

## *Ecologic Changes in the Palouse*

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OF THE many ecological changes that have occurred in the Palouse region, only those that have taken place during the past century and a quarter under the impact of settlement by the white man will be considered. While this period represents a very small portion of the total history of the biota of the region, it has been one of drastic change and of particular significance to the current human population.

The grasslands of the Palouse, along with the sagebrush-grass and some of the coniferous communities that border the region, developed in the wake of the rich Miocene forests that disappeared with the drastic climatic changes produced by the uplift of the Cascade Mountains. At this time many plants from drier regions to the south and east came into the area, and vegetation types developed that apparently were quite similar to those in existence a century ago. An expansion of the more xeric communities at the expense of the prairies and the forests apparently took place about 5,000 years ago, but this was followed by a realignment of types into an essentially modern pattern (Hansen, 1947).

The pristine condition, so far as vegetation is concerned, has been reconstructed in considerable detail from two main sources: the records of travelers who saw the country prior to appreciable change, and by the work of ecologists (Daubenmire, 1942; Weaver, 1917) who have studied such relatively undisturbed remnants as remain. Conclusions regarding the vegetation of the Palouse area have been reinforced by studies of comparable vegetation in northeastern Oregon, western Montana, and southern British Columbia (Poulton, 1955; Wright and Wright, 1948; Tisdale, 1947).

Somewhat similar evidence has been gathered for animal life, especially for the large grazing mammals, although here the evidence of necessity has leaned more on historical records and less on current ecological studies (Buechner, 1953).

The picture that emerges for the vegetation of the Palouse is one of a grassland consisting of two major zones determined primarily by climatic differences. The more mesic zone (*Festuca/Agropyron*) was dominated by two perennial grasses, Idaho fescue (*Festuca idahoensis*) and bluebunch wheatgrass (*Agropyron spicatum* and its form *inermis*). The zone was further

characterized by the presence of snowberry (*Symphoricarpos*) as the principal shrub, and by abundance of perennial forbs, including representatives of the genera *Achillea*, *Balsamorhiza*, *Geranium*, *Helianthella*, *Hieracium*, *Lupinus*, *Potentilla*, and many others. Another striking character of this community is the common occurrence of rhizomatic tendencies in the *Agropyron spicatum*. This grassland was associated with the Prairie and Chernozem great soil groups, and in luxuriance of growth and richness of composition, resembled the Tall-grass Prairies of the midcontinent.

The drier grassland zone (*Agropyron/Poa*) was dominated by perennial grasses also, with *A. spicatum* and Sandberg's bluegrass (*Poa secunda*) the principal species. The forb component was sparse, and the *Agropyron* in this zone showed mainly the bunchgrass form indicated for it in all the manuals. The general appearance was that of an open and regular arrangement of grass clumps rather than the sodlike, thicker cover of the *Festuca/Agropyron* zone.

The situation with regard to animal life is a more complicated one. Some information on smaller vertebrate and invertebrate forms has been obtained from relict areas, while historical records are the main source for data on the larger grazing mammals. From these sources it seems that the grasslands did not, in historic times at least, support populations of large grazing mammals comparable to those of the Great Plains east of the Rocky Mountains. White tail deer (*Odocoileus virginianus ochrourus*), mule deer (*O. hemionus hemionus*), and elk (*Cervus canadensis*) did occur, along with pronghorn antelope (*Antilocarpa americana*), but virtually all of the early white explorers comment on the relative scarcity of game. The Indians of the area, after their acquisition of horses, made regular trips across the Rockies to hunt big game. Bison (*Bison* sp.) seems to have been rare in the region, at least during the historical period. Various explanations have been advanced for this shortage of grazing animals in a rich grassland. Lack of water during the normally dry summer period appears to have been one factor. Decimation of small herds by relatively large Indian populations may also have been a factor, although scarcely a decisive one.

### *Changes in the Biota*

Vegetationally, drastic changes have occurred in both zones of the Palouse grasslands during the past century. The most complete change has been caused by the cultivation of most of the more productive portions, including the greater part of the *Festuca/Agropyron* and favored portions of the *Agropyron/Poa*.

Here the flora has become restricted to surviving remnants of native species along with large numbers of introduced weeds, largely of Eurasian origin.

More complex but far-reaching changes have occurred in the areas that have remained as range for domestic livestock. The major change has been the replacement of native perennials by introduced species, mainly annuals of Mediterranean origin. Annual species of brome (*Bromus*) including *B. tectorum*, *B. brizaeformis*, *B. mollis*, and others, along with annual species of *Festuca* and *Erodium cicutarium*, have become dominant over large areas where grazing use has been excessive or ill-timed (Daubenmire, 1940; Ellison, 1960). Changes have occurred also in the relative status of many native perennials. Species of low livestock preference or short season of grazing acceptance have maintained or increased their abundance and/or vigor, at least initially, under heavy grazing. Plants reacting in this manner include *Poa secunda*, *Achillea lanulosa*, and species of *Balsamorhiza*, *Geranium*, *Lupinus*, *Lomatium*, and *Erigeron*. With continued heavy use, even these species have been largely replaced by annuals.

While most of the plants listed above have some forage value, other invaders such as Klamath weed (*Hypericum perforatum*) and medusahead (*Elymus caput-medusae*) are unpalatable and even injurious to livestock. The annuals that replaced the perennial vegetation are not only less productive and valuable for grazing, but lack the ability, shown by the native species, to prevent mass invasion by less desirable introductions (Tisdale et al., 1958).

These changes due to grazing use occurred quite early in the settlement period, as indicated by observations by Cotton (1904) on the effect of overgrazing. The era of peak numbers of livestock and major damage appears to have been approximately that of 1890 to 1910. In recent years there has been a trend towards improvement of Palouse ranges both through natural revegetation induced by more rational grazing and through artificial planting to both native and introduced forage species.

The question may well be asked: why did the vegetation of the Palouse change so quickly under the impact of grazing, when other types, notably the Mixed Prairie of the Great Plains, showed greater tolerance? Two factors seem of primary importance, and, taken together, may constitute a reasonable explanation. First, the absence of large herds of native grazing animals suggests that the species, or at least the races of the species dominating these grasslands, had not developed under the selection pressure of close grazing such as existed on the Great Plains to the east. Secondly, the moisture pattern of the region, with a pronounced summer drought period, made these grasses extremely vulnerable to grazing in late spring or early summer. This fact has

been demonstrated experimentally, and modern grazing systems for the area aim at eliminating or minimizing use during this period. A third contributing factor may be the extent to which species of Mediterranean origin, both annual and perennial, are adapted to conditions in the Palouse. Once established on depleted areas, these invaders are difficult to oust; and several species appear to have become permanent although minor members of relatively undisturbed perennial communities (Daubenmire, 1942; Hulbert, 1953).

Changes in animal populations commenced as soon as white settlement began, due both to disturbance of habitat and to hunting pressure. Conspicuous decreases in native mammals include the population of white-tailed jack rabbit (*Lepus townsendii townsendii*), which has been largely replaced by the black-tailed jack rabbit (*L. californicus deserticola*). The Columbian ground squirrel (*Citellus columbianus columbianus*), on the other hand, has increased. Changes in bird life include a marked reduction in the population of sharptail grouse (*Pedioecetes phasianellus columbianus*) and the introduction and naturalization of several species including the ringneck pheasant, Hungarian partridge, and more recently the Chukar partridge. Populations of deer and elk, while probably reduced on the grasslands proper, appear to have increased in adjacent forest areas due to disturbance of the vegetation by cutting and fire. For further details on changes in animal life the reader is referred to Buechner's (1953) excellent treatise.

From the above examples it is evident that marked changes have occurred in the plant and animal life of the Palouse region since the time of Lewis and Clark. That changes are still in progress is evident from the continued influx of new plant and animal species, and from the changes produced by man's continuing manipulation of both wild and cultivated lands.

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