure we have an excellent grass stand.

QUESTION - Are you getting any bitterbrush seedlings in the area where you have so much grass?

DEALY

Very little. We did see some, but very little. We may have all the vegetation the area will allow and it would be impossible to create very much more space for bitterbrush. Perhaps the climatic and soil conditions are such that we have a maximum of vegetation now. Another study that we have in cooperation with the BLM is the survival of bitterbrush in crested wheat seedlings. We are also gathering basic data on curl-leaf Mountain-mahogany, so if the day comes when we want to work with this browse species or extend its range, we will have something in the way of knowledge of the requirements of the species.

HUBBARD

We are at the stage on the Devil's Garden where we are just about out of the brush management business. There are many decadent stands and virtually no reproduction. In a new study we are going to try and use cattle to see if we can set back succession again. This will be a small, short term project, but we hope that any findings here can be applied somewhere else on a larger scale. This study with a grazing treatment will be started next spring. The project study area is in the Devil's Garden. Our approach is simple -- at each location we are putting eight, five-acre pastures. We hope to answer the thing that was raised this morning, that is, what time of the year we can cattle graze these types and still have bitterbrush survive. Various grazing intensities and seasons will be tried out.

THE EVENING SESSION - WILDLIFE HABITAT SYMPOSIUM

Called to order by General Chairman R. D. Teague

SMITH

Discussions for this type of a meeting have been going on for about a year and a half now in various places. In December of 1963 at the Interstate Antelope Conference in Alturas, was perhaps the earliest discussion of such a symposium or workshop. It was felt that all land-use agencies needed some means of exchanging information in the wildlife habitat work. At the California-Nevada Section of the Wildlife Society Meeting last January in Davis, a luncheon meeting was held to discuss the wildlife habitat workshop possibility. As a result of this, I undertook to write a letter pointing out some of the thinking and objectives for such a meeting. Interested federal and state agencies as well as universities and colleges were notified and a committee meeting was held in Sacramento on March 23, 1965. At this time the scope of such a workshop was unknown; it was also undetermined how large a geographic area or what species of game would be considered. Fish and Wildlife people had suggested that Klamath Falls be utilized for the first get-together. Considerable thought, however, was pointed toward a meeting of Californians only somewhere in the northern part of the State. The next get-together for discussion of such a workshop was at the Desert Bighorn meeting in Redlands, California. At that time the entire thing was brought into focus and Klamath Falls was decided upon as the first habitat symposium. It was here that we decided to go ahead with the program that had been planned for northern California but to hold it in Klamath. Dick Teague had been drafted as general chairman and the other sessions were also developed and chairmanships established. Dick Hubbard was asked to chair the session on research and John McKean and Frank Stanton were soon contacted to chair the other two sessions. Representatives saw a need for exchange of ideas on a regional basis among the states as well as within each individual state. There have also been discussions as to who should attend; technicians, biologists and fieldmen who are working directly with these problems or whether they should be widened in scope and involve administrators.

TEAGUE

Thank you Ed. I think that is a fine explanation of some of the history behind this symposium and the needs for such a get-together. I would like to make it perfectly clear that there has been no intention to exclude anyone interested in this symposium. We have tried to keep it as workable as possible and on a practical basis. In many respects this symposium is exploratory to determine the need for such an organization.

SMITH

I forgot to say that at the Bighorn meeting it was felt that such a meeting should be by habitat types; in other words, we should meet each

year in a different place where there is a different plant association where management and research is being done in this particular habitat type. Arizona has expressed they would like to have a symposium in the desert area. Then another year we could visit the north coast timber type, and another year the Rocky Mountain area. Every five years we could come back to the same vegetative type and update everyone on what has happened in the intervening years.

UNIDENTIFIED SPEAKER

I wonder if this function could be realized through the various societies such as the Wildlife Society or the Range Society and the various sectional meetings.

McKEAN

I agree there is need for exchange of information in this field. I am not convinced this is the most efficient means for such a meeting or exchange of such information. Since the early 1950's the Western Association of Game and Fish Commissioners have been concerned about wildlife habitat work. They even talked about hiring an individual who could move around throughout the various western states gathering and disseminating information in habitat work. The mechanics of such an operation seemed so complicated and the workings of each individual state were of such a nature that this idea was given up and as a result there was the establishment of the Western Browse Committee. Within this committee there was a working agreement with the various federal agencies themselves. Until 1962 we did have a Western Browse Committee that was functioning. Responsibility rotated among the states. Each year a publication came out that was good and could be used for reference. The publication identified the work being done and by whom.

What are we doing to standardize habitat type? Can you answer this, Dillard? I can visualize a number of different workers going out and putting their own nametag on various habitat types. Is there a standardization of nomenclature?

GATES

I think that if the word habitat type is used the way I have defined it, it is an abstraction really, and I don't think we are going to have nomenclature or descriptive discrepancies. It doesn't say what is there now. It describes what the climax would be or what plant community would be there at the climax stage.

McKEAN

I would propose that the U. S. Forest Service Experiment Station be asked to assume the responsibility and establish the position of a wildlife habitat coordinator to serve the function that we have discussed and the needs that we feel here today.

HARRIS

I feel we have an obligation to each other and to the organizations we represent to maintain professional standards and to disseminate information. I cannot agree that the Range Society and the Wildlife Society do not have time for us and for the things that we feel need to be discussed. Let us not undersell our professional societies.

TEAGUE

Before we take action on any of these proposals, I would like to review the points of significance as brought out during this symposium. First a strong appeal was made for a worldwide search for plants adaptable to wildlife habitat development work. The need for a coordinating committee to disseminate information has been discussed at length. We have heard this evening that some of you think our professional organizations can do this work better than an organization such as this gathering tonight can do. It also has not yet been defined what the scope of an organization of this type should be. Next it has been brought to our attention that wildlife habitat research work is understaffed and lacks adequate funds. Dillard Gates has brought to our attention the fact that we must understand all of the factors in a plant community before we can do adequate research and habitat development. This is necessary in order to get away from the shotgun approach to habitat work. Another impression I get from this meeting is the fine participation by federal agencies, which apparently was not the case with the Western Browse Committee. Finally, I must ask, did we really attain the objectives we set out for ourselves? Anything new and worthwhile? Bob Sherwood indicates that he has. Perhaps there are others who have also.

We have a number of avenues of approach to consider now. First of all, should the Forest and Range Experiment Stations of the Forest Service be asked to become the information and liaison agency on wildlife habitat research and management practices? Secondly, should the various professional societies be encouraged to take greater time to help disseminate information and provide space on meeting agendas for discussion of wildlife habitat work? The third approach would be for the individual agency to call a symposium such as this when they feel they really have something worthwhile to show? Perhaps all three approaches would be good.

SHEPHERD

I think we are talking about two different things here this evening. One is the very fine proposition by John McKean for dissemination of general information of what is going on in the field. However, there has been repeated expression of the need for learning of individual problems and of delving deeper into individual problems by those researchers who have a special problem confronting them. These individuals want to know more about others who are working in a similar type of research or management problem.

RIEGELHUTH

As you recall at our meeting in Sacramento, we discussed this business of how many should be at a meeting. We felt there should be people from all disciplines; specialists in each phase of wildlife management so that the specialists in these various phases could evaluate a particular wildlife habitat management practice as it is related to their particular function in wildlife work.

MILLER

We have a parallel case for a coordinator for this type of job in waterfowl work, the Fish and Wildlife set up such a position. This was done on a fly-way basis.

SMITH

I like the proposal that John McKean has made for a coordinator to disseminate information on a regionalized basis regarding current researching practices in wildlife habitat work. However, I still feel a need in my own job for closer field coordination with individuals in work such as I am doing. As an example, the BLM is doing a considerable amount of sagebrush manipulation on several areas. The Forest Service is also doing it. We still need to know just how to manipulate this brush so that it will do the most good or the least harm to wildlife. Just how large patches should we leave? Should they be in squares? Should they be in strips? How large should they be? What are the individual needs of sage grouse, of antelope or deer? After all projects that are going ahead even in the face of the needs we have discussed today, we still need a chance to have sessions about individual problems.

TEAGUE

Ed, you are familiar with the sage grouse symposium coming up this month in Walden, Colorado. They will be discussing some of the very questions that you have just asked concerning sagebrush manipulation and its impact on wildlife.

SMITH

There are many symposiums for specific purposes. In the East there is one for deer, some for range grasses, for diseases, there are councils for special pheasant problems and other councils and symposiums throughout the United States. A coordinator could be the determining factor as to whether or not a certain project is ready to be utilized as a symposium, whether it is at the right stage to be looked at by workers in the field. I think we should get away from the word coordinator because this word is not too palatable in some circles.

MILLER

Is there a wildlife specialist in the Federal Extension Service?

TEAGUE

No, but this is a position that all state extension wildlife specialists feel needs to be filled. Wildlife work is delegated to other personnel within the Federal Extension Service.

(At this time a motion was made, seconded and passed that the resolutions committee of the Western Association of Fish and Game Commissioners should receive for their consideration a resolution from this organization pointing out that a real need exists for a coordinator of wildlife habitat information. The resolution will propose that the Western Association of Fish and Game Commissioners request that the Forest and Range Research Branch of the U. S. Forest Service perform the service of annually reviewing and reporting all pertinent progress and findings relating to wildlife habitat research management or development on forest or range lands in the 11 contiguous western states. Both Everett Doman and John McKean will be at the Western meeting in Anchorage, Alaska, in July and were asked to serve as a two-man committee to get this resolution to the resolutions committee of the Western Association of Game and Fish Commissioners for their subsequent action.)

R E S O L U T I O N

WILDLIFE HABITAT INFORMATION COORDINATOR

WHEREAS, all of the western states and the federal land management agencies are actively engaged in research, management, and development programs to improve the environment for beneficial wildlife; and

WHEREAS, these many and diversified programs are producing new knowledge and techniques that are urgently needed by all of the above agencies; and

WHEREAS, there is no adequate vehicle for coordination of the available information accruing from these programs; and

WHEREAS, the Forest and Range Experiment Stations of the U. S. Forest Service have the major federal responsibility for wildlife habitat research in the western states;

NOW THEREFORE BE IT RESOLVED that the Western Association of Game and Fish Commissioners requests that Forest and Range Research Branch of the U. S. Forest Service perform the service of annually reviewing and reporting all pertinent progress and findings relating to wildlife habitat, research, management, or development on forest or range lands in the eleven contiguous western states.

Explanation of Resolution:

On June 9 and 10, 1965, representatives of the California, Idaho, and Oregon game departments, the Bureau of Land Management, Forest Service, Park Service, Soil Conservation Service, University of California, and Oregon State University met at Klamath Falls, Oregon, to exchange essential information and explore methods of maintaining a continuing exchange of such knowledge.

The group objectively examined all available methods of coordinating and exchanging information through professional societies and regional or national conferences, and concluded that those media could not be expected to disseminate the quantity of information required. They reviewed the history of the Western States Browse Committee which partially filled this need from 1953 through 1962. The weakness of that system was that the individual states preparing the annual report had no opportunity to evaluate or edit the material supplied by participating agencies, and the rotating chairmanship did not provide the continuity of effort or the quality of publication desired.

The possibility of holding regional symposiums annually for the purpose of exchanging knowledge between persons engaged in habitat research and management and development programs was considered, but the cost of such assemblies and the probability that few state workers could attend were recognized disadvantages.

It was concluded that the Forest and Range Experiment Stations which serve the western states were best equipped to provide the leadership and service required for assembly and distribution of essential information.

In view of the volume of money being spent on environmental controls that affect wildlife resources, it was believed that this effort deserves assignment of a well qualified ecologist who could devote full time to examination of state and federal habitat research, management, and development programs, and such a service could result in substantial savings by providing the knowledge required for coordination of effort and improved project design.

If it is not possible to assign this function to a well qualified person, the alternative would be for each station to assemble and coordinate the available information by region and distribute a concise summary of findings annually to all interested agencies.

It was further concluded that the creation of a wildlife habitat information coordinator would not relieve the practicing professionals of the responsibility of making their plans and findings known to other workers or searching out all available knowledge relating to their assignment or project. It would provide an additional vehicle for such communication and be particularly useful to administrators and managers who need concise reference material.

Submitted by

John W. McKean
Oregon Game Commission
June 11, 1965

A motion was passed that a standing committee be established, composed of John McKean, Ed Smith and Dick Teague for the purpose of retaining continuity of the organization as represented by this group at the symposium. Any special requests or correspondence concerning this symposium or its objectives should be funneled through the standing committee.

SMITH

Even if this coordinator position goes through, is there need for a meeting of this type in some area next year?

DEALY

I would think that if someone has something to show it would be their responsibility to set up a similar workshop as this.

(It was the consensus of opinion that each agency represented at the symposium should send to Teague a brief summary of the work they are now doing in habitat development in the Great Basin type for inclusion in the Transactions.

A motion was made by John McKean that Dick Teague be allowed to edit the transcription of this symposium in order to save secretarial effort and materials for reproduction of the transaction. This motion was seconded and passed.)