

CONSERVATION COMMITTEE REPORT ON EFFECTS OF ALTERATION OF SAGEBRUSH COMMUNITIES ON THE ASSOCIATED AVIFAUNA

Sagebrush (*Artemisia* spp.), principally big sagebrush *A. tridentata*, is a conspicuous feature of the environment in the western United States. Prior to settlement, sagebrush-dominated rangelands occurred from the western Dakotas into southern Alberta, Montana, Idaho, Washington, Oregon, northern California, Nevada, Utah, Wyoming, and Colorado into northern New Mexico (Beetle 1960). Much of the land occupied by sagebrush is public domain administered by the Bureau of Land Management, U.S. Department of Interior; and the U.S. Forest Service, U.S. Department of Agriculture. Significant areas are in private ownership, having been acquired under a variety of homestead and mining acts and government grants. Many areas formerly occupied by sagebrush have been cleared for agriculture with the last large area to be affected being in the Columbia Basin.

Historically, livestock grazing has been the primary use of many sagebrush lands although recreational use has increased in recent years. Sagebrush has been considered by many land managers to have little value and special interest groups have successfully pressured government agencies into programs to "improve" western rangelands. Improvement has meant the reduction of sagebrush and reseeding with grass. Because of increased efforts in the late 1950's and 1960's to "control" sagebrush in the western states, and in view of the increasing demand for red meat and energy in the foreseeable future, the Conservation Committee of The Wilson Ornithological Society decided to review the available data on the effects of reducing sagebrush on the associated avifauna, especially those species presumed to be largely dependent on sagebrush communities during some portions of their annual cycle.

HISTORICAL RESUMÉ

Sagebrush has been a dominant feature of rangelands in western North America since before the advent of modern recorded history. Reports of early travelers through the west, when much of the vegetation was presumed to be in pristine condition, indicate that brush, particularly sagebrush, was common (Vale 1975). It has been variously estimated that sagebrush covered from 58.7 to 109.3 million ha of land at one time, with big sage comprising 58.3 million hectares of the total (Sturges 1973, Beetle 1960). Extent of area dominated by sagebrush prior to modern civilization is unknown but little evidence is available to support the widely held belief that present sagebrush ranges are the result of past overgrazing on most sagelands.

Much of the area once dominated by sagebrush has been altered by mechanical, chemical, and biological methods. Major reasons for this alteration were principally related to agriculture; the need for more cultivated land for grain and hay crops, and the desire to increase livestock forage production. Thus, by the early 1950's sagebrush on at least 0.6-0.8 million ha was reported as being successfully controlled (Pechanec et al. 1954). By 1966, Schneegas (1967) estimated that 2.0-2.4 million ha of sagebrush had been treated by some method. Estimates in 1974 were that about 30% of all sagebrush land in Colorado had received some treatment since 1900. The situation in this state is not indicative of the entire western United States but it is

conservatively estimated that at least 10% of the sagebrush rangelands in the west have been altered.

Prior to the end of World War II, most treatment of sagebrush was by mechanical methods such as plowing, chaining, and disking, although fire and heavy grazing pressure (by sheep and goats) had been used in some areas prior to mechanical control. After the mid-1940's, use of herbicides, primarily 2,4-D, became an important tool in reducing the abundance of sagebrush (and inadvertently many other shrubs and forbs). The basic premise was that sagebrush was competing for nutrients, water, and space with more desirable grasses. Since sagebrush is relatively unpalatable to livestock, the reasoning was that once sagebrush was controlled, the rangelands could support more livestock due to the increased growth and density of the grasses. Lost in the rush to eliminate sagebrush was the value of this shrub to many forms of wild and domestic animals. Most programs designed to reduce sagebrush on public lands were supported with public funds. On private lands, some public funds were used through cost sharing programs of the Soil Conservation Service and Agriculture Stabilization and Conservation Service. Cost per hectare of brush control and re-seeding with grasses has been estimated to range from about \$15.00 to \$62.00 (Vale 1974).

Historically, little concern was expressed about potential effects of alteration of sagebrush habitats on wild animals. Patterson (1952) questioned sagebrush control projects as a serious threat to maintenance of huntable populations of Sage Grouse (*Centrocercus urophasianus*), pronghorn (*Antilocapra americana*) and mule deer (*Odocoileus hemionus*). In 1954, Carhart suggested that at least 4 species of birds—Sage Grouse, Sage Thrasher (*Oreoscoptes montanus*), Sage Sparrow (*Amphispiza belli*), and Brewer's Sparrow (*Spizella breweri*)—would be adversely affected if sagebrush were eradicated. In the early 1960's, with advent of large-scale control projects, conservation departments of the western states, under the auspices of the Association of Western State Game and Fish Commissioners, formed the Western States Sage Grouse Committee to coordinate documentation of sagebrush loss and to make recommendations for mitigation, if possible, of such loss. Little research has been or is being done on other birds dependent upon the sagebrush type except for 2 studies in Montana (Feist 1968, Best 1972).

AVIFAUNA OF SAGEBRUSH COMMUNITIES

Over 100 species of birds which forage and nest in sagebrush communities have been listed (Wetmore 1920, Gabrielson and Jewett 1940, Dumas 1950, Booth 1952, Huey and Travis 1961, Bailey and Niedrach 1965, Walcheck 1970, Behle and Perry 1975). Birds which are obligates (almost entirely dependent) of the sagebrush type are: Sage Grouse, Sage Thrasher, Sage Sparrow, and Brewer's Sparrow. Near obligates are Green-tailed Towhees (*Chlorura chlorura*) and Vesper Sparrows (*Pooecetes gramineus*). Other species that are conspicuous and locally important are: Ferruginous Hawk (*Buteo regalis*), Golden Eagle (*Aquila chrysaetos*), Prairie Falcon (*Falco mexicanus*), Sharp-tailed Grouse (*Pedioecetes phasianellus*), Mourning Dove (*Zenaidura macroura*), Burrowing Owl (*Speotyto cunicularia*), Common Nighthawk (*Chordeiles minor*), Ash-throated Flycatcher (*Myiarchus cinerascens*), Horned Lark (*Eremophila alpestris*), Western Meadowlark (*Sturnella neglecta*), and Brewer's Blackbird (*Euphagus cyanocephalus*).

PRESENT STATUS

Alteration of sagebrush rangelands is still occurring but at a much reduced level. Probably fewer than 20,000 ha are being treated each year. Use of herbicides to reduce sagebrush densities is at the lowest level since 1950. Reasons for reduced alteration of sagebrush habitats, especially on public lands, relate to questions concerning the effectiveness of such programs, economic conditions (cost vs return), requirements of the National Environmental Policy Act, and concern about herbicides as possible agents causing birth deformities (Vale 1974).

Research in recent years on the effects of alteration of sagebrush rangelands indicates that removal of sagebrush significantly reduces soil moisture loss (Sturges 1973), increases dry matter production by forbs that remain, and makes grass more readily available to livestock (Daubenmire 1970). Evidence now becoming available indicates that any control of sagebrush outside of continuous agricultural practices is short-lived (Harniss and Murray 1973, Thilenius and Brown 1974). Thus, to increase forage production for livestock, sagebrush control must be on a continuing basis. Despite the cost and obvious limitations, agencies such as the Soil Conservation Service still actively support sagebrush conversion projects citing not only benefits to domestic livestock but also to elk (*Cervus canadensis*), deer (*Odocoileus* spp.), grouse and other wildlife (Petersen 1971).

Numerous studies throughout the western states have amply demonstrated the dependence of Sage Grouse on sagebrush during all seasons (Patterson 1952, Klebenow 1969, Peterson 1970, Wallestad 1971, Eng and Schladweiler 1972, and many others). Studies of the effects of herbicide spraying on populations of Sage Grouse have been conducted (Carr and Glover 1970, Martin 1970), but available data do not present a clear pattern. It would appear from these studies that control of sagebrush in narrow strips (with wide strips of undisturbed sage) is not detrimental to Sage Grouse. Such alteration may even be beneficial as large monotypic stands are broken into smaller stands with more edge. It has also been observed that Sage Grouse prefer the leaves of seedling sagebrush plants and seek them out in disturbed areas. In contrast to the possible benefits of certain sagebrush alteration done in strips, control of sagebrush in large blocks (larger than 16 ha) appears to be detrimental.

While research on Sage Grouse has been relatively intensive and well-funded, research on non-game species dependent upon the sagebrush community has been almost nonexistent. Best (1972) found that in central Montana, Brewer's Sparrows relied on sagebrush for nesting sites and declined 54% one year after a plot was sprayed. Follow-up studies (Pyrah and Jorgensen 1974) on this same area revealed that 5 years after a total kill of sagebrush, Brewer's Sparrows were almost completely eliminated and replacement by other species had not occurred. This is in contrast to the results of a limited study in Wyoming (Scott et al. 1966) which indicated that total numbers of birds tend to increase with sagebrush spraying. First-year results from another study in Wyoming support Best's findings, as populations of Brewer's Sparrow decreased 67% one year after sagebrush spraying with 2,4-D (Schroeder and Sturges 1975).

Data presently available indicate that the 4 species of birds that are obligates of the sagebrush community are in no danger of elimination from large areas, although total populations probably are reduced from pristine levels. Other species of birds seasonally associated with the sagebrush community do not superficially appear to

have been affected by sagebrush control programs. Many of these species appear to be adapted to the structure of the sagebrush community, not sagebrush itself. It is thus possible that disturbance of this community by overgrazing, spraying, or plowing, while improving the area for some species such as Horned Larks, Western Meadowlarks, Vesper Sparrows, Lark Sparrows (*Chondestes grammacus*), and Mourning Doves, may be detrimental to other species, especially raptors.

While direct control of sagebrush as a range "improvement" practice is at a low level, many sagebrush-dominated lands have potential for development of energy resources, especially coal. Large tracts of sagebrush range in Wyoming, Colorado, and to a lesser extent, Montana, are underlain by coal deposits. Strip mining of these deposits on a limited basis has been occurring for several years. Extensive mining of some deposits is now underway and it appears that strip mining will be a major disturbance in sagebrush areas for at least the next 40 years. Effects of mining will be apparent long after extraction has been completed as current reclamation attempts leave considerable doubt that disturbed lands can be restored to any semblance of their original condition. With increasing demands for energy, oil, gas, and geothermal exploration on public lands in the western United States has vastly expanded. Present effects of increased energy exploitation on bird life of the sagebrush type are not known. It is anticipated that most effects will be detrimental, especially those related to disposition of overburden, waste products, and road development. Research on the revegetation of these strip-mined lands with grasses and forbs is now underway but little attention has been given to reestablishment of sagebrush. Of considerable importance to the avifauna in areas surrounding energy extraction sites is the unknown but assumed detrimental effects of increased human populations living and working in the area.

SUMMARY

Sagebrush, long considered by land managers to be an undesirable shrub, has been reduced throughout its range in western North America. Conservative estimates are that at least 10% of the 58.7 to 109.3 million ha of sagebrush lands have been altered through biological, chemical, or mechanical methods. Four species of birds (Sage Grouse, Sage Thrasher, Sage Sparrow and Brewer's Sparrow) are heavily dependent on the sagebrush community. Adverse effects of sagebrush control are well documented for Sage Grouse and partially documented for Brewer's Sparrow. Effects on Sage Thrashers and Sage Sparrows have not been documented. It is probable that these 2 species have also been adversely affected by reduction of sagebrush. Many other birds have been affected by alteration of sagebrush rangelands, with some being positively affected, and others, especially raptors, being adversely affected. Alteration of sagebrush communities by mechanical and chemical methods for livestock grazing is presently at the lowest level since 1950. Overgrazing of this community on public and private lands is still a major problem and the outlook is not favorable. Development of energy resources, especially coal, will have major impact on sagebrush communities and dependent avifauna for at least the next 40 years. Concern about the effects of alteration of sagebrush communities on wild animals is increasing at both the state and national level. However, judging from past performance of various governmental agencies, wildlife use of such lands is not presently considered to have high value.

RECOMMENDATIONS

1. Sagebrush should be considered a worthwhile and desirable plant because: (a) it supplies food and cover for wildlife and livestock; (b) it is a desirable ground cover plant helping to prevent or reduce soil erosion, reduce drifting of snow, supply a large amount of humus, and tap a deep moisture supply thereby increasing the amount of herbage produced per hectare; (c) aesthetically, sagebrush is a very desirable plant and its alteration creates a displeasing blotch on the landscape.
2. It should be recognized that disturbed or treated sagebrush habitat is dynamic and is a temporary condition which is especially vulnerable to overgrazing.
3. Sagebrush treatment should be confined to only the most productive sites where the greatest favorable returns can be expected.
4. Sagebrush alteration should be confined to relatively small areas of 16 ha, preferably less. These should be in irregular strips which would give a maximum amount of edge for wildlife and maintain habitat diversity, and be aesthetically most pleasing. Such strips should be alternated with undisturbed strips of sagebrush about twice as wide, or more, and preferably at right angles to the prevailing wind and/or the slope of the land.
5. Grazing and browsing by wildlife and livestock is a desirable use of the sagebrush range. This use should be carefully controlled to encourage maximum forage productivity and to prevent range deterioration.
6. Wildfires and all destructive uses of the sagebrush habitat should be discouraged and controlled and kept to a minimum amount. Prescribed burns may prove to be a good management tool in the future.
7. Sagebrush control programs should be scheduled so as to avoid the bird nesting season as much as possible. Late April, May, June, and early July are the main nesting months.

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NEW LIFE MEMBER

Storrs L. Olson is a life member of the Wilson Ornithological Society. Dr. Olson is presently a zoologist at the National Museum of Natural History, Smithsonian Institution, Washington, D.C. His interests in ornithology include evolution, systematics, and paleontology. Much of his work has dealt with island avifaunas, seabirds, and rails; he has published numerous papers on these subjects. The photograph of Dr. Olson was taken at the bottom of a fumarole on Ascension Island, the type locality of the extinct rail *Atlantisia elpenor*.

