

ON THE ECONOMIC VALUE OF OKLAHOMA TOADS¹

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The value of the American toad, *Bufo americanus americanus* Holbrook, in the eastern part of the country has been appreciated for more than forty years and it has been tacitly assumed that other species of *Bufo* are of about equal value for the control of insect pests. The climatic, as well as faunal and floral, differences of the prairie regions of the country have suggested that the value of the indigenous species of toads here might differ, either positively or negatively, from that of the American toad of the East. If this were so, then it should be known.

Kirkland (1897, 1904), and others later, have known that the value of the American toad in the East is considerable, the former estimating this as a little over \$18.00 per toad per year. How do our Oklahoma toads compare with this figure?

Smith and Bragg (1943) present some observations upon which a reasonable (but rough) estimate may be made. Of the seven species of *Bufo* occurring in Oklahoma, only five need be considered. These are *B. a. americanus*, *B. cognatus* Say, *B. compactilis* Wiegmann, *B. woodhousii fowleri* (Hinckley), and *B. w. woodhousii* Girard. None of these is statewide in distribution; and the value of anyone of them will depend upon (1) their numbers, (2) their food, (3) their feeding habits, (4) the numbers of insect pests possible for them to procure, and (5) the value of the specific crops being damaged by particular pests. With so many complex variables in operation, it is obviously impossible to give more than an approximation of the economic value of these animals.

Our observations indicate that (1) *B. w. fowleri* in Oklahoma is about like *B. a. americanus* in the East, (2) *B. a. americanus* here is probably less valuable than in the East, and (3) the other species considered are of considerably more value than the American toad in the East. The reasons for these conclusions follow.

The American toad averages much smaller in Oklahoma than in the East and, along the western limits of the range in Oklahoma, is dwarfed in size (Bragg, 1940). In addition, it is less active here than in the East. Also, this animal is limited to moister areas in Oklahoma which largely restrict it to areas of blackjack oaks (Bragg and Smith 1943, Moore and Rigney 1942), that is, to areas of less value agriculturally.

No detailed studies have been made on the food of *B. w. fowleri* but its abundance and its activities as known in southeastern Oklahoma, where it is the principal species, show it to be of considerable value. The fact that it occupies mostly the relatively less fertile regions is somewhat offset by the fact that it is the principal species of the area and occurs in considerable numbers. Also, since this toad prefers the lower areas whereas *B. a. americanus* prefers the higher ones, *B. w. fowleri* is often the only species present in any numbers along the river valleys and creek bottoms which are the areas used most extensively for crops in eastern Oklahoma.

B. w. woodhousii is a large toad, very abundant in all parts of Oklahoma except the eastern third. It probably does not occur at all from eastern Pittsburg County southeastward. On the prairies, it is the common toad of sandy soils, bottom lands, and small gardens but is only incidentally present in higher portions of the prairies, where it is replaced by *Bufo cognatus* or *Bufo compactilis* or both. Its size, its numbers, its

¹Contribution from the Zoological Laboratory, University of Oklahoma.

partial habitat-restriction, and its high activity, noticeable even in hot dry weather, make this toad a very valuable animal. It destroys grasshoppers, beetles, spiders, and ants in large numbers and will even occasionally swallow scorpions and centipedes. It is fully as effective as the American toad in the East and much more so in local situations, particularly on prairie bottom land, i.e. in some of the most valuable agricultural lands in the state.

Bufo cognatus and *B. compactilis* are typical prairie toads in Oklahoma, the latter in the western part of the state only, the former in all of the prairies except in the northeastern part of the state. In central and west-central Oklahoma, *B. cognatus* does on the high prairies what *B. w. woodhousii* does in the valleys and, in the western third of Oklahoma, particularly in the southwest (Greer, Harmon, Kiowa, Southern Comanche, and neighboring counties) it is joined by large numbers of *B. compactilis* in influence and value.

The values of *B. cognatus* and *B. w. woodhousii* are enhanced in central Oklahoma by two facts of special interest. First, young toads have difficulty in burrowing in the prairie soil, and consequently migrate into cultivated fields and gardens—I have seen hundreds of small toads in fields of cotton, corn, sorghum, etc., when only few could be found in adjacent pastures; this means (a) that the young toads automatically go where they will do the most good from eating insects and (b) their presence in such numbers tends to keep the ground mulched through their burrowing activities. Older toads, on the other hand, tend to range more in wheat fields and roadways. Second, the climatic conditions in Oklahoma allow some insect pests to overwinter in the larval stages. This is particularly true of various types of cutworms. These insects, therefore, are common in the ground in winter and emerge to feed upon the young plants early in the spring, the very season when they can do the most damage because the insects are relatively large and the plants small. They are nocturnal feeders and are largely confined to feeding upon the lower portions of the plant stems. Now it so happens that in early spring the toads also emerge from their winter rest, very hungry and ready to attack any insect which they can find. Because other ground-dwelling nocturnal insects are rather rare at this time, the toads fill upon cutworms. I have dissected hundreds of toads caught at various seasons. Those taken in springtime have invariably had more cutworms in their stomachs than all other insects combined: those collected in summer have had more beetles, ants, and spiders, although spiders are also eaten in large numbers in the spring. This whole effect is further enhanced by the fact that toads feed more in spring than at any other season in Oklahoma.

Taking all of these things into consideration and assuming Kirkland's figure for the value of individual toads (*B. a. americanus*) in the East to be substantially correct, I estimate the yearly value of the individual toad in Oklahoma as follows: *B. a. americanus*, \$15.00; *B. cognatus* \$25.00; *B. compactilis*, \$25.00; *B. w. fowleri*, \$18.00; *B. w. woodhousii*, \$25.00. It should not be overlooked, however, that the prairie-inhabiting species occur in Oklahoma in much greater numbers than the American toad usually does in the East, so that in the aggregate, our toads are of much greater value than those of the East merely because there are many more of them.

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