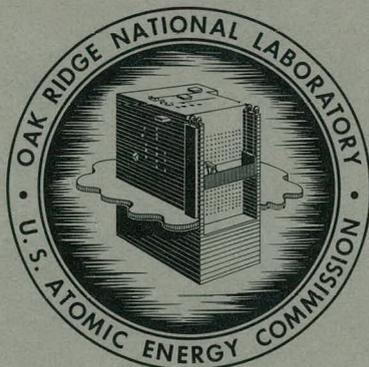


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INSECT SPECIES ON VEGETATION OF THE
WHITE OAK LAKE BED, OAK RIDGE, TENNESSEE

H. F. Howden
D. A. Crossley, Jr.



OAK RIDGE NATIONAL LABORATORY
operated by
UNION CARBIDE CORPORATION
for the
U. S. ATOMIC ENERGY COMMISSION

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HEALTH PHYSICS DIVISION

INSECT SPECIES ON VEGETATION OF THE WHITE OAK LAKE
BED, OAK RIDGE, TENNESSEE

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D. A. Crossley, Jr.

DATE ISSUED

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OAK RIDGE NATIONAL LABORATORY
Oak Ridge, Tennessee
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INSECT SPECIES ON VEGETATION OF THE WHITE OAK LAKE

BED, OAK RIDGE, TENNESSEE

Abstract

Studies on the insects inhabiting the vegetation on White Oak Lake bed, Oak Ridge, Tennessee, revealed 401 species present during 1956 and 1957. Most numerous were members of the insect Orders Hymenoptera, Diptera, and Coleoptera. In the summer of 1956, the first summer following draining of the lake, there were relatively fewer species of insects represented by large numbers of individuals. In 1957, there were relatively more species of insects but fewer individuals were present. By the end of the summer of 1957, only two years after the lake was drained, the vegetation supported a rich and varied insect fauna.

Introduction

Ecological studies in areas contaminated with radioactive waste products are yielding information on basic biological components and processes, as well as information on the movement of radioactive materials through ecological systems. White Oak Lake bed, Oak Ridge, Tennessee, is such a contaminated area, since the lake received low-level radioactive wastes from the Oak Ridge National Laboratory for 12 years prior to draining in 1955. Studies on the vegetation (1), insects (2), birds (3), and mammals (4) of White Oak Lake bed have been reported.

The present report deals with the species of insects which invaded the vegetation on White Oak Lake bed. During the summers of 1956 and 1957, particular attention was given to a survey of these insects, with the objectives of finding how many species were present and which ones would

develop large populations. This information is valuable in the interpretation of data on the cycling of radioactive fission products from soil to plant to insect and back to soil. Such an evaluation has been made in a further report (2). The bulk of the present report is an appendix, which lists the species collected, the plant association on which these species were found, and their month of occurrence during the summer. These data are a necessary basis for future, more refined work on the population sizes of the insect species and possible effects of ionizing radiation on the insect populations.

Materials and Methods

Sampling of the insects was performed with a sweep net. A series of 10 rapid consecutive sweeps was taken in the top part of the vegetation being sampled. A net with a 4-ft handle and a 14-in. nylon marquisette collecting bag was used. This sample was judged by comparison with other methods to approximate the number of insects found on one square meter of vegetation.

Only the dominant vegetation types were sampled: smartweed (Polygonum spp.), sedge-rush (Carex spp., Juncus spp.), and willow (Salix nigra Marsh). The coverage of these vegetation types is discussed by Crossley and Howden (2). For each of the vegetation types, two replicate areas were sampled: one near White Oak Creek (designated "center") and one closer to the former shoreline (designated "inshore"). Samples were taken in each of the six collecting areas on Mondays for 14 consecutive weeks.

The samples were sorted to major insect groups in the laboratory, counted, and then specimens of each species were sent to various specialists

for identification. Upon return of the identified material, the more easily recognized and common species were counted. It was not possible to attempt identification of every individual in the sample.

Acknowledgements

We are grateful to Doctor S. I. Auerbach and Mr. P. B. Dunaway, Oak Ridge National Laboratory, for aid and advice both in field and laboratory. Mrs. Jane H. Marks and Mr. Madison E. Pryor, both formerly of Oak Ridge National Laboratory, assisted in the collection and preparation of the samples of insects.

The following specialists made identifications of the insect species: ORTHOPTERA: T. H. Hubbell, Univ. of Michigan. HOMOPTERA: J. P. Kramer, L. M. Russell, K. Sommerman, U. S. National Museum; and D. A. Young, North Carolina State College. HEMIPTERA: R. I. Sailer, U.S.N.M. ZYGOPTERA: S. Parfin, U.S.N.M. DIPTERA: C. W. Sabrosky, Alan Stone, R. H. Foote, W. W. Wirth, U.S.N.M. HYMENOPTERA: B. D. Burks, K. V. Krombein, C. F. W. Muesebeck, M. R. Smith, L. M. Walkley, U.S.N.M.; T. B. Mitchell, N. C. State College; and H. K. Townes, Univ. of Michigan. LEPIDOPTERA: J. F. Gates Clarke, E. L. Todd, U.S.N.M. COLEOPTERA: H. F. Howden, Entomology Research Institute, Ottawa. Checking the manuscript with particular reference to the scientific names, was done by the members of the Systematic Unit, Entomology Research Institute, Department of Agriculture, Ottawa, Canada.

Results and Discussion

A total of 401 species of insects were found on the lake bed vegetation in 1956 and 1957. These species are listed in the appendix, and for

1957 the month of collection in each of the six vegetation areas is included. Only the presence or absence of each species in the 1956 samples is indicated. A detailed comparison of the population sizes which developed in the various vegetation types is given elsewhere (2).

The wasps and bees, belonging to the Order Hymenoptera, were the most numerous insects, numbering 108 species. Chacidoidea, parasites or gall-wasps, were the most common hymenopterans and were found throughout the summer in each of the vegetation areas. Of the other wasps, the braconids were found in most of the collections. Bees were collected in all of the vegetation types but were particularly numerous in the smartweed areas during the blossoming period. Most of the species of Hymenoptera were represented by only a few individuals.

The Diptera were the second most numerous of the insect orders, with 102 species occurring in the collections. Chloropid flies were the most ubiquitous dipterans, occurring throughout the summer in all of the vegetation areas. Midges (Family Tendipedidae) were also commonly collected. Like the hymenopterans, most of the dipteran species were represented by few individuals.

The Order Coleoptera was the third most numerous, comprising 75 species. The majority of species listed are plant feeders, the predatory groups, such as the Carabidae, being poorly represented. This is perhaps due to the fact that many of the predatory beetles remained on or near the ground and were not collected by sweeping. As for the plant feeders, only a relatively few species could be said to be numerous. Most of these common species were taken on willow in 1957 and are not represented in 1956, since willow was not sampled. Among the willow feeders in order of descending abundance were

Chalcoides fulvicornis (Fab.), Agrilus politus (Say), two species of Orchestes, and Cryptocephalus leucomelas Suffr. On smartweed, Systema frontalis (Fab.) was abundant.

The 53 species of Homoptera were mostly leafhoppers. No one leafhopper species was predominant. Some of the species were restricted to a particular vegetation type, but most occurred in two or three vegetation types, perhaps merely "seeming to" due to "perching" records.

The Orthoptera, 16 species, contained two widespread and abundant ones: Conocephalus spp. in all of the areas and Melanoplus differentialis (Thos.) in all but willow areas. The sampling method may have been less adequate for these grasshoppers than for the smaller, less mobile forms.

For the insects as a whole, as well as for most of the insect orders, there were relatively fewer species represented by more individuals in 1956, and relatively more species represented by fewer individuals in 1957. A shift of this sort is to be expected during the process of ecological succession and, in the case of the insects, may be in part a function of the increasingly diverse flora of the lake bed. The rapidity with which the various insect species became established on the lake bed may not be unusual but is worthy of comment. By the second summer (1957) the diversity of insects on the lake bed vegetation was similar to that which might be found in any area of mixed forbs. Evidently the vagilities of the insect species are such that the presence of suitable host plants almost assures the presence of the associated insects, as long as the area is only moderately distant from other areas supporting the host plants and insects.

Bibliography

- (1) S. I. Auerbach and D. A. Crossley, Jr., "Strontium-90 and Cesium-137 Uptake by Vegetation under Natural Conditions", Paper 401, Proc. 2nd Intern. Conf. Peaceful Uses of Atomic Energy (1958).
- (2) D. A. Crossley, Jr. and H. F. Howden, "Insect-Vegetation Relationships in an Area Contaminated by Radioactive Wastes", Ecology (In press).
- (3) W. K. Willard, "Avian Uptake of Fission Products from an Area Contaminated by Low-Level Atomic Wastes", Science 132, 148-50.
- (4) P. B. Dunaway, HPD Ann. Prog. Rep. July 31, 1959, ORNL-2806, pp. 33-40.

APPENDIX

1957

1956

	Sedge Inshore	Sedge Center	Smartweed Inshore	Smartweed Center	Willow Inshore	Willow Center	
ORDER ORTHOPTERA							
FAMILY TETRIGIDAE							
<u>Tettigidea lateralis</u> (Say)		July, Aug					Yes
<u>Paratettix cucullatus</u> (Burm.)							Yes
FAMILY TETTIGONIIDAE							
<u>Orchelimum agile</u> (DeG.)		Aug	July	July			Yes
<u>Conocephalus</u> spp. (<u>brevipennis</u> and <u>fasciatus</u>)	May thru Sept	May thru Sept	June thru Aug	June thru Aug	May thru July	May thru Aug	Yes
<u>Microcentrum rhombifolium</u> (Sauss.)			Aug				No
<u>Scudderia</u> sp.	May thru July	May, June	July	June, July	June, July	June	No
FAMILY ACRIDIDAE							
<u>Melanoplus differentialis</u> (Thos.)	June thru Aug	June thru Aug	June thru Aug	June, July	May thru July		No
<u>Melanoplus femur-rubrum</u> (DeG.)	Aug						Yes
<u>Melanoplus bilituratus</u> <u>vulturinus</u> G. and B.			Aug				Yes
<u>Chortophaga viridifasciata</u> (DeG.)							Yes
<u>Metalepta brevicornis</u> (Joh.)							

1957

1956

	Sedge Inshore	Sedge Center	Smartweed Inshore	Smartweed Center	Willow Inshore	Willow Center	
<u>Syrbula admirabilis</u> Uhl.							Yes
FAMILY MANTIDAE							
<u>Stagmomantis carolina</u> (Joh.)					June		Yes
FAMILY GRYLLIDAE							
<u>Oecanthus quadripunctatus</u> (Beut.)			June, Aug	June, July	May, July Aug		Yes
<u>Anaxipha exigua</u> (Say)							Yes

ORDER HEMIPTERA

FAMILY MIRIDAE							
<u>Polymerus venaticus</u> (Uhl.)			May				No
<u>Poecilopsallus lineatus</u> (F.)					June		No
<u>Liocoris lineolaris</u> (Beauv.)	May thru Aug	May thru Sept	June thru Aug	June thru Aug	June, Aug	June, Aug	Yes
<u>Ceratopsallus pumilus</u> (Uhl.)				July	June, July	June thru Aug	No
<u>Orthotylus viridis</u> Van D.					June	June	No
<u>Lepidopsallus rubidus</u> (Uhl.)					June		No
<u>Phytocoris conspersipes</u> Reut.	June						No
<u>Prepops rubrovittatus</u> (Stål)	July, Aug						No

1957

1956

	Sedge Inshore	Sedge Center	Smartweed Inshore	Smartweed Center	Willow Inshore	Willow Center	
FAMILY ANTHOCORIDAE							
<u>Orius insidiosus</u> (Say)	Aug	Aug	July thru Sept	June thru Sept	June	June thru Aug	Yes
FAMILY REDUVIIDAE							
<u>Sinea spinipes</u> (H. -S.)	Sept				June		Yes
FAMILY PHYMATIDAE							
<u>Phymata americana</u> Melin			June	July			Yes
FAMILY TINGIDAE							
<u>Corythucha marmorata</u> (Uhl.)					May		No
<u>Corythucha mollicula</u> C. and D.						Sept	No
FAMILY LYGAEIDAE							
<u>Lygaeus bicrucis</u> Say	May						Yes
<u>Pachybrachius albocinctus</u> Barber	June, Aug	June thru Aug	June thru Aug	June thru Aug	June	June, July	No
<u>Pachybrachius basalis</u> (Dall.)		June					No
<u>Pachybrachius</u> sp.						July	No
<u>Paromius longulus</u> (Dall.)	Aug	Aug		Aug			Yes
<u>Oedancala crassimanna</u> (F.)		July	Aug				No
<u>Cymus discors</u> Horv.	May, July	May, July	July				Yes

1957

1956

	Sedge Inshore	Sedge Center	Smartweed Inshore	Smartweed Center	Willow Inshore	Willow Center	
<u>Cymus angustatus</u> Stål	May, June, July, Sept	May thru Aug		June		July	Yes
<u>Geocoris punctipes</u> (Say)				Aug			Yes
<u>Nysius ericae</u> (Schill.)							Yes
FAMILY NEIDIDAE							
<u>Jalysus wickhami</u> Van D.		June, Aug	June				Yes
FAMILY COREIDAE							
<u>Arhyssus lateralis</u> (Say)	Aug, Sept	July thru Sept	June thru Sept	June thru Sept		May, July	Yes
<u>Harmostes reflexulus</u> (Say)		July					No
FAMILY PENTATOMIDAE							
<u>Podops cinctipes</u> (Say)				Aug			No
<u>Corimelaena pulicaria</u> (Germ.)	May, June	May	June, July		May		No
<u>Euschistus servus</u> (Say)		Aug		Aug			Yes
<u>Thyanta accerra</u> McA.				June			No
<u>Brochymena quadripustulata</u> (F.)					Aug, Sept		No
<u>Stiretrus anchorago</u> var. <u>fimbriatus</u> (Say)					May	June	No

1957

1956

	Sedge Inshore	Sedge Center	Smartweed Inshore	Smartweed Center	Willow Inshore	Willow Center	
<u>Cosmopepla bimaculata</u> (Thomas)					Aug	Aug	No
<u>Solubea pugnax</u> (F.)		Aug					Yes
<u>Holcostethus limbolarius</u> (Stål)							Yes
<u>Podisus maculiventris</u> (Say)							Yes
FAMILY CYDNIDAE							
Gen. sp.							Yes
FAMILY NABIDAE							
<u>Nabis alternatus</u> Parshley							Yes
<u>Nabis ferus</u> (L.)							Yes
ORDER HEMIPTERA							
FAMILY CICADELLIDAE							
<u>Graphocephala versuta</u> (Say)	July	July	June thru Aug	June thru Sept	June thru Sept	June, July	Yes
<u>Graphocephala coccinea</u> (Forst.)				June, July	Sept		No
<u>Chlorotettix galbanatus</u> Van D.					Aug		No
<u>Chlorotettix limosus</u> DeL. and Ct.	Aug	Aug	July, Aug	July, Aug	June thru Aug	July, Aug	Yes
<u>Chlorotettix viridius</u> Van D.							Yes
<u>Chlorotettix</u> sp.					June		No
<u>Empoasca osborni</u> Hartz.					Aug		No

1957

1956

	Sedge Inshore	Sedge Center	Smartweed Inshore	Smartweed Center	Willow Inshore	Willow Center	
<u>Empoasca</u> sp.	June, July	June thru Aug	June thru Aug	July	June, July	July	No
<u>Macropsis viridis</u> (Fitch)					July		No
<u>Colladonus clitellarius</u> (Say)					July, Aug	May, Aug	No
<u>Agalliopsis novella</u> (Say)					June	May	No
<u>Scaphytopius acutus</u> (Say)	June	July	May thru Sept	June, July	July, Aug		No
<u>Norvellina seminuda</u> (Say)			July		June, July		No
<u>Draeculocephala portola</u> Ball	May, Aug	May, July	July	June, July	Sept	June	Yes
<u>Erythroneura illinoiensis</u> (Gill.)				July			No
<u>Erythroneura aclys</u> McAtee				July			No
<u>Erythroneura</u> sp.			Aug		Aug	Aug	No
<u>Graminella</u> sp.						July	Yes
<u>Graminella nigrifrons</u> (Forbes)	May thru Aug	May, July Aug	Aug	June thru Aug	May thru July	June, July	Yes
<u>Paraphlepsius</u> sp.					July	Aug	No
<u>Stirellus bicolor</u> (Van D.)	June thru Aug	Aug	July			July	No
<u>Stirellus obtutus</u> (Van D.)	May, Aug	May	June				No
<u>Idiocerus</u> sp.		June			July	May, June Aug	No
<u>Sanctanus fasciatus</u> (Osborne)		Aug					No

1957

1956

	Sedge Inshore	Sedge Center	Smartweed Inshore	Smartweed Center	Willow Inshore	Willow Center	
<u>Xerophloea viridis</u> (F.)		Sept					No
<u>Agallia constricta</u> Van D.	May	May	Aug		June		No
<u>Aulacizes irrorata</u> (F.)	Aug						No
<u>Oncometopia undata</u> (F.)			Aug	June, July			No
<u>Xestocephalus</u> sp.			July				No
<u>Gyponana</u> sp.					June	June	Yes
<u>Macropsis</u> sp.					July	July	No
<u>Balclutha abdominalis</u> (Van D.)							Yes
<u>Macrosteles fascifrons</u> (Stål)							Yes
FAMILY FULGORIDAE							
<u>Acanalonia bivittata</u> (Say)			Aug		Aug		Yes
<u>Oliarus aridus</u> Ball			Aug				Yes
FAMILY DELPHACIDAE							
<u>Liburniella ornata</u> (Stål)	Aug	June thru Aug	June				No
<u>Delphacodes basivitta</u> (Van D.)		Aug	July	Aug			No
<u>Delphacodes puella</u> (Van D.)	Sept						Yes
Delphacidae gen. sp.	May thru Aug	June thru Aug	June, Aug	June, July Sept	June, July	June	No

1957

1956

	Sedge Inshore	Sedge Center	Smartweed Inshore	Smartweed Center	Willow Inshore	Willow Center	
<u>Pissonotus piceus</u> (Van D.)			Aug				No
FAMILY CIXIIDAE							
Cixiidae gen. sp.				June			No
<u>Myndus pictifrons</u> (Stål)			July	June	June, July	June, July	No
FAMILY MEMBRACIDAE							
<u>Spissistulus festinus</u> (Say)	June, Aug	June, Aug	June	June	July, Aug	June	No
<u>Microtalis calva</u> (Say)			July, Aug	June, Aug	June, July	June	No
<u>Stictocephala bubalus</u> (F.)				July		June, July	No
FAMILY CERCOPIIDAE							
<u>Lepyronia quadrangularis</u> (Say)	Aug	Aug, Sept		July	June	May	No
<u>Clastoptera xanthocephala</u> Germ.		Aug, Sept	July, Aug		Sept	Aug	No
<u>Clastoptera achatina</u> Germ.					Aug		No
FAMILY PSYLLIDAE							
<u>Trioza minuta</u> (Crawf.)				June	June thru Sept	June, Aug Sept	No
<u>Aphalara simila</u> (Cald.)	July	July	June thru Aug	June thru Aug		June thru Aug	No
<u>Aphalara veaziei</u> Patch			June	July	Aug	July	No

	1957				1956		
	Sedge Inshore	Sedge Center	Smartweed Inshore	Smartweed Center	Willow Inshore	Willow Center	
<u>Livia maculipennis</u> (Fitch)	May, June						No
<u>Livia vernalis</u> Fitch	May						No
ORDER COLEOPTERA							
FAMILY CARABIDAE							
<u>Leptotrachelus dorsalis</u> (F.)				June			Yes
<u>Lebia viridis</u> (Say)	July						Yes
<u>Anadaptus baltimorensis</u> (Say)			May				No
FAMILY STAPHYLINIDAE							
<u>Stenus flavicornis</u> Erichs.						June	Yes
FAMILY CANTHARIDAE							
<u>Chauliognathus marginatus</u> (F.)				June	May	June	Yes
FAMILY MALACHIIDAE							
<u>Collops quadrimaculatus</u> (F.)		June, July		June, July			Yes
<u>Collops balteatus</u> Lec.		June	May				Yes
<u>Attalus greeni</u> Marshall				June, July	June		Yes
FAMILY CLERIDAE							
<u>Isohydnocera curtipennis</u> (Newn.)		June	May				Yes

1957

1956

	Sedge Inshore	Sedge Center	Smartweed Inshore	Smartweed Center	Willow Inshore	Willow Center	
FAMILY MORDELLIDAE							
<u>Mordellistena nigricans</u> (Melsh.)					June		No
<u>Mordellistena</u> sp.				June	May		Yes
<u>Mordella</u> sp.				June			No
FAMILY PEDILIDAE							
<u>Macratia murina</u> (F.)				July		July	No
FAMILY ANTHICIDAE							
<u>Anthicus cervinus</u> Laf.						July	Yes
<u>Anthicus floralis</u> (L.)							Yes
<u>Notoxus bicolor</u> Say							Yes
FAMILY BUPRESTIDAE							
<u>Agrilus politus</u> (Say)				July	July, Aug	June, July	No
<u>Taphrocerus gracilis</u> (Say)		June					Yes
FAMILY CUCUJIDAE							
<u>Ahasverus advena</u> Waltl.						July	No
<u>Telephanus velox</u> (Hald.)	July	June					Yes
FAMILY LANGURIIDAE							
<u>Acropteroxys gracilis</u> Newn.				July			No

1957

1956

	Sedge Inshore	Sedge Center	Smartweed Inshore	Smartweed Center	Willow Inshore	Willow Center	
FAMILY MYCETOPHAGIDAE							
<u>Litargus didesmus</u> Say					Aug		No
FAMILY LATHRIDIDAE							
<u>Melanophthalma picta</u> Lec.	June	June					Yes
<u>Melanophthalma pumila</u> Lec.	May					June	No
<u>Melanophthalma</u> sp.		July			July	July, Aug	Yes
FAMILY PHALACRIDAE							
Gen. sp.		June, July	June, Aug	June thru Aug	July	June, July	Yes
FAMILY COCCINELLIDAE							
<u>Brachyacantha ursina</u> (F.)				June			Yes
<u>Coccinella novemnotata</u> Hbst.	Aug					June	Yes
<u>Pullus loewii</u> Muls.					June		Yes
<u>Pullus</u> sp.			June, Aug				No
<u>Hippodamia convergens</u> Guer.							Yes
<u>Coleomegilla maculata lengi</u> Timb.	June thru Aug	June, July Sept	Aug	June thru Aug	June thru Aug	June, July	Yes
FAMILY MELANDRYIDAE							
<u>Allopeda lutea</u> (Hald.)						June	No

1957

1956

	Sedge Inshore	Sedge Center	Smartweed Inshore	Smartweed Center	Willow Inshore	Willow Center	
FAMILY CHRYSOMELIDAE							
<u>Pachybrachys femoratus</u> (Oliv.)					June	June, July	No
<u>Cryptocephalus guttulatus</u> Oliv.			Aug	June, Aug	Aug	Aug	No
<u>Cryptocephalus leucomelas</u> Suffr.						Aug	No
<u>Cryptocephalus</u> sp.					June		No
<u>Diachus auratus</u> (F.)			Aug, Sept		May, July	May thru Aug	Yes
<u>Nodonota tristis</u> (Oliv.)				June, July	June, July	June, July	No
<u>Colaspis brunnea</u> (F.)				July			No
<u>Paria canella</u> (F.)	July		June				No
<u>Chrysomela scripta</u> F.					June, July	May, June	No
<u>Chrysomela knabi</u> Brown						June	No
<u>Diabrotica undecimpunctata</u> <u>howardi</u> Barber	July			Aug, Sept			Yes
<u>Altica</u> sp.		Aug					No
<u>Chalcoides fulvicornis</u> (F.)	Aug	June, Aug Sept	July thru Sept	June thru Aug	May thru Sept	May thru Sept	No
<u>Epitrix hirtipennis</u> (Melsh.)					July		No
<u>Orthaltica copalina</u> (F.)						June	No

1957

1956

	Sedge Inshore	Sedge Center	Smartweed Inshore	Smartweed Center	Willow Inshore	Willow Center	
<u>Chaetocnema pulicaria</u> Melsh.	May, June Aug, Sept	June thru Sept			July, Aug	Aug	Yes
<u>Chaetocnema denticulata</u> Ill.							Yes
<u>Systema hudsonias</u> (Forst.)		June	June, Aug	June			Yes
<u>Systema elongata</u> (F.)				July		July	Yes
<u>Systema blanda</u> (Melsh.)				May			Yes
<u>Systema frontalis</u> (F.)	July thru Sept	June thru Sept	July thru Sept	June thru Sept	Aug	July	Yes
<u>Longitarsus subcylindricus</u> Blatch.		July	Aug		July		No
<u>Longitarsus subrufus</u> Lec.	May						No
<u>Phyllotreta zimmermanni</u> (Crotch)		May		May			Yes
<u>Palaeothona picta</u> (Say)					July		No
<u>Deloyala guttata</u> (Oliv.)				Aug			Yes
<u>Metricona bicolor</u> (F.)						July	Yes
FAMILY BRUCHIDAE							
<u>Acanthoscelides alboscuteatus</u> (Horn)	Aug	Aug	July		June		Yes

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	Sedge Inshore	Sedge Center	Smartweed Inshore	Smartweed Center	Willow Inshore	Willow Center	
FAMILY ANTHRIBIDAE							
<u>Brachytarsus sticticus</u> Boh.	June, July	June thru Sept	July thru Sept	July thru Sept	Aug	Sept	No
<u>Anthribulus rotundatus</u> Lec.			May				No
FAMILY CURCULIONIDAE							
<u>Apion</u> sp.			July			Aug	No
<u>Sitona hispidula</u> (F.)		Aug					No
<u>Endalus ovalis</u> Lec.		June	May			May	No
<u>Anthonomini</u> gen. sp.				June			No
<u>Orchestes ephippiatus</u> (Say)					May	June	No
<u>Orchestes niger</u> Horn					June, Sept	July, Aug	No
<u>Lixus rubellus</u> Rand.				July		June	No
<u>Barini</u> gen. sp.	June						No
<u>Centrinus picumnus</u> (Hbst.)	Aug			Aug			No
<u>Odontocorynus scutellum-album</u> (Say)					July		No
<u>Auleutes nebulosus</u> (Lec.)	Aug	July thru Sept	June		Aug		No
<u>Ceutorhynchus sulcipennis</u> Lec.	Aug	Aug		Aug			No
<u>Perigaster cretura</u> (Hbst.)		July					No

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Sedge
InshoreSedge
CenterSmartweed
InshoreSmartweed
CenterWillow
InshoreWillow
Center

ORDER HYMENOPTERA

	Sedge Inshore	Sedge Center	Smartweed Inshore	Smartweed Center	Willow Inshore	Willow Center	
FAMILY TENTHREDINIDAE							
<u>Pachynematus</u> sp.			June				No
<u>Pristiphora</u> sp.					May, June Aug		No
FAMILY BRACONIDAE							
<u>Heterospilus</u> sp.		Aug					No
<u>Urosigalphus femoratus</u> Cwfd.			Sept				No
<u>Orgilus gelechia</u> Ashm.	June						No
<u>Chelonus</u> sp.			June	July			No
<u>Ascogaster</u> sp.			June				No
<u>Aridelus fisheri</u> Vier.			July			July	No
<u>Aridelus melanderi</u> (Brues)	June						No
<u>Euphorus pallipes</u> (Curt.)						Aug	No
<u>Rogas stigmator</u> (Say)						June	No
<u>Tetrasphaeropyx</u> sp.					July		No
<u>Microctonus</u> sp.					May		No
<u>Euphoriella incerta</u> (Ashm.)			May				No

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	Sedge Inshore	Sedge Center	Smartweed Inshore	Smartweed Center	Willow Inshore	Willow Center	
<u>Perilitus coccinellae</u> (Schrank)	May						Yes
<u>Apanteles paleacritae</u> Riley						June	No
<u>Apanteles ornigis</u> Weed						June	No
<u>Apanteles rohweri</u> Mues.	July						No
<u>Apanteles winkleyi</u> Vier.				Aug		Aug	No
<u>Apanteles</u> sp.	May thru Aug	May thru July	July	July	Aug, Sept	July, Sept	Yes
<u>Apanteles disputabilis</u> (Ashm.)						Sept	No
<u>Microgaster epagoges</u> Gah.			Aug	July			No
<u>Agathis gibbosa</u> (Say)			July				No
<u>Agathis cincta</u> (Cress.)	June						No
<u>Agathis acrobasidis</u> (Cush.)				Aug			No
<u>Agathis discolor</u> (Cress.)		Aug					No
<u>Agathis agilis</u> (Cress.)	July			July			No
<u>Vipio rugator</u> (Say)		Aug	July, Aug	July, Aug			Yes
<u>Bracon pygmaeus</u> Prov.	June thru Aug	June	Aug			Aug	Yes
<u>Bracon caulicola</u> (Gah.)	June		June	May, June Sept	July		No
<u>Bracon quinnipiacorum</u> (Vier.)	June						Yes

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	Sedge Inshore	Sedge Center	Smartweed Inshore	Smartweed Center	Willow Inshore	Willow Center	
<u>Bracor</u> spp.	June thru Aug	May thru Aug	June thru Aug	June thru Aug	May, June July, Sept	May thru Aug	Yes
FAMILY MYMARIDAE							
<u>Anagrus armatus</u> (Ashm.)	June						No
FAMILY EULOPHIDAE							
<u>Tetrastichus</u> sp.				June			No
<u>Auplectrus mellipes</u> Prov.						July	No
<u>Euplectrus marginatus</u> Ashm.						July	No
<u>Pediobius sexdentatus</u> (Grlt.)	June						No
Entedontini gen. sp.						Aug	No
<u>Euderus rugosus</u> (Cwfd.)			July				No
<u>Euderus argyresthiae</u> (Cwfd.)							Yes
<u>Euderus subopacus</u> (Gah.)	June					July	No
<u>Homalotylus terminalis</u> (Say)		Aug					Yes
FAMILY ENCYRTIDAE							
<u>Chalcaspis phenacocci</u> (Ashm.)				July			No
FAMILY EUPELMIDAE							
<u>Anastatus</u> sp.	Aug						No
<u>Eupelmus cyaniceps</u> Ashm.			June		Aug	Aug	No

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	Sedge Inshore	Sedge Center	Smartweed Inshore	Smartweed Center	Willow Inshore	Willow Center	
FAMILY PERILAMPIDAE							
<u>Perilampus hyalinus</u> Say						Aug	No
<u>Perilampus fulvicornis</u> Ashm.			Aug			July, Aug	No
FAMILY TORYMIDAE							
<u>Torymus solidaginis</u> (Huber)						Aug	Yes
<u>Microdontomerus anthonomi</u> Cwfd.	Aug						Yes
FAMILY PTEROMALIDAE							
<u>Norbanus perplexus</u> (Ashm.)	June						No
<u>Bruchobius mayri</u> (Masi)					Aug		No
<u>Heteroschema</u> sp.					June		No
<u>Pteromalini</u> gen. sp.		June		Aug	July		No
<u>Habrocytus piercei</u> Cwfd.				Aug			No
<u>Eupteromalus tachinae</u> Gah.	July						No
FAMILY EURYTOMIDAE							
<u>Eudecatoma</u> sp.						June	No
FAMILY CHALCIDIDAE							
<u>Brachymeria</u> sp.			Aug		Sept		Yes
"Chalcid" gen. sp.	June thru Sept	June thru Sept	June, July Sept	June thru Sept	June thru Aug	June, Aug Sept	Yes

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	Sedge Inshore	Sedge Center	Smartweed Inshore	Smartweed Center	Willow Inshore	Willow Center	
FAMILY SCELIONIDAE							
<u>Hadronotus</u> sp.		June					No
<u>Macroteleia</u> sp.	June, Aug	July		July			No
FAMILY BETHYLIDAE							
<u>Perisierola cellularis</u> (Say)	June						No
<u>Goniozus platynotae</u> Ashm.						Sept	No
FAMILY MUTILLIDAE							
<u>Dasymutilla occidentalis</u> (L.)		July					Yes
FAMILY SCOLIIDAE							
<u>Scolia nobilitata</u> F.							Yes
FAMILY FORMICIDAE							
<u>Camponotus nearcticus</u> Em.					July		No
<u>Brachymermyx depilis</u> Em.				July			No
<u>Brachymermyx</u> sp.			June				No
<u>Crematogaster clara</u> Mayr						June	No
<u>Crematogaster</u> spp.	July	June	Aug		June thru Aug	Sept	No

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	Sedge Inshore	Sedge Center	Smartweed Inshore	Smartweed Center	Willow Inshore	Willow Center	
FAMILY VESPIDAE							
<u>Polistes exclamans</u> Vier.	Aug		Sept				Yes
<u>Polistes annularis</u> (L.)	May		Aug	Aug		June	Yes
FAMILY POMPILIDAE							
<u>Priocnemis cornica</u> (Say)						July	Yes
<u>Priocnemioides fulvicornis</u> (Cr.)							Yes
<u>Psorthaspis legata</u> (Cr.)				Aug			No
<u>Anoplius v. ventralis</u> (Bks.)	July, Aug					July	No
FAMILY SPECIDAE							
<u>Ammophila nigricans</u> Dahlb.			June	July			No
<u>Mimesa longicornis</u> (Fox)				July			No
<u>Ectemnius paucimaculatus</u> (Pack.)			Aug				No
<u>Ectemnius comptus</u> (Lep. and Br.)							Yes
<u>Astata unicolor</u> Say							Yes
<u>Didineis texana</u> (Cress.)							Yes
<u>Cereris fumipennis</u> Say							Yes
FAMILY COLLETIDAE							
<u>Hylaeus modestus</u> Say				Sept			No

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	Sedge Inshore	Sedge Center	Smartweed Inshore	Smartweed Center	Willow Inshore	Willow Center	
<u>Hylaeus affinis</u> Sm.				July			No
<u>Heriades v. variolosa</u> (Cr.)				Aug			No
FAMILY HALICTIDAE							
<u>Lasioglossum (Chloralictus)</u> <u>zephyrum</u> (Sm.)	July, Aug	June	July, Aug	July, Aug	Aug	Aug	Yes
<u>L. (C.) versatum</u> (Rob.)			June thru Aug	July, Aug			Yes
<u>L. (C.) inconspicuum</u> Sm.	June thru Aug	July thru Aug	June thru Sept	July thru Sept	July thru Sept	June thru Aug	Yes
<u>L. (C.) tegularis</u> Rob.				July, Aug	Aug		No
<u>L. (C.) admirandum</u> (Sandh.)		Aug		June thru Aug		May thru Aug	No
<u>L. (C.) bruneri</u> Cwfd.			Aug				No
<u>L. (C.) illinoense</u> Rob.	Aug		Aug			Aug	No
<u>L. (C.) pilosum</u> Sm.		Aug					No
<u>L. (C.) sp.</u>	June, Sept		Aug	June thru Aug	Aug	June thru Sept	Yes
<u>Lasioglossum pectorale</u> Sm.				Aug			No
<u>Halictus ligatus</u> Say			July, Aug	July			No
<u>Halictus confusus</u> Sm.			July				No
<u>Augochlora aurata</u> Sm.			June	July, Aug			No
<u>Augochlora striata</u> Prov.	June			July			No

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	Sedge Inshore	Sedge Center	Smartweed Inshore	Smartweed Center	Willow Inshore	Willow Center	
<u>Augochlora pura</u> Say			Aug	Aug	Aug	July	No
<u>Augochloropsis cuprea</u> Sm.		Sept	July	Aug			No
<u>Agapostemon radiatus</u> Say							Yes
FAMILY MEGACHILIDAE							
<u>Hoplitis cylindrica</u> Cress.		May					No
<u>Anthidium maculifrons</u> Sm.							Yes
FAMILY APIDAE							
<u>Apis mellifera</u> L.	Sept		Aug	Aug, Sept	Aug	Aug	Yes
<u>Ceratina calcarata</u> Rob.				July			No
<u>Bombus impatiens</u> Cress.				Aug			No
ORDER LEPIDOPTERA							
FAMILY TORTRICIDAE							
<u>Archips</u> sp.		July					No
<u>Sparganothis sulfureana</u> Clem.			July				No
FAMILY SCYTHRIDAE							
<u>Scythris</u> sp.		Aug					No
FAMILY GRACILLARIIDAE							
<u>Gracillaria</u> sp.							No

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	Sedge Inshore	Sedge Center	Smartweed Inshore	Smartweed Center	Willow Inshore	Willow Center	
FAMILY COLEOPHORIDAE							
<u>Coleophora</u> sp.	June thru Aug	May thru Aug	Sept	June	July	May, July Aug	Yes
FAMILY NOCTUIDAE							
<u>Salia interpuncta</u> (Grt.)			June				No
FAMILY NYMPHALIDAE							
<u>Vanessa atalanta</u> L.						July	No
<u>Basilarchia archippus</u> Cram.						July	No

ORDER DIPTERA

FAMILY TIPULIDAE							
<u>Nephrotoma ferruginea</u> (F.)			May				No
<u>Symplectra cana</u> (Walk.)	May	May					No
FAMILY TENDIPEIDAE							
(Midges)	May thru Sept	May thru Sept	June, July	June, July	May thru July	May, June	Yes
<u>Hydrobaenus</u> sp.						May	No
<u>Cricotopus</u> sp.							Yes
FAMILY ITONIDIDAE							
<u>Mycodiplosis</u> sp.	June						No

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	Sedge Inshore	Sedge Center	Smartweed Inshore	Smartweed Center	Willow Inshore	Willow Center	
<u>Lasioptera</u> sp.	June, July						No
Poss. <u>Mycophila</u> sp.						July	No
FAMILY FUNGIVORIDAE							
<u>Macrocera formosa</u> Lw.				July			No
FAMILY STRATIOMYIDAE							
<u>Allognosta fuscitarsis</u> (Say)		Aug		July, Aug	May, July		No
FAMILY TABANIDAE							
<u>Tabanus calens</u> L.					Aug		No
FAMILY BOMBYLIIDAE							
<u>Villa</u> sp.			Aug		Sept		No
FAMILY EMPIDIDAE							
<u>Euhybos strumaticus</u> Mel.		July, Sept			May thru July	July, Aug	No
<u>Chelipoda</u> sp.				July		June	No
<u>Drapetis</u> sp.						July	No
FAMILY DOLICHOPIDAE							
<u>Condylostylus</u> sp.	May	June thru Aug	June thru Aug	June thru Aug	June, July	June, July	Yes
<u>Dolichopus</u> sp.					July, Aug	July	Yes
<u>Dolichopus comatus</u> Lw.				Aug			No
<u>Rhaphium</u> sp.				July		June	No

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	Sedge Inshore	Sedge Center	Smartweed Inshore	Smartweed Center	Willow Inshore	Willow Center	
<u>Chrysotus</u> sp.	July	July, Aug	June, July	June thru Aug	June thru Aug	June, Aug	Yes
<u>Paraphrosylus</u> sp.				June		June, Aug	No
FAMILY PIPUNCULIDAE							
Gen. sp.		May, June				June, Sept	No
" " <u>Tömösvaryella</u> sp.	Aug	July, Aug	June, Aug	June, July		July, Aug	Yes
FAMILY SYRPEIDAE							
<u>Mesograpta geminata</u> (Say)						Sept	No
<u>Syritta pipiens</u> (L.)							Yes
<u>Mesograpta polita</u> (Say)				Aug			Yes
<u>Metasyrphus wiedemanni</u> (Johnson)							Yes
FAMILY OTITIDAE							
<u>Chaetopsis fulvifrons</u> (Macq.)	May	Aug, Sept				May, June	Yes
<u>Eumetopiella rufipes</u> (Macq.)	Aug	Aug		July, Aug			Yes
<u>Euxesta notata</u> (Wied.)					July		No
FAMILY TEPHRITIDAE							
<u>Paroxyna</u> sp.			Aug				Yes
<u>Trupanea actinobola</u> (Lw.)			Aug				No
<u>Eutreta rotundipennis</u> (Lw.)			July		July		No

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	Sedge Inshore	Sedge Center	Smartweed Inshore	Smartweed Center	Willow Inshore	Willow Center	
FAMILY SEPSIDAE							
<u>Sepsis punctum</u> (Fab.)			June, July	June	June		No
FAMILY LAUXANIIDAE							
<u>Homoneura conjuncta</u> (Johns.)					May		No
<u>Sapromyza umbrosa</u> Lw.					May		No
<u>Sapromyza</u> sp.			May, June			July	No
<u>Sapromyza vittigera</u> Coq.					June	July	No
<u>Sapromyza quadrilineata</u> Lw.							Yes
<u>Trigonometopus vittatus</u> Lw.						Aug	No
<u>Minettia valida</u> (Walk.)							Yes
FAMILY DROSOPHILIDAE							
<u>Scaptomyza adusta</u> (Lw.)				June			No
<u>Drosophila sigmoides</u> Lw.						Sept	No
FAMILY ANTHOMYZIDAE							
<u>Mumetopia occipitalis</u> Mel.	June	June					No
<u>Stenomicro angustata</u> Coq.	Aug						No
FAMILY AGROMYZIDAE							
<u>Melanagromyza</u> sp.				Aug			No

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	Sedge Inshore	Sedge Center	Smartweed Inshore	Smartweed Center	Willow Inshore	Willow Center	
FAMILY MILICHIIDAE							
<u>Desmometopa m-nigrum</u> (Zett.)			June	Aug			No
FAMILY CHLOROPIDAE							
<u>Eribolus longulus</u> (Lw.)	Aug	July, Aug		Aug		Aug	No
<u>Monochaetoscinella nigricornis</u> (Lw.)							Yes
<u>Elachiptera nigriceps</u> (Lw.)	June						No
<u>Elachiptera erythropleura</u> (Sabr.)						July	Yes
<u>Diplotoxa versicolor</u> (Lw.)							Yes
<u>Oscinella umbrosa</u> (Lw.)	July						No
<u>Oscinella neocoxendix</u> Sabr.		Aug					Yes
<u>Oscinella flavescens</u> (Tuck.)			June				No
<u>Conioscinella trigramma</u> (Lw.)						July	No
<u>Siphonella</u> sp.					Aug		No
<u>Hippelates dissidens</u> (Tuck.)	Aug	Aug					Yes
<u>Hippelates particeps</u> (Beck.)							Yes
<u>Chlorops</u> spp.	June thru Aug	June thru Aug	June thru Aug	June thru Sept	May, July Aug	June, July	Yes
<u>Meromyza americana</u> Fitch		Aug					No

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	Sedge Inshore	Sedge Center	Smartweed Inshore	Smartweed Center	Willow Inshore	Willow Center	
<u>Thaumatomyia bistrata</u> (Wlk.)						Aug	No
<u>Thaumatomyia glabra</u> (Mg.)	May, Aug	May, July	June, July	June, July	June, Aug	May, June	Yes
<u>Thaumatomyia pulla</u> var. <u>punctum</u> (Beck.)		July, Aug					No
FAMILY EPHYDRIDAE							
<u>Paralimna punctipennis</u> (Wied.)		Aug		July	Sept	Aug	Yes
<u>Scatella</u> sp.						May	No
<u>Discocerina</u> sp.					Aug		Yes
<u>Leptopsilopa</u> sp.	Aug	Aug					Yes
FAMILY SPHAEROCERIDAE							
<u>Leptocera fontinalis</u> (F.)	Aug				Aug		No
FAMILY SCIOMYZIDAE							
<u>Tetanocera vicina</u> Macq.						July	No
<u>Limnia</u> sp.				May			Yes
<u>Dictya expansa</u> Stey.					May		No
<u>Dictya texensis</u> Cn.							Yes
FAMILY PSILIDAE							
<u>Loxocera cylindrica</u> Say	Aug						No

1957

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	Sedge Inshore	Sedge Center	Smartweed Inshore	Smartweed Center	Willow Inshore	Willow Center	
FAMILY MUSCIDAE							
<u>Limnophora narona</u> (Walk.)		June					No
<u>Coenosia</u> (<u>Limosia</u>) <u>atrata</u> (Walk.)	June, Aug	June		June			No
<u>Lispe</u> sp.							Yes
<u>Achaetella varipes</u> (Wlk.)			July			July	No
<u>Pyrellia cyanicolor</u> (Zett.)			July		July		No
FAMILY CALLIPHCRIDAE							
<u>Callitroga macellaria</u> (Fab.)							Yes
FAMILY SARCOPHAGIDAE							
<u>Sarcophaga</u> (<u>Helicobia</u>) <u>rapax</u> Walk.					July, Aug		Yes
<u>Sarcophaga</u> (<u>Chaetoravinia</u>) <u>derelecta</u> Walk.	May, July	June	July, Aug	June, Aug		July	Yes
<u>Sarcophaga ochracea</u> Ald.							Yes
<u>Sarcophaga</u> (<u>Oxysarcodexia</u>) <u>ventricosa</u> Wulp.			July, Aug	July, Sept	Aug, Sept	July, Aug	Yes
<u>Sarcophaga</u> (<u>Acridiophaga</u>) nr <u>acullata</u> Ald.	June				July		No
<u>Sarcophaga</u> (<u>Ravinia</u>) <u>querula</u> Wlk.			July				No
<u>Sarcophaga</u> sp.		May, Aug Sept	June, July	July, Aug	May, July	June, July	Yes

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	Sedge Inshore	Sedge Center	Smartweed Inshore	Smartweed Center	Willow Inshore	Willow Center	
<u>Hypopelta scrofa</u> Ald.							Yes
FAMILY LARVAEVORIDAE							
<u>Cylindromyia nana</u> (Tns.)			Aug				No
<u>Rhodogyne fuliginosa</u> (R.D.)							Yes
<u>Sciasma nebulosa</u> Coq.	Aug	Sept					No
<u>Hyalomyiopsis aldrichi</u> (Tns.)							Yes
<u>Copecryta nitens</u> (Wd.)					July		No
<u>Leucostoma simplex</u> (Fall.)							Yes
<u>Gonia</u> sp.				Aug			No
<u>Acroglossa hesperidarum</u> Will.	Aug						No
<u>Archytas apicifer</u> (Wlk.)							Yes
<u>Lydella</u> sp.				June			No
<u>Chaetophlepsis</u> sp.	Aug				July		Yes
<u>Amedoria luctuosa</u> (Mg.)			June		June, July	July, Aug	No
<u>Xanthomelanodes atripennis</u> (Say)							Yes
FAMILY HELEIDAE							
<u>Dasyhelea</u> sp.	July						No

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