fire protection, administrative uses, and other purposes on the refuge. Although adjacent to the lowlands embraced in the refuge much of the area is not subject to overflow, as it extends up into the hills bordering the river bottoms, and the inclusion of this high land will have the desirable result of lending variety to the refuge and attracting and protecting additional species of wild life.

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Goat Grass, a New Wheat-Field Weed, Is Growing Troublesome

In recent years goat grass, *Aegilops cylindrica* Host., has become a troublesome weed in wheat fields of south-central Kansas and north-central Oklahoma. It was first reported from the vicinity of Trousdale, Kans., in 1917. The grass was not identified at that time and received no particular attention. Nothing was heard of it again until 1920, when it was identified. Its continued spread has forced a recognition of its importance as a weed in wheat fields.

Goat grass is a wild relative of cultivated wheat. It will even cross to a certain extent with wheat, although most plants arising from the hybrid seeds are sterile. Goat grass, like winter wheat, is a winter annual. The seedlings emerge in the fall, and the plants mature the following spring, about the time wheat is ready for harvest. Seedlings and young plants of goat grass are difficult to distinguish from wheat plants. The leaves of goat grass are narrower than those of wheat, however, and have hairs along the edges near the base, a character lacking in wheat. The grass tillers profusely, and when abundant it often crowds out the wheat. Plants with as many as 50 tillers are not of unusual occurrence, although in thick stands fewer tillers are developed. The grass is a vigorous grower, very winter-hardy, and has a distinct advantage over wheat where the latter is at all checked by unfavorable conditions.

FIGURE 73.—A plant of goat grass showing its resemblance to wheat and its tillering habit

Goat grass produces a head or spike something like that of wheat, but more slender and cylindrical, as shown in Figure 73. Two varieties are found in the southern Great Plains, one with velvety chaff and the other smooth. Both varieties have beards only at the tip of the heads. At maturity the heads become very brittle and break up.

The seed remains inclosed in the chaff with the latter attached to a portion of the head. The head ripens from the top downward, each portion falling to the ground as soon as mature. Mature heads are so brittle that a slight disturbance scatters the seed-bearing portions in all directions. The grass therefore reseeds itself very profusely. Each section of the head contains two seeds which resemble those of wheat in general appearance, but are much smaller. The sections of the goat-grass head are only slightly larger than well-formed kernels of wheat and about the same weight, making them difficult to remove from threshed grain. In appearance they resemble small pieces of straw or trash. (Fig. 74.)

Matures Before Wheat is Cut

Goat grass begins to mature slightly before the wheat, the ripe seed falling to the ground. Usually about one-half to two-thirds of the seed has been dropped before the wheat is cut. The remainder goes into the threshed grain.

FIGURE 74.—Goat-grass seed in a sample of threshed wheat as it came from a Kansas farmer's field

Goat grass has been reported from 21 counties in central and southern Kansas and 2 counties in north-central Oklahoma. In individual fields the extent of infestation varies from a few scattered plants to solid stands of the grass several acres in extent.

Goat grass is not native to the United States, and it probably was brought into the area in seed wheat imported from southern Russia. Many Russian immigrants settled in central Kansas about 1873 and brought Turkey wheat with them. The most severely infested areas are in counties where these immigrants settled, or near by. The original Oklahoma infestation appeared in fields of Turkey wheat, the seed of which came from infested areas in Kansas. It is not clear why the grass did not make itself evident before 1918 if it was imported as early as 1873.

Where wheat is grown continuously, eradication is extremely difficult. Some farmers mow infested spots while the plants are still green and burn the straw as soon as dry. Others avoid infested spots in harvesting, and later pile straw on them and burn it. Still others disk fields as soon as the grass seedlings are well up in the fall and before the wheat is sown. None of these methods really controls the weed, however, and goat grass continues to spread slowly in the infested area where wheat is grown continuously.

Control of goat grass is not difficult where rotation with row crops is possible. It is easily killed by cultivation. The only complicating factor is the difficulty of killing plants growing in fence rows, roadways, and other waste places. The grass does not compete with native grasses in undisturbed sod.

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GULLIED Land Reclaimed by the Use of Brush Followed by Terracing

Preliminary to terracing land cut up with deep gullies that can not be crossed with farm machinery, it is sometimes advisable first to partly fill the gully by intercepting eroded soil in the run-off water. Where an abundant supply of brush is available, an ideal method for

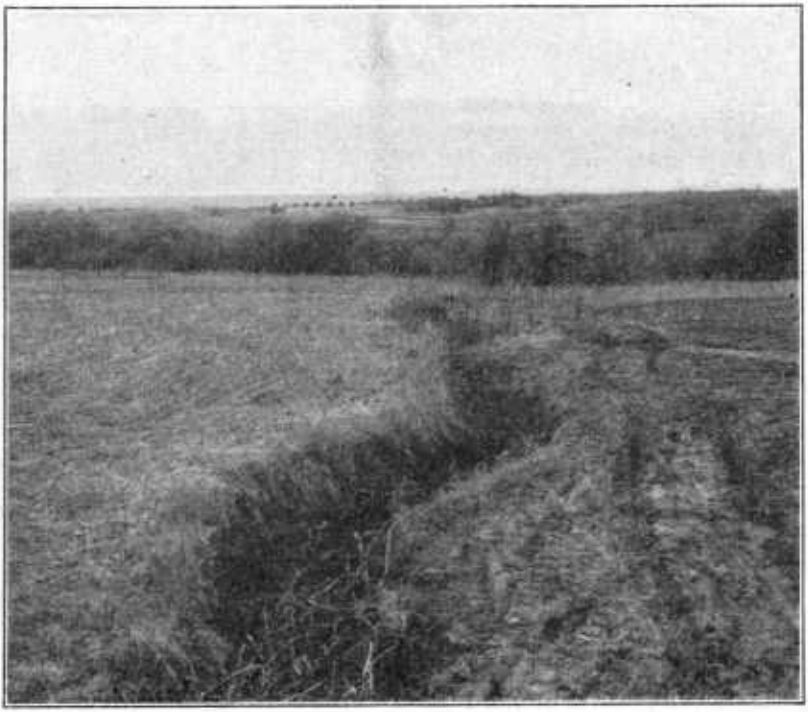

FIGURE 75.—Gully about half filled with brush to check erosion and intercept silt in the run-off water

collecting a deposit of soil is to partly fill the gully along its entire length with brush. This method has some advantages over the use of brush dams in that a greater proportion of the silt in the run-off water is caught and deposited in the gully, resulting in only small loss of soil from the field. The gully should be filled to about one-half its depth at the middle, and the brush should extend up the sides as near to the top of the banks as possible. This provides a passageway for the run-off water without permitting erosion on the sides of the gully. Two very common mistakes are to fill the gully so full of brush as to cause an overflowing of the banks and the eroding of a new parallel