

WILDLIFE SESSION

THE SCREWORM AND ITS EFFECT ON THE DEER HERD IN THE SOUTHEAST

RALPH H. ALLEN, JR., Division of Game, Fish and Seafoods, Alabama
Department of Conservation

Proc. Annu. Conf. Southeast. Assoc. Game & Fish Comm. 4:143-147

Screwworms (*Cochliomyia americana*) have been serious pests to this nation's livestock and wildlife for more than a century. In the southwest they were first recognized as dangerous parasites in the early 1840s but it was not until 1933 that the first outbreak was reported in the southeast. Since then, periodic outbreaks with varying degrees of severity have occurred in this section.

A survey conducted by the Bureau of Entomology and Plant Quarantine of the United States Department of Agriculture reveals screwworm outbreaks in all the southeastern states in August of this year with the possible exception of Kentucky.

The screwworm is a true parasite and exists only in the living flesh of warm-blooded animals. The primary screwworm fly is bluish green in color and has three dark stripes on its back. The space between and below the eyes is a reddish or orange color.

The female fly generally seeks the edges or a dry portion of the wound on which to deposit its eggs. From 50 to 300 eggs are laid at one time, fastened tightly to the tissue surface in compact shingle-like masses. A single female is capable of laying 3,000 eggs, which are deposited in masses of about 300 at four-day intervals.

Hatching the eggs occurs in 6-12 hours, and the young whitish worms immediately burrow into the flesh, where they feed and grow for a period of 4 to 7 days. During the larval, or maggot stage, the worms shed their skins twice. When the worms have reached their full growth they assume a pinkish color, leave the wound, and drop to the ground, where they dig beneath the surface and undergo a change to the hard-skinned, dark-brown motionless pupa. It is during the pupal stage that the transformation from the maggot to the adult fly takes place. After the pupa has been in the soil from 7 to 60 days the fly emerges from it, works its way to the surface and crawls up on some nearby bush, weed, or other object to allow its wings to unfold and its outer body coverings to harden. When it first comes from the pupa, the fly is a grayish color without distinct markings, but as its body hardens it assumes its characteristic coloration. Under favorable conditions about 5 days are required before the newly emerged female fly becomes sexually mature and ready to lay eggs. During warm weather the life cycle is usually completed in 21 days, but under cold, unfavorable conditions the cycle takes as many as 80 days.

The injury this parasite does to animals is inflicted by the worms or maggots. The debilitating effects and the destruction of tissue kill the infested animal in a few days.

Both climate and topography play important parts in determining the establishment and building up of fly populations. Weather conditions during certain seasons of the year favor the propagation of these pests, while the opposite is true at other seasons. The screwworm fly cannot survive the year around in localities where the average temperature is 50 degrees F. or lower for continuous period of approximately 80 days.

Generally, screwworms cannot survive above a line running east and west through Gainesville, Florida, under normal winter conditions. In most of our southeastern states, unusually mild winter conditions during the past three years have permitted these insects to be active over a much larger area the year round.

It has been found that the primary screwworm fly breeds in greatest numbers on sparsely settled grazing and forest lands that are covered with a low growth of brush and timber. Thus, much of the southeast affords terrain favorable to their propagation.

Inquiries sent to biologists and other qualified personnel in the southeastern states provided the following information about the extent of the screwworm infestation:

In Kentucky, Superintendent of Game Management Larry R. Gale reports that they have no information concerning screwworms and do not believe that this is a problem in that state.

Chester F. Phelps, Chief of the Game Division of Virginia's Game and Inland Fisheries Commission, advises that they have no information on the effect of screwworms on their deer and that to the best of their knowledge no cases of this worm infestation have occurred.

The Arkansas deer herd has not been affected by the screwworm either, according to T. H. Holder, Federal Aid Coordinator.

In Tennessee, Lands Manager Robert J. Wheeler, Jr., reports that there has never been any screwworm outbreak of any consequence in their deer herd. He did report, however, the presence of screwworms in an opossum captured near Chattanooga during July.

The latest information from Assistant Federal Aid Coordinator Lyle S. St. Amant of Louisiana report a heavy infestation of screwworms in livestock but there has been no complaint or information regarding screwworms infestations in their deer herd.

Mississippi's Director R. M. Freeman reports that at one time screwworms were very bad in Mississippi but that they have not had any deer losses from this cause reported in several years.

In Alabama, the first indication of the screwworm infestation in the state's deer herd was noted this spring; however, upon a thorough check we found evidence that some animals were lost from this cause last year. In an intensive survey conducted at the Fred T. Stimpson Sanctuary, 40 dead and dying deer were found. Of this number, 29 were found inside the 2,200-acre fenced area. Up to September 30 of the year, 319 known deaths had occurred from screwworms. Our wardens and field biologists estimate an additional loss of 1,570 animals from this cause.

Indications are that screwworms enter into most animals through tick bites, particularly in the head and ear regions where the dreded Gulf Coast or ear tick so frequently attacks. Prior to the fawning season, carcass checks indicated that more

bucks were lost than does, however, the sex ratio was probably equalized during the fawning seasons when does and fawns were most susceptible.

Not only did these parasites attack deer, but screwworm losses have been noted in raccoon, opossum, rabbits, squirrels, and even rats.

It is interesting to note that the severe outbreak of parasites follows directly on the heels of two exceptionally mild winters. The average temperature from December 1, 1948, through March 31, 1949, was 56 degrees F. with only 9 days having a temperature as low as 32 degrees F. During this past year the average temperature from December 1 through March 31 was 56.3 degrees F. Only 11 days had temperature as low as 32 degrees F.

Earl Frye, Chief Wildlife Biologist of the Florida Game and Fresh Water Fish Commission, states that reports reaching this office indicate that screwworm damage to deer has been exceptionally heavy. The commission has started a deer research project in West Florida where investigations of the screwworm are an important part of the study.

Phil Goodrum, Regional Biologist, U. S. Fish and Wildlife Service, believes the mortality from screwworms in the Eglin Florida Air Force Reservation to be very severe. He states that although no one knows the exact mortality, as many as six wild deer have been known to have been infected with this parasite. He further states that the outbreak at Eglin Field and the outbreak at the Fred. T. Stimpson Sanctuary in Alabama seems to be localized in areas where deer and tick populations are both high. He suspects that tick and biting flies are directly related to the degree of deer mortality in those areas.

Hayden W. Olds, Assistant to the Director, Wildlife Resources Commission of North Carolina, has written me that a number of deer were killed by screwworms in that state last year and that another mild winter may have increased the destructive potential of the pests for the coming season.

Game Technician Jack A. Crockford, State Game and Fish Commission, Atlanta, Georgia, states that the commission has very little information on the screwworm except that it is considered very serious. He further states that Georgia loses quite a number of deer each year especially in the Lower Coastal Plains area where it is known to be most serious. It is also found commonly throughout the Piedmont area but rarely in the mountains.

Bill Baldwin, Wildlife Management Biologist, U. S. Fish and Wildlife Service reports that at Blackbeard Island, McIntosh County, Georgia, the first serious mortality occurred in 1948 at which time it was estimated that approximately 400 deer ranged on 3,000 acres. He states that they have at this time about 100 deer on the same area and that screwworms were actively responsible for most of this reduction, dead and dying deer being found even in mild winter months. About 100 animals were removed by live-trapping and hunting, but during the period presumably 200 or one-half of the deer were killed by screwworms.

Baldwin further states that, in varying degrees, this pattern was repeated during the past three years all along the Georgia and Carolina coasts with some deer herds at certain plantations badly decimated. Actually, he believes, the parasite had been active in deer for several years before the severe 1948 - 49 outbreak.

In South Carolina, Baldwin reports that at Bull's Island, Charleston County, the deer herd of 150 head on 2,500 acres of deer range experienced its first

serious mortality in the summer of 1948. A mild winter followed and the screwworms were very active again in 1949. Still another mild winter followed and complete decimation of the deer was expected, however, the 1950 losses do not seem to have been so high in proportion to population, probably because there were so few host animals left, Baldwin pointed out. The summer of 1950, the deer population was estimated to be 35 animals. Old deer skeletons were fairly common throughout the woods. The heavy tick population presumably encouraged the success of the screwworm infestation. There are no cattle or stock on Bull's Island.

James W. Webb, Coordinator with the State Game and Fish Department, reports that screwworm damages and losses of deer were rather severe in South Carolina during the summer of 1949. However, it appeared to be spotty at that time with some areas having a tremendous loss of bucks and some does dying, and in other areas, very few deer were affected. He reports that estimates of the buck mortality in sections of the state ran as high as 90 percent during the summer and early fall of 1949. In other areas, the loss was negligible, he said.

"So far this year the screwworm damage has been very mild," according to his letter written in August. "However, we are watching the situation more closely and are expecting it to break out most any time. We have had only a few deer dying from screwworms this summer."

William W. Neely, Biologist with the Soil Conservation Service in South Carolina, conducted a survey on deer mortality from screwworms on 12 plantations, comprising approximately 67,300 acres. On this area, 196 dead deer were found during the summer of 1949.

Neely questioned all the managers and woods-riders as to what they thought the ratio of deer found was to the number actually killed by the screwworm. On the basis of a 1:5 ratio which seems to be the best possible estimate, there were 980 deer killed by screwworms on the dozen plantations during 1949.

No records were kept of the portions of the deers' bodies infested. The opinion of the woods-riders was that the greater majority of those found which were not too badly decomposed, "had the backs of their heads eaten off." There was unfortunately no record of the kills by sex. The riders were divided on the mortality rate by sexes, some claiming there were more bucks dead than does while others thought there were about equal numbers of each sex.

The kills of deer by screwworm during the summer of 1950 were negligible, according to reports Neeley received. "I do not feel that this can be entirely due to the decimation of deer herds during 1949," Mr. Neeley states. "Something else must also be a factor. This section had three heavy frosts spaced about 10 days apart last March, which may have had some effect."

Studies show that the heaviest mortalities resulting from screwworms follow mild weather conditions during the winter season. It is established fact that this pest does not survive when the mean temperature falls below 49 degrees F. for three months or 53 degrees F. for five months. Adults are killed in temperatures below 20 degrees F. and pupa at 15 degrees F. Ordinarily, the screwworm cannot survive under our average winter conditions north of Gainesville, Florida.

Evidence strongly indicates that screwworm infestations are in many cases traceable directly to a high tick population. Control of screwworms and ticks with modern insecticides is economically prohibitive. It is known however that controlled burning in tick-infested areas is a very economical means of controlling these

parasites. I quote from a bulletin entitled "Livestock Pest Surveys" by W. G. Bruce, A. L. Smith and C. C. Skipper, and published by the U. S. Department of Agriculture.

Observations were also made by Mr. Smith on the efficacy of woods burning, as commonly practiced in Georgia, in the reduction of tick populations. The ranch of Mr. Paul Sikes, located 16 miles southeast of Midway, (Liberty County), Georgia, was selected to make surveys of tick populations in burned and unburned woods. These woodlands had not been burned during the past ten years except that a portion was burned in November 1948. The tick survey was made in May, 1950.

Ticks (lone star ticks) were collected on a cloth drag in all unburned areas, as many as 10 ticks being collected in a 50-foot drag. In the burned area a few larvae and nymphs were collected immediately adjacent to the unburned area and for 100 to 150 feet from the burned area. The results of this survey, according to Smith, indicates that in rough woods, where fire becomes intensely hot, the burning of woods would give complete control of ticks for at least six months.

The above facts are in agreement with controlled burning experiments carried on at Alabama's Fred T. Stimpson Sanctuary where it was found that the tick population was greatly reduced for at least a six month period following the burning.

I believe that the screwworm infestation of deer in the southeast poses a greater threat to an expanding deer herd than is commonly realized. Additional research is very desirable in order that we may reduce this problem to a bare minimum within wildlife species in this area.