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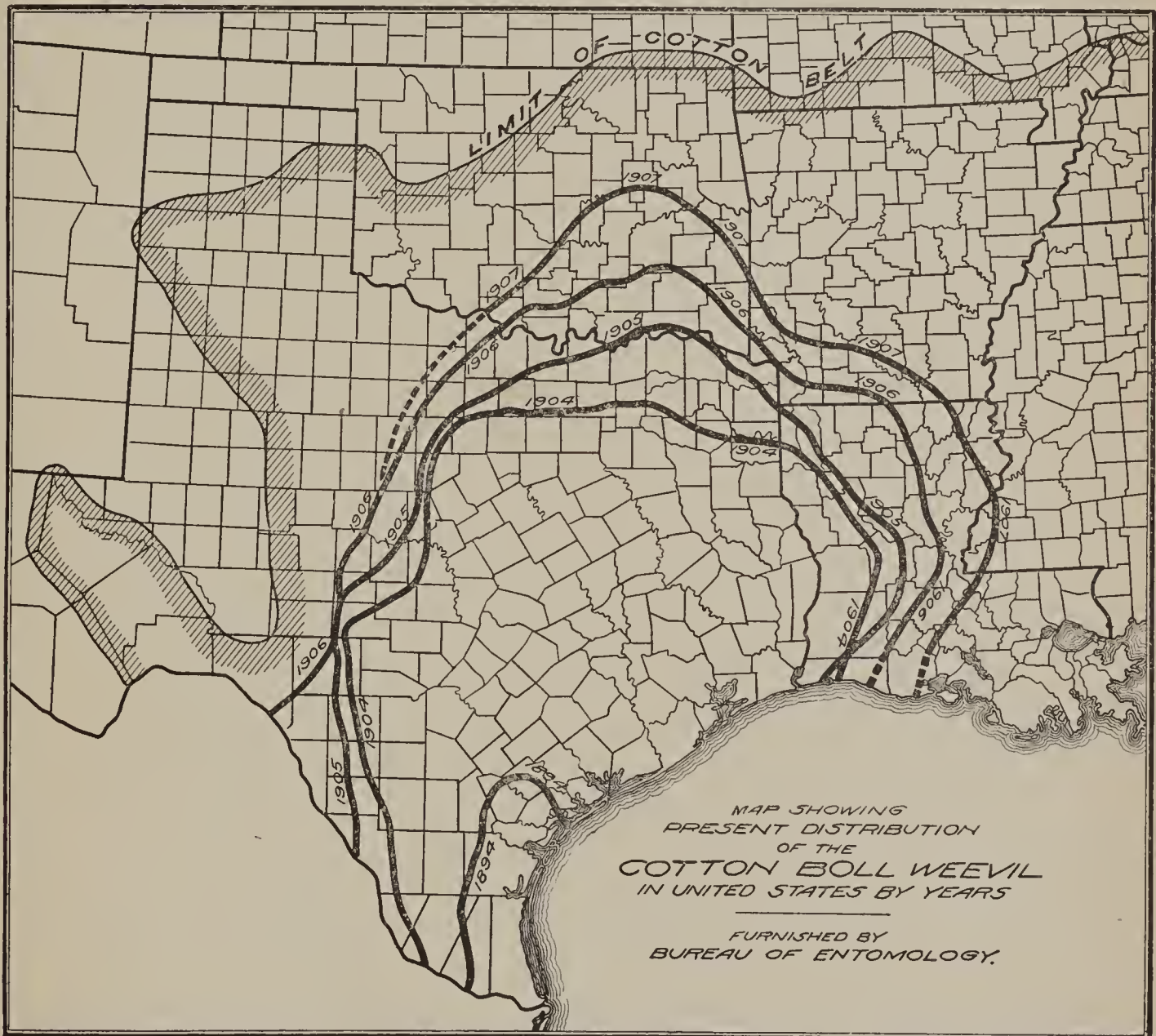
C. HART MERRIAM, Chief of Bureau.

DESTRUCTION OF THE COTTON BOLL WEEVIL BY BIRDS IN WINTER.

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The region now infested by the cotton boll weevil includes the greater part of the cotton-growing area of Texas and Louisiana, and parts of Oklahoma, Arkansas, and Mississippi. (See map.) Texas and Louisi-



ana produced in 1906 over 5,000,000 bales of cotton, valued at upward of \$270,000,000. The loss occasioned by the boll weevil is variously estimated in different localities at from 10 percent to 50 percent of the crop, or even more in badly infested areas. Even at the lowest reasonable estimate, the loss to the cotton planters of Texas and Louisiana from the ravages of the pest yearly aggregates many millions. As the weevil extends its range eastward into the more humid regions of the lower Mississippi Valley, the damage it does will be proportionately greater than in the drier regions to the westward.

Investigations conducted by the Biological Survey on the food habits of birds in Louisiana during January and February, 1908, showed that more birds were feeding upon the weevils, and that many more weevils were destroyed by them, than in any of the more western localities where birds have been collected at a corresponding season. The destruction of weevils in winter is vastly more important than in summer, for the reason that the death of every weevil at that season prevents the production of a very numerous progeny during the early summer, and postpones the date when the increase will become so great as to destroy the cotton squares as fast as they appear.

The service rendered by the vast army of birds which occupies the cotton plantations of the South during the winter months is only beginning to be appreciated. During the first season in which birds were studied in their relation to the weevil, only 20 species were discovered to feed upon the insect, and it was supposed that the influence of birds in keeping down the pest was slight. Later investigations, however, carried on during several years and at all seasons, have shown that no less than 53 species of native birds feed upon the pest, many of them destroying large numbers of weevils during the most critical period of the insect's life, that is, in winter and early spring.

Among the 30 species known to eat the weevil in winter, several species, notably the upland plover, the meadowlark, and the various blackbirds, are frequently killed for food or sport, the plover, or "papa-botte," especially, being the victim of extensive persecution, which has reduced the species to a small fraction of its former numbers. The food habits of most of these birds have been fully treated in previous publications.¹ The object of the present circular is to give a brief summary of results of recent investigations, to call the attention of cotton planters and other interested persons to the great value of insectivorous birds in the war against the boll weevil, and to emphasize the need for rigid protection of each and every species of bird known to feed on the pest.

RESULTS OF INVESTIGATIONS IN THE WINTER OF 1908.

During January and February, 1908, the writer visited central and northwestern Louisiana, and studied the food habits of the birds found in and about the cotton fields. Collections were made at Alexandria, Lecompte, Natchitoches, Shreveport, and Belcher. About 600 specimens, representing 50 species, were secured, of which 20 species and 81 individuals were found to have eaten boll weevils, this being 13½ per cent of the total number taken. Only the more important species will be treated here; for fuller information the reader is referred to previous bulletins of the Biological Survey, and for a complete record of birds found eating boll weevils to the schedule on page 5.

¹ See especially Bulletin No. 29, Bureau of Biological Survey, 1907.

STATUS OF THE MORE IMPORTANT WINTER BIRDS.

BLACKBIRDS.

Three species of blackbirds were found to be destroying the boll weevil in Louisiana during January and February, namely, the Brewer blackbird, rusty blackbird, and red-winged blackbird. The Brewer blackbird was common at a number of localities, and on Mr. Henry Carlton's farm near Shreveport fully 2,000 were present. They follow the plow closely, and pick up any insects that are turned up to view. Of the 30 specimens examined on the Shreveport farm, 9 had eaten a total of 12 boll weevils. Allowing one weevil a day to each bird and estimating that 30 percent of the flock eat weevils, we find that about 600 weevils are destroyed each day by the blackbirds on a single plantation. The rusty blackbird was quite scarce and only one was found with a boll weevil in its stomach. This blackbird is the eastern representative of the Brewer blackbird; and in localities where numerous doubtless it will be found fully as useful as its western cousin in destroying boll weevils. Red-winged blackbirds were quite abundant in several localities, particularly at Belcher. They capture fewer boll weevils than the other blackbirds, only three having been found on this trip with the insect in their stomachs. In view, however, of the abundance of the species in the cotton fields, their value as weevil destroyers is not inconsiderable.

MEADOWLARKS.

Meadowlarks, or "field larks," as they are often called, are common in and about the cotton fields of Louisiana. In winter they are rarely seen in plowed fields; they prefer to forage in old cotton and corn fields and alfalfa pastures. Only 13 individuals were taken, but these maintained the good reputation which the species has established, for 7 of the 13 had eaten a total of 14 boll weevils. With a record of at least one weevil per day, on the average, destroyed by each lark, their value to the cotton planter is evident; and, instead of being destroyed, as they often are, for the morsel of food each lark furnishes, they should be afforded the most complete protection possible.

SPARROWS.

Six species of native sparrows were found to be eating the boll weevil, thus increasing the number of species in the family known to feed upon the pest to 12. The six species referred to are the savanna sparrow, vesper sparrow, field sparrow, swamp sparrow, white-throated sparrow, and fox sparrow. The only one of these which seems to eat the weevil regularly is the savanna sparrow, and in view of the large numbers of these little birds which live in the cotton fields all winter, the good they do in destroying weevils is of considerable importance. Of the 29 specimens of this species collected, 5 had eaten a total of 12 boll weevils,

and one had taken 7 weevils at a meal. These little sparrows, sometimes known as "grass sparrows," feed in grass fields and among the old cotton stalks, where they run about like mice.

PIPITS, OR TITLARKS.

The American pipit, or titlark, is common in winter in flocks over most of the open country of Louisiana and Texas. Flocks of 100 to 200 were seen at Alexandria, Lecompte, and Shreveport. They feed in freshly plowed fields, as well as among old cotton stalks, and are usually very gentle and confiding. They are small, brownish-streaked birds, and may be recognized by their habit of walking instead of hopping as most small birds do, and by the habit of constantly tilting the body as if they had springs in their legs. Sixty-eight specimens were collected, and of these just half, or 34 birds, contained boll weevils. The largest number eaten by one bird was 10, while several others had consumed 8 or 9 at a meal. The total number of weevils destroyed by the 34 birds was 120, or an average of nearly 4 to a bird. Some of these birds were feeding in plowed fields, others among standing cotton stalks, and the numbers of weevils taken in each of these situations did not vary much. More weevils are captured, however, immediately after the first stirring of the ground than at any other time. Estimating 200 titlarks to each plantation of 1,000 acres, and allowing 4 weevils per day to half of the flock, we find that about 400 weevils are destroyed by them daily in each locality where they occur. Remaining as they do in the cotton States from November to May, titlarks render important service during the entire period of hibernation of the weevil, and the numbers of the pests destroyed by them every season are certainly enormous. This bird is one of the most useful species on the farm, and its presence should be encouraged in every way possible.

WRENS.

Three species of wrens have been found to feed upon the boll weevil—the Carolina wren, Bewick wren, and winter wren. The last is too rare in the South to be of much economic importance, but both the other species are quite numerous in timbered areas, and their work in the brush supplements that of the sparrows, titlarks, and blackbirds in the fields. They search every nook and cranny in old logs, tree trunks, and brush piles, and many boll weevils fall prey to their persistent hunting. Thirty specimens of the Carolina wren were collected, of which 6 had eaten a total of 9 boll weevils. Of the 9 Bewick wrens examined, one had eaten 3 weevils. The single winter wren taken contained 2 weevils.

TITMICE.

Two species of titmice—the tufted titmouse and the Carolina chickadee—carry on a work in the timber similar to that done by the wrens, although as a rule the titmice feed higher up in the trees. Tufted tits are generally distributed in the South and 13 specimens were taken on the present trip. Four of these had eaten boll weevils to the number of 6. Carolina chickadees are less numerous. That they eat weevils, however, is proved by the fact that one was found in the stomach of a chickadee taken at Shreveport.

SCHEDULE OF STOMACH EXAMINATIONS.

RECORD OF BIRDS EXAMINED WHICH HAD EATEN BOLL WEEVILS.

Species.	During January, February, and March.			During April, May, and June.			During July, August, and September.			During October, November, and December.		
	Number of birds examined.	Number eating boll weevils.	Number of boll weevils eaten.	Number of birds examined.	Number eating boll weevils.	Number of boll weevils eaten.	Number of birds examined.	Number eating boll weevils.	Number of boll weevils eaten.	Number of birds examined.	Number eating boll weevils.	Number of boll weevils eaten.
Upland plover (<i>Bartramia longicauda</i>)	48			13	1	1	1					
Killdeer (<i>Oxyechus vociferus</i>)	28	2	5	1			6			1		
Quail (<i>Colinus virginianus</i>)	63			10			38			108	1	1
Nighthawk (<i>Chordeiles virginianus</i>)							10	4	15			
Scissor-tailed flycatcher (<i>Muscivora forficata</i>)							91	5	7			
Kingbird (<i>Tyrannus tyrannus</i>)				10	1	1	22	6	8			
Crested flycatcher (<i>Myiarchus crinitus</i>)				7	1	2	5	1	3			
Phoebe (<i>Sayornis phoebe</i>)	19						2	1	1	13	3	3
Olive-sided flycatcher (<i>Nuttallornis borealis</i>)												
Alder flycatcher (<i>Empidonax traillii alnorum</i>)							2	1	2			
Least flycatcher (<i>Empidonax minimus</i>)							3	1	2			
Blue jay (<i>Cyanocitta cristata</i>)	8	1	1	1			14	7	21			
Cowbird (<i>Molothrus ater</i>)	92	4	4				1			2		
Red-winged blackbird (<i>Agelaius phoeniceus</i>)							84	3	3	24		
Meadow lark (<i>Sturnella magna</i>)	79	4	5	16	1	1	11			49	2	2
Western meadow lark (<i>Sturnella neglecta</i>)	48	10	18	1			1			183	28	32
Orchard oriole (<i>Icterus spurius</i>)	52	8	11							66	12	18
Baltimore oriole (<i>Icterus galbula</i>)				20	1	1	101	30	64			
Bullock oriole (<i>Icterus bullocki</i>)				2			50	11	24			
Rusty blackbird (<i>Euphagus carolinus</i>)							149	40	133			
Brewer blackbird (<i>Euphagus cyanocephalus</i>)	6	1	1							10		
Bronzed grackle (<i>Quiscalus q. ceneus</i>)	139	24	40	1						5	2	2
Great-tailed grackle (<i>Megaquiscalus major macrourus</i>)	36	5	5	19			3			3		
Vesper sparrow (<i>Poæetes gramineus</i>)	32	2	2	7	1	1	6			2		
Savanna sparrow (<i>Passerculus sandwichensis</i> , subspecies)	29	1	1							11		
Lark sparrow (<i>Chondestes grammacus</i>)	68	8	15	2						18	1	1
White-throated sparrow (<i>Zonotrichia albicollis</i>)				13			54	1	1			
Field sparrow (<i>Spizella pusilla</i>)	53	1	1	4						9	1	1
Swamp sparrow (<i>Melospiza georgiana</i>)	25	2	2				5					
Fox sparrow (<i>Passerella iliaca</i>)	27	1	2									
Towhee (<i>Pipilo erythrophthalmus</i>)	8	1	2							9		
Cardinal (<i>Cardinalis cardinalis</i>)	10	1	1	1						6		
Texan pyrrhuloxia (<i>Pyrrhuloxia s. texana</i>)	42			7			39	3	4			
Painted bunting (<i>Passerina ciris</i>)							64	2	2			
Dickcissel (<i>Spiza americana</i>)							109	18	19			
Purple martin (<i>Progne subis</i>)				1			26	3	3			
Cliff swallow (<i>Petrochelidon lunifrons</i>)				15	1	1	5	1	1			
Barn swallow (<i>Hirundo erythrogastra</i>)	1			1			35	34	638			
Bank swallow (<i>Riparia riparia</i>)							14	5	52	16		
Loggerhead shrike (<i>Lanius ludovicianus</i>)							25	11	68			
Yellow warbler (<i>Dendroica aestiva</i>)	46	1	4	4			19			12	2	5
Myrtle warbler (<i>Dendroica coronata</i>)							25	1	1			
Maryland yellowthroat (<i>Geothlypis trichas</i>)	17	1	2	3								
Yellow-breasted chat (<i>Icteria virens</i>)	2	1	1	1			1					
American pipit (<i>Anthus pensilvanicus</i>)							5	1	1			
Mockingbird (<i>Mimus polyglottos</i>)	73	34	120							8	3	4
Brown thrasher (<i>Toxostoma rufum</i>)	43	2	2	13			85	5	5	5		
Carolina wren (<i>Thryothorus ludovicianus</i>)	9			7						29	1	1
Bewick wren (<i>Thryomanes bewicki</i>)	37	6	9	31	1	2	1			7	5	6
Winter wren (<i>Nannus hyemalis</i>)	11	1	3				3			2		
Tufted titmouse (<i>Baeolophus bicolor</i>)	1	1	2									
Black-crested titmouse (<i>Baeolophus atricristatus</i>)	14	5	7	23								
Carolina chickadee (<i>Penthestes carolinensis</i>)							1			2	1	1
	6	1	1				1			1		

