

Insects of Western North America
**4. Survey of Selected Insect Taxa of Fort Sill,
Comanche County, Oklahoma**
**2. Dragonflies (Odonata), Stoneflies (Plecoptera) and
selected Moths (Lepidoptera)**



**Contributions of the
C.P. Gillette Museum of Arthropod Diversity
Colorado State University**

**Survey of Selected Insect Taxa of Fort Sill, Comanche
County, Oklahoma**
**2. Dragonflies (Odonata), Stoneflies (Plecoptera) and
selected Moths (Lepidoptera)**

by

Boris C. Kondratieff, Paul A. Opler, Matthew C. Garhart, and Jason P. Schmidt
C.P. Gillette Museum of Arthropod Diversity
Department of Bioagricultural Sciences and Pest Management
Colorado State University, Fort Collins, Colorado 80523

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C.P. Gillette Museum of Arthropod Diversity
Colorado State University**

Cover illustration (top to bottom): Widow Skimmer (*Libellula luctuosa*) [photo ©Robert Behrstock], Stonefly (*Perlesta* species) [photo © David H. Funk, White-lined Sphinx (*Hyles lineata*) [photo © Matthew C. Garhart]

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EXECUTIVE SUMMARY

Faunal and floral surveys on Federal lands are critical in the monitoring, conservation, and management of our Nation's natural resources. Integrating the knowledge gained from surveys such as this into management plans and activities on Fort Sill, Comanche County, Oklahoma may help reduce or prevent effects from activities associated with military construction and field exercises.

Moreover, such surveys can discover whether or not any species are protected by the U.S. Endangered Species Act of 1973. Further, the presence of any other species listed by the State of Oklahoma as protected or sensitive, while not a legal mandate, can be included in management plans to prevent these species from becoming more vulnerable. The Endangered Species Act requires that no Federally-funded activity, including those of the military, jeopardize the continued existence of listed Endangered or Threatened species or result in the destruction or adverse modification of their critical habitats.

Collection of such data is required for compliance with the National Environmental Policy Act of 1969. Identifying and documenting the locations of any listed, proposed, or candidate species on an installation are crucial to effectively balancing mission and conservation requirements. Army regulation 200-3 (1995) Sec. 11-11 states "Installations will conduct initial, thorough inventories of plants, fish, wildlife, and habitat types on installation lands, using scientifically acceptable methodology. Installations will conduct a 100 percent inventory of suitable habitat for listed, proposed, or category 1 candidate species that may occur on the installation." Compliance with these policies and regulations requires knowledge of the numbers and habitats of rare species on an installation.

This is our second of a series of three reports on the inventory and status of selected insect and other arthropod groups at Fort Sill. In this publication, we report on the status of selected aquatic insect orders and moth families found on Fort Sill. In the 2003 survey work, we sampled insects in six major habitats on the fort – short-grass prairie, mixed grass prairie, tall-grass prairie, deciduous river bottom woodland, post oak–black jack oak woodland, and aquatic (both streams and reservoirs). In particular, our 2003 survey included dragonflies and damselflies (order Odonata), stoneflies (order Plecoptera), and selected moth families (Sphingidae, Saturniidae, Notodontidae, Arctiidae, and Noctuidae – genera *Catocala* and *Schinia*: order Lepidoptera). The primary purpose was to discover whether any Federally listed, proposed, or candidate species occurred on Fort Sill. Secondly, we wished to find out whether any sensitive or protected species listed by the State of Oklahoma occurred on the fort.

We found no listed, proposed, or candidate species among the groups surveyed. Furthermore, we found no species listed by the State of Oklahoma that would require protection or special management (Oklahoma Natural Heritage Program web site).

Our survey revealed 169 species of insects in the groups selected for survey in 2003. In addition, we found 23 species of beetles (Coleoptera) and 7 species of butterflies not found during our 2002 surveys. None of these species are Federally listed, proposed or candidate species, and none are protected or being considered by the State of Oklahoma.

We recommend that several small lakes or reservoirs be kept fish-free in order to allow for the breeding of dragonfly and damselfly species (see discussion of management considerations). The selected water bodies should also have surrounding disturbance free buffer zones.

With regard to streams, we recommend that extreme disturbance of the substrate by unnatural stream hydrological events and sedimentation should be minimized or avoided. Also, protection of streamside vegetation should be a priority, to prevent further erosion. Streams such as Medicine Creek, Blue Beaver Creek and Quanah Creek need to be protected from unnecessary perturbation such as crossings by heavy vehicles. Considerations should be discussed for protecting the aquatic insects of the above streams if future changes are made to the outlet structures of upstream dams or if stream channels are altered.

For the conservation of grassland and woodland moths, we suggest that no management plan changes are necessary, but we urge that the bottomland woodlands be conserved to the maximum extent practicable, and that minimal levels of disturbance be accepted for the understory vegetation.

RECOMMENDATIONS

The following recommendations are in addition to those made in the 2003 report.

1. Minimize crossings of Medicine Creek, Blue Beaver Creek, Quanah Creek and other similar high quality streams by heavy equipment so as to minimize substrate disturbance, heavy erosion and siltation.
2. Maintain selected lakes and small reservoirs as fish-free refuges for dragonfly and damselfly populations. Maintain disturbance-free buffers around the selected water bodies.
3. Continue to maintain the data base of Fort Sill insects for long-term purposes such as management decisions that affect any aspect of natural environments on Fort Sill.

INTRODUCTION

This is our second report on the insect fauna of Fort Sill (U.S. Army), Comanche County, Oklahoma. The first report (Kondratieff et al., 2003) gave survey results from 2002 surveys of the grasshoppers (Orthoptera), selected beetles (Coleoptera), and butterflies (Lepidoptera) of grassland habitats on Fort Sill. The present report presents

data for a 2003 survey of the dragonflies and damselflies (Odonata), stoneflies (Plecoptera), and selected moth groups (Lepidoptera) on Fort Sill's lands.

Aquatic insects are excellent indicators of water quality. The damselflies and damselflies (Odonata) and in particular the stoneflies (Plecoptera) have long been considered especially sensitive to pollution and disturbance. Many species of these two insect orders in North America are either rare or vulnerable to extirpation.

We found 61 species of dragonflies and damselfies as well as 6 stonefly species on Fort Sill during our survey. The species of these groups that we found on Fort Sill are discussed as well as the details of their occurrence and habitats on the fort. Some species of these groups that might occur on Fort Sill are listed by the United States Fish and Wildlife Service (2002). During our surveys in 2002 and 2003, no listed endangered or threatened species were found.

Most Lepidoptera feed on plant material, especially leaves. They are among the most important components of ecosystems, because their caterpillars are the principal primary consumers on Earth. A number of species are sensitive to pollution or to habitat degradation and loss of their caterpillar host plants. One hundred and two species of moths in the groups selected were found during our survey at Fort Sill.

We found 15 sphinx moth species (Sphingidae), 4 wild silk moth species (Saturniidae), 24 tiger moth species (Arctiidae), 23 prominent moth species (Notodontidae), 19 underwing species (genus *Catocala* in family Noctuidae), and 17 flower moths species (genera *Melaporphyria* and *Schinia* in family Noctuidae). For most of these moth groups the number of species sampled is beyond what we expected. The number of tiger moths and prominents was especially astounding.

These groups, although none have listed Endangered or Threatened species in Oklahoma, contain a number of species that are considered rare or sensitive. Most of these families are being monitored by various state heritage programs based on information available through the NatureServe web site (<http://www.natureserve.org>). Dr. Opler has provided most of the served information for these families under contract to NatureServe.

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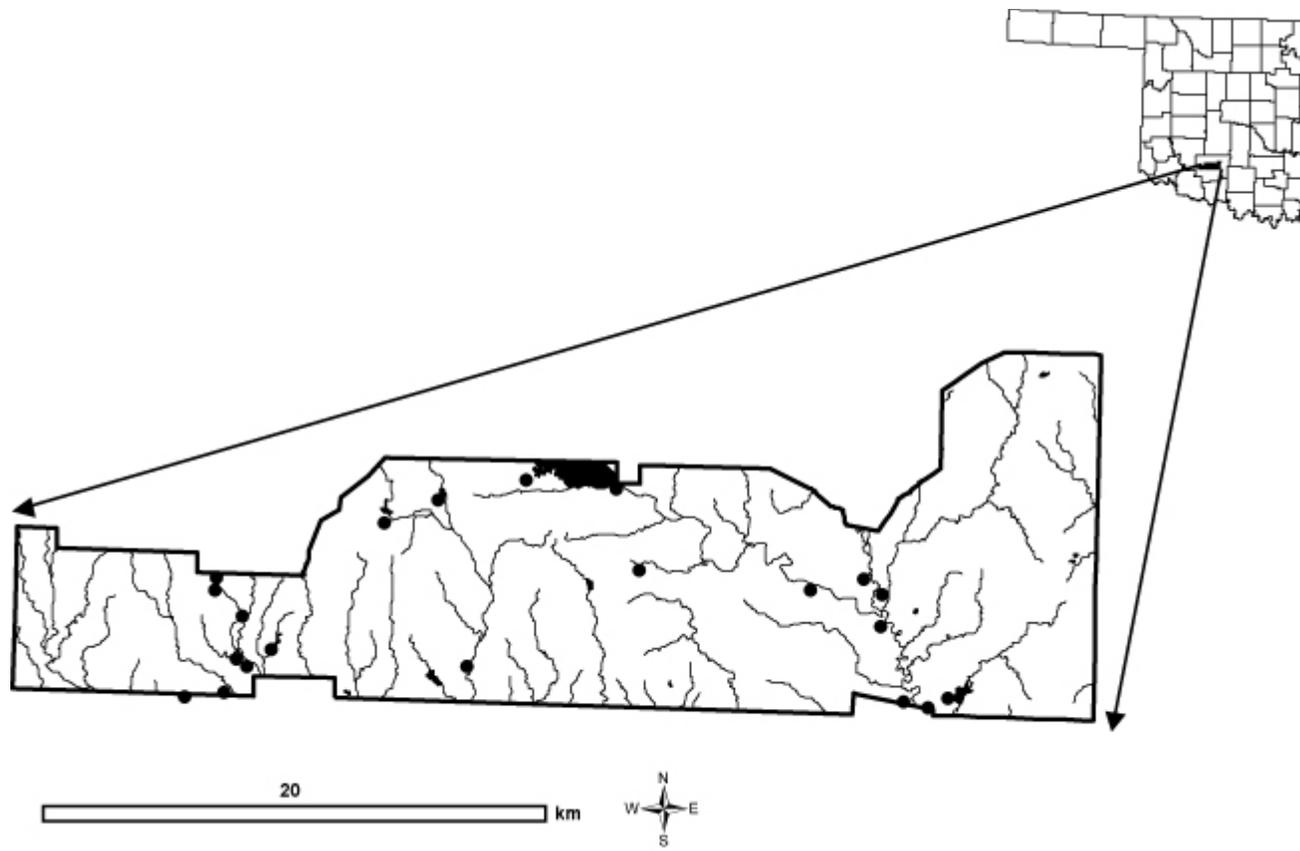
OBJECTIVE

An inventory of selected aquatic insects (Odonata, dragonflies and damselflies; Plecoptera, stoneflies) from specific aquatic habitats and selected moth families {tiger moths (Arctiidae), Noctuidae [Underwing moths (*Catocala*) and flower moths (*Schinia*) only], prominent moths (Notodontidae), wild silk moths (Saturniidae), and sphinx moths (Sphingidae)} from five habitat types –short, mixed and tall grasslands, riparian woodland, and post oak woodland) on Fort Sill Military Reservation, Oklahoma.

MATERIALS AND METHODS

Vaughn and Obermeyer (2002) reported on an inventory of selected aquatic invertebrates of Fort Sill. Important aquatic insect orders such as the Odonata (dragonflies and damselflies) and the Plecoptera (stoneflies) were not thoroughly surveyed. The aquatic habitats that were identified in Vaughn and Obermeyer (2002) were extensively sampled using standard techniques as described by Merritt et al.(1996). Vaughn and Obermeyer (2002) chose 17 sampling sites on streams and 12 sites were ponds or lakes. Our sampling regime (Map 1) emphasized those sites on Blue Beaver Creek, East Cache Creek, Medicine Creek, and West Cache Creek. Pond or lake sites included Clear Lake, Engineer Pond, Ketch Lake, lark Lake, Lake Elmer Thomas, Lake George, and Pottawotamie Pond. Additionally, several unnamed ponds on the Quannah Range were sampled.

Map 1. Sampling sites for aquatic insects (Odonata and Plecoptera).



Adult dragonflies and damselflies were collected by aerial net and placed in paper envelopes. Specimens were immersed in a 100% acetone for at least 10 hours. Specimens were removed from the acetone and air dried for at least 4 hours, labeled and were permanently stored in glassine envelopes such as those used by stamp collectors. Nymphs were collected by dip net and stored in 4-dram vials containing 80% ethanol. A good review of collecting methods is given in Glotzhober and McShaffrey (2002).

Standard techniques were used to collect stonefly adults and nymphs, including beating sheets, sweeping using an aerial net, UV light traps, handpicking adults and nymphs from substrates, and kick nets (Merritt et al. 1996). Additionally, mature nymphs were collected alive from several Fort Sill streams and returned to rearing facilities at Colorado State University. All adults and nymphs collected were labeled and stored in 4-dram vials containing 80% ethanol.

Sampling for the two aquatic orders was carried out on bimonthly visits ranging from February to October 2003. A number of Odonata were collected during visits to Fort Sill in 2002. Kondratieff is considered an expert in the taxonomy of both orders.

In general, Lepidoptera sampling followed standard field techniques (Winter, 2000). Field collections for Lepidoptera were carried out during monthly trips from March through September 2003. The dates of the collecting trips and the collectors are listed on the table below:

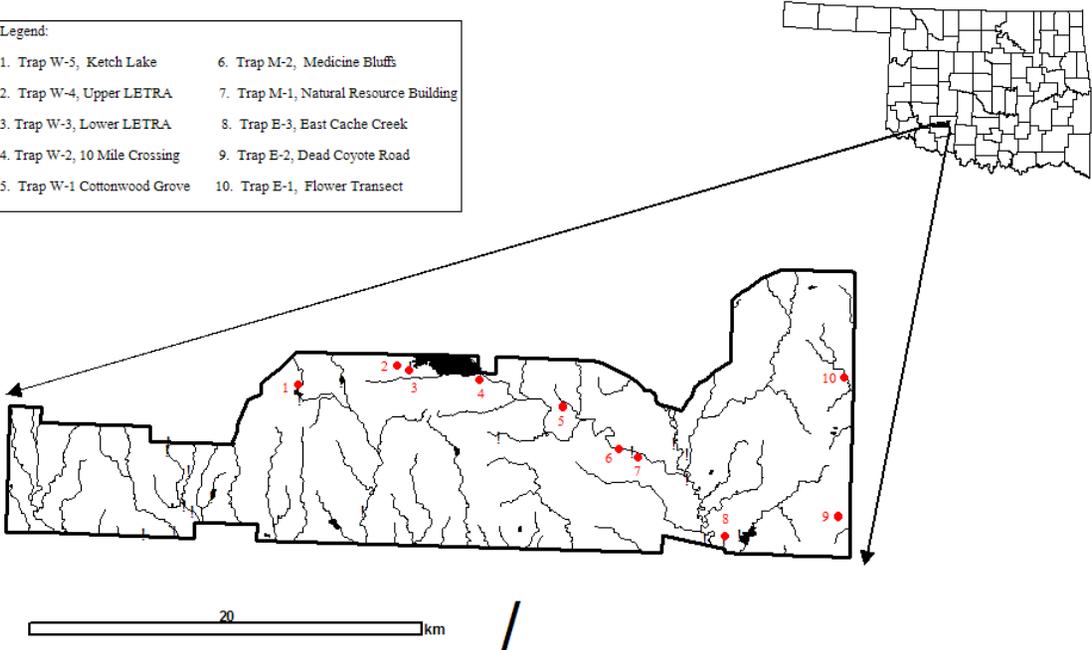
Table 1. Dates of 2003 collecting trips for Lepidoptera and the participants on each trip

<u>Date</u>	<u>Collector(s)</u>
March 27–31	Buckner, Garhart, Opler
April 25–28	Garhart, Opler
May 25–28	Garhart
June 24–27	Garhart
July 16–19	Garhart
August 17–20	Garhart, Harp
September 26–29	Garhart

Each survey visit was for a minimum of three days by one to two experienced collectors. During each visit, Lepidoptera were sampled by ultra-violet light traps in ten sites (usually five on each of two nights). The Natural Resources staff at Fort Sill helped us select appropriate sites in each habitat that would not conflict with military training or our safety. Locations were recorded exactly using a Garmin GPS locator.

Map 2. Sampling sites for moths.

- Legend:
- | | |
|-------------------------------|--|
| 1. Trap W-5, Ketch Lake | 6. Trap M-2, Medicine Bluffs |
| 2. Trap W-4, Upper LETRA | 7. Trap M-1, Natural Resource Building |
| 3. Trap W-3, Lower LETRA | 8. Trap E-3, East Cache Creek |
| 4. Trap W-2, 10 Mile Crossing | 9. Trap E-2, Dead Coyote Road |
| 5. Trap W-1 Cottonwood Grove | 10. Trap E-1, Flower Transect |



The light traps are standard U.V. traps constructed by Leroy Koehn. The traps had metal baffles adjacent to the vertical black light bulb perched atop a 5-gallon plastic bucket equipped with metal funnel and a rain drain. Inside each trap, we placed small wicked cans containing ethyl acetate as a killing agent. A 12-volt lawn tractor battery and light sensitive switch provided the electricity to run the trap each night. Each morning the traps were checked and the insects removed. Moths were separated from the other insects and placed in separate Kitchenmaid© containers.

Table 2. Fort Sill Moth Trap Locations, including latitude and longitude, and range (LETRA=Lake Elmer Thomas Recreation Area)

E-1	Flower Transect: N34° 42'32.3", W 98°16'59.9"	East Range
E-2	Dead Coyote Road: N34° 39'5", W 98° 17'30"	East Range
E-3	East Cache Creek: N34° 38'36.1", W98° 21'37.4"	East Range
M-1	Woods east of Natural Resource Building: N34° 41'6.4", W98° 24'23.2"	East Range
M-2	Medicine Bluff: N34° 41'13.1", W 98° 24'55.6"	East Range
W-1	Cottonwood Grove: N34° 42'23.3", W98°25'40.7"	West Range
W-2	10-Mile Crossing: N34° 42'58.2", W98° 29'9.7"	West Range
W-3	Lower LETRA: N34° 43'12.7", W98° 31' 49"	West Range
W-4	Upper LETRA: N34° 43'10.6", W98° 31'56"	West Range
W-5	Ketch Lake: N34° 42'38.4", W98° 35'28.9"	West Range

Hanging bait traps (6) for *Catocala* (Noctuidae) moths were run at the same locations from June through September. These were hanging net fruit bait traps with a side zipper. The bait was a fermented grape juice bait with beer and sugar added. Each morning the traps were checked and the moths killed in cyanide and removed. The collected moths were lumped with those collected by light trap.

Flower moths (*Schinia* species) were searched for on known host plant families, especially Asteraceae and Fabaceae, that occur especially in grassland habitats at Fort Sill. Host plants are given by Hardwick (1997). Our search was aided by advice from Chuck Harp (Littleton, Colorado) who is expert on *Schinia* species and who accompanied Matthew Garhart on the August survey visit.

The plastic containers with moths were kept in a freezer at Ft. Sill and carried back to Ft. Collins where they were kept in another freezer until preparation. A series of each moth species surveyed was pinned and spread and is deposited in the C.P. Gillette Museum of Arthropod Diversity at Colorado State University (see Winter 2000). Range maps for all of the groups to be sampled (except Sesiidae) are found on the USGS Moths of North America web site (Opler, 2003a) [<http://www.npwrc.usgs.gov/resource/distr/lepid/moths/mothsusa.htm>]. Information on the

species sampled will be served on the USGS Insects and Related Arthropods web site (Opler, 2003b) under Fort Sill
[<http://www.npwrc.usgs.gov/resource/1999/insect/insect.htm>].

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RESULTS AND DISCUSSION

ODONATA (DRAGONFLIES AND DAMSELFLIES)

Introduction

Adult dragonflies and damselflies are among the most beautiful and better-known insects of the world. Their kaleidoscope of colors and aerobatic abilities has fascinated people for centuries, and much has been written about them. They are conspicuous members of most permanent lakes, ponds, and other wetlands. Nymphs of many species are also found in lotic habitats (creeks, rivers). Nymphs of some species are found in water-filled leaf axils of plants, moist leaf litter, and even brackish water. Nymphs of some species also occur in temporary habitats. Nymphs of two North American species (family Petaluridae, the Petaltails) are found among wet leaves in seepage areas.

Adults are medium to large in size, having wingspans ranging from 0.8 to 4.5 inches (20 to 115 mm). Local names that have been applied to this order include mosquito hawk, devil's darning needle, and horse stinger. The order name Odonata, which means tooth, refers to the large prominent jaws or mandibles of the adults.

Adult dragonflies are easily recognized by two pairs of membranous elongate wings with many veins, long abdomen, bristle-like antennae and large head occupied mostly by the compound eyes. The nymphs are unique as compared to all other insect immatures by having the lower lip (labium) modified into a grasping structure that is elbowed and can be folded. The order includes two distinctive suborders in both the adults and nymphs in North America – the dragonflies or Anisoptera, and the damselflies or Zygoptera. Dragonfly adults are distinguished by the hind wings that are wider at the base than the front wings, abdomens that are long and stout, and when at rest wings that are held outstretched. Nymphs are recognized by their long or oval body, absence of gill plates at the end of the abdomen. Adult damselflies have both the front and hind wing of the same shape and size, a long thin abdomen, and wings held “roof-like” over the body at rest. Damselfly nymphs have elongate and slender bodies and three flat, elongate gill plates at the end of the abdomen.

All Odonata adults are predators of flying insects, often small flies, but also larger insects such as wasps and butterflies. They use their front legs as a “basket” to scoop their prey out of the air. Sometimes adults will pick prey off plants or other substrates. Dragonfly and damselfly nymphs are accomplished visual predators of almost anything they can overpower, including microcrustaceans, other aquatic insects, tadpoles, and even fish. They use their unique lower lip or labium to grab the prey and bring it to their mouthparts for consumption. Nymphs are either climbers or crawlers stalking their prey or, sprawlers and burrowers ambushing their prey.

Dragonfly nymphs pump water in and out of a gill chamber inside the posterior portion of the abdomen. This type of “jet propulsion” can be easily observed in a pan of water. Damselfly nymphs have three flat gill plates at the end of the abdomen, providing a larger surface area for oxygen diffusion.

About 5,500 species of Odonata are known worldwide and are grouped in 28 or so families, of which eleven are recorded from North America. Approximately, 440 species have been recorded from North America. A summary of the North American species of dragonflies and damselflies by Bick and Mauffray (1997-2000) is located at the website <http://www.afn.org/~iori/nalist.html>. Additionally, the web site by Valley (2000) includes links to other Odonata websites (http://www.ent.orst.edu/ore_dfly/links.html). Paulson and Dunkle (1999) provide an excellent checklist of the North American species and their distributions.

Bird (1932) and Bick and Bick (1957) reported 126 species of dragonflies and damselflies as occurring in Oklahoma. Recently, Abbott and Stewart (1998) listed 132 species, but did not include the Ozark Clubtail, *Gomphus (Gomphurus) ozarkensis* Westfall. This species was included as part of the Oklahoma fauna by Needham et al. (2000). Thus, the Oklahoma total for this order is 133 species.

Bick and Bick (1957) included 48 species of dragonflies and damselflies from Comanche County, Oklahoma. Vaughn and Obermeyer (2002) listed seven species from Fort Sill. During our survey in 2002 and 2003 we collected at least 61 species (Table 3) for Fort Sill. This is 46% of the known Oklahoma species of dragonflies and damselflies. It is to be noted that often adults can be collected at habitats where they do not breed, and immatures some of these 61 species may not occur in the aquatic habitats on Fort Sill.

Bick (2003) indentified 27 species of dragonflies and damselflies in the United States considered to be “at risk,” none occur at Fort Sill. Bick (2003) used the Natural Heritage Program rating system to evaluate state ranking using the website NatureServe (<http://www.natureserve.org/>). The only potential “at-risk” dragonfly species occurring in Oklahoma is *Somatochlora ozarkensis* Bird, known as the Ozark Emerald, which is currently recorded only from the mountainous eastern Oklahoma counties of Latimer, LaFlore and Osage, a northeastern county next to the Kansas border. Previously, Bick (1983) included *G. ozarkensis* as an “at-risk” species, a dragonfly known from Fort Sill. However, Bick (2003) now considers this species “too common and/or abundant to include.”

Regarding lentic species (ponds, lakes, reservoirs), the most diverse dragonfly and damselfly communities were found at Lake Elmer Thomas and Medicine Creek, with respect to lotic species. At least 23 species were collected from Lake Elmer Thomas and 36 species from Medicine Creek. East Cache Creek apparently supports populations of two species not collected from Medicine Creek, *G. ozarkensis* and the Russet-tipped Clubtail, *Stylurus plagiatus* (Selys).

The following are apparently new species records for Comanche County, Oklahoma: *Hetaerina titia* (Drury) [Smoky Rubyspot], *Argia sedula* (Hagen) [Blue-ringed Dancer], *Enallagma aspersum* (Hagen) [Azure Bluet], *E. exsulans* (Hagen) [Stream Bluet], *E. praevarum* (Hagen)[Arroyo Bluet], *Ischnura demosa* (Hagen)[Mexican Forktail], *I. denticollis* (Burmeister)[Black-fronted Forktail], *I. posita* (Hagen)[Fragile Forktail], *Dromogomphus spinosus* Selys [Black-shouldered Spinyleg], *Gomphus externus* Hagen

[Plains Clubtail], *G. ozarkensis* Westfall, *Hagenius brevistylus* Selys [Dragonhunter], *Stylurus plagiatus* (Selys), *Macromia pacifica* Hagen [Gilded River Cruiser], *Cordulegaster obliqua* (Say) [Arrowhead Spiketail], *Brechmorhoga mendax* (Hagen) [Pale-faced Clubskimmer], *Celithemis fasciata* Kirby [Banded Pennant], and *Ladona deplanata* (Rambur) [Blue Corporal].

Bick and Bick (1957) reported an additional 13 species from Comanche County. We expect that some of these species occur on Fort Sill, but were not collected during our survey, especially, *Nasiaeschna pentacantha* (Rambur) [Cyrano Darner], *Arigomphus submedianus* (Williamson) [Jade Clubtail], *Erythrodiplax minuscula* (Rambur) [Little Blue Dragonlet], *Libellula comanche* Calvert [Comanche Skimmer], *L. croceipennis* Selys, [Neon Skimmer] *Orthemis ferruginea* (F.) [Roseate Skimmer], *Archilestes grandis* Rambur [Great Spreadwing], *Calopteryx maculata* Beauvois [Ebony Jewelwing], *Argia fumipennis* (Burmeister) [Variable Dancer], *A. plana* Calvert [Springwater Dancer], *A. vivida* Hagen [Vivid Dancer], *Enallagma divagans* Selys [Turquoise Bluet], and *Ischnura hastata* (Say) [Citrine Forktail].

A brief synopsis of the Fort Sill families, genera, and noteworthy species is presented below:

Family Calopterygidae (Broad-winged Damselflies)

These well-known groups of familiar stream damselflies are known as the Jewelwings (*Calopteryx*) and the Ruby-spots (*Hetaerina*). The large adults have metallic green bodies, the wings not abruptly stalked at the base, and have a skipping flight. The long-legged nymph with a flat, pentagonal head, and very long first antennal segment is usually associated with in stream aquatic plants, woody debris, and exposed roots of streamside plants. Species are characteristic of small to medium sized streams (*Calopteryx*) and larger rivers (*Hetaerina*). Only one generation per year is known for this group. Adults perch horizontally on twigs at the shore. The courtship behaviors of the adults have been extensively studied. The dancing flights are characteristic. Males have distinctive territorial display flights. Two species of Ruby-spots are known from Fort Sill. The common *Calopteryx maculata* (Beauvois), the Ebony Jewelwing, has been recorded from Comanche County, but this conspicuous species was not observed during this study.

Hetaerina americana (F.) –American Ruby-spot

This common species ranges from eastern Canada, Maine to Florida west to California. Males of the American Ruby-spot are territorial and perch close to submerged vegetation of streams and rivers. The species occurs commonly in East Cache Creek and Medicine Creek.

Hetaerina titia (Drury) –Smoky Ruby-spot

The species is known from Pennsylvania to Florida west to Texas and north to Wisconsin, but is not as common as the American Ruby-spot. Adults of the Smoky Ruby-spot are wary and prefer to perch higher than the American Ruby-spot. Only two individuals

of *H. titia* were collected from Medicine Creek. An additional individual was observed at Lake Elmer Thomas.

Family Lestidae (Spreadwinged Damselflies)

Nymphs of most species inhabit marshes and swamps, some temporary standing water and slow moving streams. The adults of these damselflies are easily recognized by their perching posture, at an oblique angle with partially spread wings. The long abdomens and petiolate (stalked) part of the lower lip (prementum) easily distinguish the nymphs. One generation per year has been reported for the North American species. We found that two *Lestes* species occur on Fort Sill.

Lestes disjunctus australis Walker–Southern Spreadwing

Lestes alacer Hagen–Plateau Spreadwing

We found both species of these spreadwings in a small pond near Pottawatomie Pond on the Quanah Range, which becomes mostly dry in late summer. Female adults oviposited in living stems of Bulrush, eggs hatched in early summer, and nymphs completed development in two months or less. Adults of both species can be easily recognized by their perching posture, clinging to emergent vegetation stems at an oblique angle.

Family Coenagrionidae (Narrow-winged or Pond Damselflies)

This family is the most successful of all damselflies in terms of the number of different species and types of aquatic habitats occupied. These are the red, orange, yellow and blue small adult damselflies commonly seen around ponds and various types of wetlands. The adults are known by such common names as Sprites (genus *Nehalennia*), Forktails (genus *Ischnura*), Dancers (genus *Argia*), and Bluets (genus *Enallagma*). Nymphs are usually associated with living and dead aquatic vegetation, and debris. Nymphs of the genus *Argia* are often within rocky substrates of riffle reaches of streams. Egg laying habits of the adult female are often astounding, with some species completely submerging and crawling about. Most species lay eggs just a few centimeters below the surface in plant material, both living and dead. We collected at least 18 species of this family from Fort Sill.

Enallagma aspersum (Hagen) –Azure Bluet

It has been reported that this species is not usually found in ponds or lakes with fish populations. During our survey, we found only one adult at Pottawatomie Pond.

Enallagma vesperum (Calvert) –Vesper Bluet

The damselfly is known from Nova Scotia south to Florida, and as far west as Arizona. This species flies at dusk and females have been reported to oviposit after dark. This species may be more common at Fort Sill than the single record from Lake Elmer Thomas indicates.

Family Aeshnidae (The Darner Dragonflies)

The adults of these soaring dragonflies include the largest species in North America. Genera such as *Anax* (Green Darner), *Coryphaeschna* (Pilot Darner), and *Epiaeschna* (Swamp Darner) are the giants of this group. Many Darners have long slender bodies resembling a “darning needle,” hence the name. The large eyes meeting on top of the head, bodies brown or black and striped or spotted with blue, easily identify adults. Nymphs are easily distinguished by the combination of a flat mentum (lower lip) and 6 or 7-segmented antennae. Adults are strong fliers, with some species migrating long distances. Often they feed in swarms. Nymphs are climbers, found among living and dead submerged plant material, and woody debris. Some species that occur in streams may be found clinging to submerged logs. Adult females insert eggs into underwater portions of plants. Nymphs may require 2 to 4 years to complete one generation.

Anax junius (Drury) –Common Green Darner

The Common Green Darner is one of the most common dragonflies in the U.S., known from every state including Hawaii. Nymphs occur in a wide variety of ponds, lakes and slow moving waters that have a fringe of aquatic vegetation. Adults migrate long distances. At Fort Sill, adults were collected from March into October. This species was observed swarming in large numbers and was feeding on midges on 11 October 2002 along East Cache Creek. Adults will migrate long distances.

Basiaeschna janata–Say The Springtime Darner

The Springtime Darner occurs in the eastern U.S. and southern Canada. Adults fly in spring early summer. Generally, nymphs are found in more permanent streams such as Medicine Creek. Adults fly from midday to nightfall.

Family Cordulegastridae (Spiketails Dragonflies)

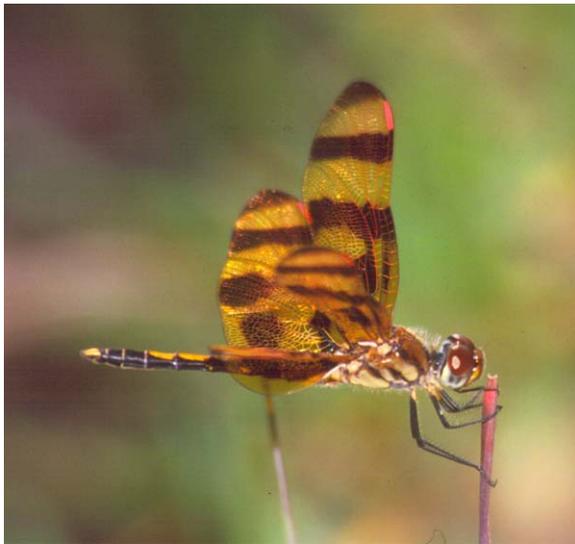
Female adult Spiketails have long, spike-like ovipositors, hence the common name. These dragonflies are generally associated with woodland streams. Nymphs remain partially buried in bottom sediments awaiting prey. The black adults are easily distinguished by the distinctive yellow markings.



Anax junius, Family Aeschnidae, © P.A. Opler



Erpetogomphus designatus, Family Gomphidae, ©Robert Behrstock



Calithemis eponina Family Libellulidae ©R.Behrstock



Erythemis simplicicollis, Libellulidae ©R. Behrstock



Libellula luctuosa, Family Libellulidae © Robert Behrstock



Libellula pulchella, Libellulidae ©Evi Buckner-Opler



Tramea lacerata, Libellulidae ©Robert Behrstock



Enallagma species, Family Coenagrionidae ©Robert Behrstock



Lestes disjunctus, Family Lestidae ©Robert Behrstock

Cordulegaster obliqua (Say) –Arrowhead Spiketail

The Arrowhead Spiketail ranges from Northern Florida west to Oklahoma and eastern Tennessee, north to Ontario and Minnesota, and into New England. Nymphs prefer forested streams of varying sizes. Males patrol the stream, flying along the shaded side of the stream. One female of this species was collected flying down a road in the East Range of Fort Sill.

Family Gomphidae (Clubtail Dragonflies)

Adults of Clubtails get their name from the enlarged end of the abdomen in males of many species. Adults are beautifully camouflaged with brown or black marked with yellow or green. The eyes are widely spaced on top. Nymphs are like those of the family Aeshnidae, have a flat mentum, but the antennae are only 4-segmented. Adults usually perch on the ground horizontally, and unlike the Darners, they do not soar, but skulk around trees or make short distance flights in nearby fields, squatting on stones, sometimes branches of shrubs or on logs. Nymphs are burrowers in soft silt, sand or gravel of streams of all sizes or ponds. Most species require 2 years to complete their life cycle.

Hagenius brevistylus Selys–The Dragonhunter

The Dragonhunter ranges from Nova Scotia to Florida west to Texas and north to Minnesota and Manitoba. The species is considered to be one of the largest dragonflies in eastern North America. The distinctive large nymphs with a broadly rounded flattened abdomen, and antennae with the third segment flat and disc-like can be found in leaf litter along [the] stream edges. This dragonfly has a four-year life cycle. The adults are powerful, voracious predators of large insects including butterflies and other dragonflies. The Dragonhunter is a common species in Medicine Creek, but only one adult was captured!

Phyllogomphoides stigmatus (Say) –Four-striped Leaf-tail

The Four-striped-Leaf-tail is an impressive species, with nymphs burrowing in muddy bottoms of lakes, ponds, and slow reaches of streams. This species is especially common at Lake Elmer Thomas, with males flying with arched abdomens cruising along the shoreline. The species is known from New Mexico, Oklahoma, Texas and Mexico.

Erpetogomphus designatus Hagen in Selys–Eastern Ringtail

Nymphs of the Eastern Ringtail burrow into sand and gravel of riffle reaches of streams, apparently most commonly occurring in Medicine Creek and East Cache Creek. Adult males patrol by hovering at the head of riffles or over pools. These males are very aggressive towards other dragonfly intruders. This species has a wide distribution from the Southeast west to Illinois and South Dakota, Colorado south to Texas and Arizona.

Dromogomphus spinosus Selys–Black-shouldered Spinyleg

This species prefers streams, and has been also reported from lakes. Adults often perch in the shade along streams in bushes and trees. We collected it from Medicine Creek and East Cache Creek. The Black-shouldered Spinyleg occurs from Canada south to Florida and west to Kansas, Oklahoma and western Texas.

Dromogomphus spoliatus Hagen–Flag-tailed Spinyleg

Like the Black-shouldered Spinyleg, nymphs of this species burrow into muddy bottoms of streams, lakes, and ponds. The Flag-tailed Spinyleg is distributed in east central and south central U.S. Males like to perch on the shore, and often hover for long periods of time. This species occurred both on the East and West ranges of Fort Sill.

Gomphus (Gomphurus) ozarkensis Westfall–Ozark Clubtail

The Ozark Clubtail is considered a species of the Ozark and Ouachita plateaus, where the nymphs inhabit rather pristine forested streams. This species is known from Arkansas, Kansas, Missouri and Oklahoma. As previously indicated Bick (1983) considered this species “at-risk.” However, currently it is considered “fairly common” by Dunkle (2000). Two individuals were collected from East Cache Creek.

Gomphus (Gomphurus) externus Hagen in Selys–The Plains Clubtail

The Plains Clubtail ranging from Texas and New Mexico, north to Utah and east to Manitoba, Nebraska to Wisconsin. The nymphs typically inhabit mostly turbid medium-sized streams with moderate silt loads. Nymphs burrow into the sandy/gravel substrates. Males often can be found perching on shore vegetation along East Cache Creek.

Gomphus (Gomphus) militaris Hagen–Sulphur-tipped Clubtail

The Sulphur-Tipped Clubtail is the most common clubtail found on Fort Sill, occurring in most streams. Nymphs can occur in mud-bottomed ponds, lakes, and slow reaches of streams. Adults perch on the ground or on vegetation. The species ranges from Colorado to South Dakota south to Texas and Mexico.

Progomphus obscurus (Rambur) –Common Sanddragon

This species occurs from southern Ontario to Maine south to Florida, and west to Texas to New Mexico and Colorado. The Common Sanddragon is a typical dragonfly of larger streams and small rivers with sandy bottoms. The sleek nymphs burrow in the sand. Adults fly low over the water, often perching on sand and gravel banks or bare mud. This species is found in the larger streams of Fort Sill.

Stylurus plagiatus (Selys) –Russet-tipped Clubtail

The Russet-tipped Clubtail ranges from Florida west to southern California and Texas, northeast to Wisconsin, Michigan, and Ontario. Nymphs of this species typically prefer sandy, silty streams, but have been recorded from reservoirs and lakes. A single male adult was collected at East Cache Creek.

Family Libellulidae (Cruisers, Emeralds, and Skimmer Dragonflies)

The Skimmers include some of the most common dragonflies in North America. Almost every pond, lake or wetland has an assemblage of these species. A few species are found in streams. Adults of many species have prominent wing patterns, and many have brightly colored abdomens of red, blue and other colors. Adults can be easily distinguished by the characteristic boot-shaped anal loop venation of the hind wing. Adults usually perch on tips of stems, and have a gliding type of flight. Nymphs can be usually recognized by the “scoop-like” labial palps with the distal margins relatively smooth. However, nymphs are often difficult to distinguish from the Corduliidae (in some classifications only recognized as a subfamily, the Corduliinae). Nymphs are sprawlers with some climbers, found in all types of standing water, from hoof prints to the edges large lakes or reservoirs. A few species are even found in brackish water and other estuarine environments. Well-known genera are *Libellula* (King Skimmers), *Sympetrum* (Meadowhawks), *Erythrodiplax* (Dragonlets), *Perithemis* (Amberwings), *Erythemis* (Pondhawks), *Tramea* (Saddlebags Gliders), and *Celithemis* (Small Pennants). Especially common at Fort Sill were the Halloween Pennant (*Celithemis eponina* (Drury)), the Eastern Pondhawk (*Erythemis simplicicollis* (Say)), Widow Skimmer (*Libellula luctuosa* Burmeister) and the Eastern Amberwing (*Perithemis tenera* (Say)).

Subfamily Macromiinae (Cruisers)

Didymops transversa (Say) –Stream Cruiser

The Stream Cruiser is known from northeastern Canada and Maine south to Florida, west to Texas and north to Minnesota. This species frequents small streams, especially in forested areas. Nymphs have long legs and are associated with streamside debris or dams. Adults were only collected from West Cache Creek.

Macromia pacifica Hagen–Gilded River Cruiser

The Gilded River Cruiser, despite its western specific name ranges from Texas north to Wisconsin, southeast to Ohio and south to Tennessee. Nymphs of this species occur in streams and rivers of various sizes. The species appears not to be common throughout its range. On Fort Sill, we collected it only from Medicine Creek.

Macromia illinoiensis georgina (Selys) –Georgia River Cruiser

This beautiful black and yellow dragonfly inhabits rivers and streams. This form

of the Illinois River Cruiser ranges from Florida to New Jersey west to Kansas and Texas. A single female was collected from Medicine Creek at Punchbowl Road in July.

Subfamily Libellulinae (Skimmers)

Brechmorhoga mendax (Hagen) –Pale-faced Clubskimmer

This genus includes species that as nymphs inhabit streams rather than lakes or ponds. The species is more common in the Southwest, and ranges from California to Texas and Oklahoma north to Kansas and South Dakota. The Pale-faced Clubskimmer was collected from Medicine Creek during this survey, where we found the nymphs in riffles and runs.

Ladona deplanata (Rambur) –Blue Corporal

The Blue Corporal is a widespread species throughout eastern North America. Adults are active in spring and early summer, and it is usually associated with ponds and lakes. We took one individual at Lake Elmer Thomas.

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STONEFLIES (PLECOPTERA)

The stoneflies or Plecoptera, more than any other order of insects, are typical inhabitants of running waters. Nearly all species occur exclusively in streams, and most are restricted to running water habitats of mountainous regions of the world. Usually water temperatures of these streams are below 25°C and with high dissolved oxygen levels. These requirements have made them an excellent indicator of water quality.

Adult stoneflies can be distinguished from other insects that undergo hemimetabolous or incomplete metamorphosis by the long, thin antennae; both membranous wings, when not used, lying flat over the abdomen; and the straight front wings that are about the same length as the body. The front wings usually have a 'fish skeleton-like' venation pattern. The hind wings usually have an expanded posterior area, that folds like a fan, hence Plecoptera, or 'pleated' wing insects. Some groups of adult stoneflies have reduced wings, or even lack wings. Additionally, most species have two thin tails or cerci that project from the end of the abdomen.

The nymphs usually have cylindrical or flattened bodies; the head with long, thin antennae; wing pads usually present on the thorax in more mature individuals; three pairs of segmented legs, each with two terminal claws; and two long, thin tails or cerci filaments at the end of the abdomen. Some species have single or branched gills on the thorax or abdomen.

Most stonefly nymphs are herbivores, feeding principally on plant detritus. Even the young nymphs of many carnivorous species feed on fine detritus before switching to animal prey. The Perlodidae (the Stripetails and Springflies), Perlidae (the Common Stoneflies), and Chloroperlidae (the Sallflies) are predominantly predators as older instars. Mature nymphs range in length from a few millimeters (some capniids, the Winter Stoneflies) to over five centimeters (Pteronarcyidae, the Salmonflies). Although some species emerge in autumn, most stoneflies transform to adults in spring or early summer. Mature nymphs often congregate at emergence sites such as piles of rocks, bridge abutments, and woody debris. The cast skins or exuviae of the nymphs are often abundantly seen attached to these sites.

Stonefly nymphs occur most commonly in lotic (creeks, rivers) habitats with rocky bottoms, and with high dissolved oxygen concentrations. Some species are restricted to seeps and springs, others to high gradient coldwater streams. One species is known only from Lake Tahoe, California-Nevada. Many stonefly nymphs, when subjected to low dissolved oxygen concentrations, will exhibit a 'push up' behavior, that apparently increases the rate of water movement over the body and gills.

A remarkable behavior of adult stoneflies is the two-way communication between sexes called drumming. Males tap, rub or scrape their elongate abdomens upon various substrates such as branches and leaves. The female adult detects this vibration, and she will answer, allowing for an eventual location of each other. The drumming pattern in amplitude, frequency, or duration is species-specific.

Numerous 'winter stoneflies' occur in North America. These species typically emerge as soon as openings appear in the ice (late winter, early spring); the dark-colored adults are seen on snow-covered stream banks, bridges, fence posts or tree trunks. The remarkable aspect of these stoneflies is the reversal of the typical development pattern of aquatic insects, in that growth and maturity occur during the coldest part of the year. Eggs laid by adult females during the winter or early spring hatch quickly, and the nymphs migrate into the interstitial spaces of the loose, rocky streambed (known as the hyporheic zone) and begin a state of inactivity or diapause throughout the warmer months. As water temperatures begin to cool in the fall and early winter, nymphs move back to the water body substrate surface and complete development.

The classification of the order is relatively well established, with over 2,000 species in the world placed in fifteen families. Nine of these families occur in North America, including about 626 species. A web site maintained by B. P. Stark provides a listing of all North American species by province or state:
<http://www.mc.edu/campus/users/stark/Sfly0102.htm>

A short synopsis of the families of stoneflies found at Fort Sill:

Family Capniidae (Small Winter Stoneflies)

This family is composed primarily of small species and contains many 'winter stoneflies,' with adults typically emerging from January to April. The numerous species are most common in small streams, including seeps and springs. Nymphs are usually found in leaf packs, accumulations of woody debris, and develop during the coldest water temperatures of winter. The early instars diapause in the hyporheic zone of the stream. Most species of capniids are detritivore shredders. One genus, *Allocapnia* occurs in most Fort Sill streams, both permanent and intermittent.

Family Leuctridae (Rolledwinged Stoneflies)

Nymphs occur in a variety of lotic habitats from intermittent streams, springs to small rivers, and are associated primarily with leaf packs, woody debris or mineral

substrates. Nymphs are considered shredder-detritivores. Adults of the genus *Zealeuctra* emerge during late winter to early spring, and typically occur in intermittent streams of Fort Sill.

Family Taeniopterygidae (Winter Stoneflies)

Another well-known group of ‘winter stoneflies,’ with adults in the south emerging during the winter, and through the spring and early summer in the north and at high elevations. The nymphs are characterized by their stout, robust appearance with divergent wing pads, and can be found in almost all types of permanent streams, small and large. Nymphs usually are associated with leaf packs, wood debris, but also coarse mineral substrates. They are primarily detritivore (feeding on decayed plant material) and shredders (feeding on larger pieces of plant material, such as leaves). One genus, *Taeniopteryx* is known from Fort Sill.

Family Perlidae (Common Stoneflies)

The distinctively patterned yellow and brown nymphs can be found in all types of streams from intermittent to large rivers. Some species can even occur along wave-swept shores of lakes. Members of this family inhabit warmer waters than most other stoneflies. Nymphs are usually associated with large loose rocks, but also leaf packs, woody debris, and submerged logs.

Of the two Fort Sill genera, *Neoperla* and *Perlesta* have one-year life cycles. The nymphs are predaceous, feeding largely on other aquatic insects. Adults often can be found attracted to lights near streams.

Family Perlodidae (Stripetails, Springfly Stoneflies)

Perlodid nymphs are medium to moderately large-sized, primarily predaceous stoneflies. If gills are present, they are simple (unbranched) and are restricted to the thorax or neck region. Nymphs of most species are restricted to cool, swift, mountain streams with rocky bottoms. Some species are found only at splash zones of seeps. Others are restricted to large silty western rivers. All species apparently have a single generation per year. Emergence is generally in the spring, but some species are active as adults in the fall. Several species have egg diapause as long as 5 to 7 months. *Hydromel* (**Hydroperla??**) is the only genus occurring at Fort Sill.



Allocapnia recta, Family Capniidae ©D.H. Funk



Taeniopteryx nivalis, Family Taeniopterygidae ©David H. Funk



Neoperla clymene, Family Perlidae ©Bill P. Stark



Perlesta species, Family Perlidae ©David H. Funk

The stoneflies of Oklahoma are relatively well known (Stark and Stewart 1973a, 1973b, Stewart et al. 1974, and Poulton and Stewart 1991). The majority of the published stonefly records are from the Ozark-Ouachita Mountains in the eastern part of the state. Relatively few records have been reported from the southwestern region of the state. This area of the Osage Plains and Central Lowlands physiographic province, including Fort Sill (Hunt 1974), is characterized by often sluggish, sandy-bottomed silt laden streams that have been substantially affected by poor agricultural practices.

Previously, from Fort Sill, only unidentified species of the perlid genera *Perlesta* and *Neoperla* were recorded (Vaughn and Obermeyer 2002). Apparently, these authors conducted no winter sampling.

Two major drainages traverse the western portion of Fort Sill, West Cache Creek and Medicine Creek; East Cache Creek drains the eastern side. These are tributaries of the Red River, which forms the political boundary between Oklahoma and Texas. These streams and their tributaries are often flooding during precipitation events, and some become intermittent or dry during summer and fall.

We found six species of stoneflies from Fort Sill (Tables 1 and 2). All of these taxa are common regional species. Stark and Stewart (1973a) and Stewart et al. (1974)

previously reported four of these species from Comanche County, Oklahoma) *Allocapnia granulata* (Claassen)[Common Snowfly], *Zealeuctra claasseni* (Frisson) [Common Needlefly], *Taeniopteryx burksi* Ricker and Ross [Eastern Willowfly] and *Hydroperla crosbyi* (Needham and Claassen)[Early Springfly]. *Perlesta decipiens* (Walsh) [Widespread Stone], and *Neoperla choctaw* Stark and Baumann [Choctaw Stone] are apparently new county records.

The streams of the Wichita Mountains region of Fort Sill are very different from the more deeply incised silted streams of the eastern rolling grasslands of Fort Sill. *Allocapnia granulata* and *Z. claasseni* occur in almost every small tributary of West Cache Creek and Medicine Creek. These become intermittent or completely dry in late summer and fall.

Allocapnia granulata, *T. burksi*, and *H. crosbyi* also occur in the permanent larger streams of the eastern portion of Fort Sill. Four (66%) of the stoneflies of Fort Sill are cold or cool season species, emerging in the winter or early spring. *Perlesta decipiens* and *N. choctaw* emerge in the summer months. *Neoperla choctaw* has an interesting distribution, having originally described from Latimer County, Oklahoma, but disjunct populations are known from Kentucky, Pennsylvania and West Virginia. In the Ozark and Ouachita region this species is most common in the Gulf Coastal Plain, and the Missouri River border subregions (Poulton and Stewart 1991). Apparently, at Fort Sill, *N. choctaw* occurs only in streams of the West and Quanah ranges. Other common regional summer taxa such as *Acroneuria* are apparently absent. As Poulton and Stewart (1991) have indicated, the intermittent streams are characterized by a few species adapted to the regional hydrological cycles. For example, *H. crosbyi* has an approximate seven-month egg diapause (do not hatch) during the low water or intermittent hydrological periods. Early instar nymphs appear in late October to early November and grow rapidly through the winter and emerge in late February April (Oberndorfer and Stewart 1977). Additionally, *A. granulata*, *Z. claasseni*, and *Taeniopteryx burksi* occur in the streams of Fort Sill and a few other streams of southwestern Oklahoma as isolated populations from their principal eastern ranges (Stewart et al. 1974).

All the above stonefly species found at Fort Sill have had no doubt a long-term persistence in the rather human affected impacted streams of the area. These affects include construction of reservoirs and dewatering. In fact, the long-term affects of the drought-assisted dust bowl of the 1920's and 1930's that decimated the aquatic environments of the region (Bonnifield 1979) are not known, but are presumed substantial. No threatened or imperiled stonefly species are known from Fort Sill.

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Figure 1. Photos showing typical views seen along Medicine Creek (A), East Cache Creek (B), Quannah Creek (C), and Blue Beaver Creek (D), Fort Sill, Comanche County, Oklahoma.



Butterflies and Moths (Lepidoptera)

Arctiidae, Notodontidae, Sphingidae, Sesiidae, Saturnidae, and two genera of Noctuidae, *Catocala* and *Schinia* were the groups selected for survey during 2003 (see Materials and Methods). As a result of intensive surveys in 2003, we found 103 total moth species within these taxa at Fort Sill.

Information about the identification, distribution, and occurrence of North American moths is generally scant. The groups selected for survey are reasonably well known and described – a primary reason for their selection in this study. Primary sources of such information are the specimen holdings of North American museums and private collections. There is no exhaustive data base, but county occurrences of many collections have been recorded and served on the Moths of North America web site (Opler, 2002). The specific references utilized for each family are given below in the discussions under each family. More general works that contain significant information and assistance in identification are Covell (1984) and Forbes (1948, 1954). Scientific names are based on those found in Hodges et al. (1983) or subsequent taxonomic sources. Common names are those used in the specific monographs, Covell's (1984) guide, or on the Moths of North American web site (Opler, 2002).

Butterflies and moths (Lepidoptera) are primarily terrestrial, although a few groups have larvae that live in aquatic environments, including Fort Sill. Lepidoptera are holometabolous insects having a complete life cycle. They possess egg, larval (=caterpillar), pupa, and adult stages. The timing of these stages is very different for different groups of butterflies and moths and is usually designed to overcome unfavorable weather or climates and to allow the larvae to be present on their preferred food sources when they are nutritionally appropriate for feeding. Different moths specialize on different plants parts, usually leaves or reproductive structures, and many are very specific in their choices of caterpillar host plants. All of the groups reported herein feed on leaves or the reproductive portions of their hosts (Scoble, 1992). Because of their host plant specializations, many species are sensitive to the ecological conditions of their hosts. The larvae of one group, the lichen moths (subfamily Lithosiinae of the Arctiidae), feed only on various lichens and the diversity and abundance of these moths can be an indicator of the effects of air pollution on the local lichen fauna.

Larval Lepidoptera of the groups we sampled all have external feeding larvae with chewing mandibles, the larvae vary from naked to hairy (carrying dense tufts of setae). Those of the prominent have arched bodies and tail-like projections (Packard, 1895; Stehr, 1987).

Adult Lepidoptera can be distinguished from other insects, including their closest relatives the caddisflies (Trichoptera), by their paired usually long antennae, wings covered with rows of tiny colored dehiscent scales, and a suctorial proboscis, and some other more technical morphological structures (Kristensen, 1999). The adults usually have four wings,

and in the groups surveyed), the front wings are usually held roof-like over the abdomen and hindwings when the insects are at rest.

Sphinx moths (Sphingidae) feed on a variety of plants, either woody or herbaceous. Their larvae are naked and often have a pointed thin projection (or horn) from the end of the abdomen. The adults feed at night on nocturnal-flowering plants with rich nectar supplies. The adults of most species have strong flight and exceptional long proboscises for feeding on flowers with deep corolla tubes. They are often mistaken as hummingbirds and may fly long distances between nectar sources.

Wild silk moths (Saturniidae) have cigar-shaped larvae covered with small wart-like projections each of which bears relatively stout urticaceous (stinging) hairs that may produce water blisters when touched. Adults are not usually considered capable of flying long distances. They emerge from their cocoons without functional mouthparts and are unable to feed as adults. Thus, their longevity is fairly brief.

The remaining groups all belong to the Superfamily Noctuoidea. These have a unified body plan and the adults of all have typanae (sound receptors) capable of sensing sound. They are well-known to be able to escape the pursuit of bats in flight.

The prominent moths (Notodontidae) have larvae with a humped body posture and split tail-like projection from the end of the abdomen which they often hold above the substrate. Often, they are found in cluster and often rest in plain view. With some exceptions, most prominent adults have relatively dull-colored, often garbed in gray.

The caterpillars of tiger moths (Arctiidae) are often referred to as woolly bears and those of most species vary from having lightly dispersed long hairs to those that are densely hairy. An exception, is presented by the lichen moths (Subfamily Lithosiinae) that are bizarre and cryptic with odd shapes and are virtually hairless. Adults of tiger moths are often brightly colored and beautifully patterned. This is interpreted as “aposematic coloration”, a way to advertise or ward predators of their bitter taste. Most or all species are thought to be variably distasteful and some can produce droplets of distasteful fluids at their leg joints (“so-called reflex bleeding”) to further deter would-be predators. The caterpillars of most species feed openly during the day or night, some in clusters or groups.

Underwing moths (genus *Catocala*, subfamily Catocalinae), family Noctuidae) seem to have relatively uniform larval and adults behaviors, and the caterpillars usually feed nocturnally on the leaves of woody plants, especially trees. The larvae are cryptically colored and patterned and rest during the day with their bodies closely appressed to twigs and branches of their hosts (Barnes and McDunnough, 1918; Sargent, 1976). The adults have bark-like forewings and brightly colored hindwings. The latter are hidden when the adults are at rest, but when the adults are disturbed and fly these bright colors are flashed and draw the attention of vertebrate predators, especially birds. The adults alight quickly and rapidly cover their hindwings with the result that birds are usually unable to locate them. This “flash coloration” is akin to a “bait and switch” procedure.

Flower moths (genera *Melaporphyria* and *Schinia*, subfamily Heliothinae, family Noctuidae) have similar life history scenario. The species are highly specialized in their choice of caterpillar host plants, often selecting just a single species of plant. The caterpillars feed on the reproductive structures of their hosts and their color patterns usually come close to matching the background of the material upon which they feed (Hardwick, 1996). The adults are relatively small and are often brightly colored and intricately patterned, but when at rest on their hosts, they closely match the colors and patterns of the host structures on which they rest (Hardwick, 1996).

The classification of Lepidoptera is summarized in Kristensen (1999) with about 150,000 species world-wide and a likely number of 300,000, many undescribed. In North America, there are roughly 11,000 described species, but it is thought that as many as 14,000 or more actually occur (Hodges et al., 1983). As presently classified, somewhat more than 75 families are known for North America (Hodges et al, 1983), with in excess of 100 world-wide (Kristensen, 1999).

The Moth species and numbers of individuals are recorded for each trap site in Tables 1-10. A complete list of moth species found during the survey is presented below (Table 3).

Table 3. Taxonomic list of selected moth species sampled

Family Sphingidae [Sphinx Moths and Hawkmoths]

1. *Amphion floridensis* Clark, 1920
2. *Ceratomia amyntor* (Geyer, 1835)
3. *Ceratomia catalpae* (Boisduval, 1875)
4. *Ceratomia undulosa* (Walker, 1856)
5. *Darapsa myron* (Cramer, 1780)
6. *Deidamia inscriptum* (Harris, 1839)
7. *Eumorpha achemon* (Drury, 1773)
8. *Hemaris diffinis* (Boisduval, 1836)
9. *Hyles lineata* (Fabricius, 1775)
10. *Amorpha juglandis* (J.E. Smith, 1797)
11. *Manduca quinquemaculata* (Haworth, 1803)
12. *Manduca sexta* (Linnaeus, 1783)
13. *Paonias excaecatus* (J.E. Smith, 1797)
14. *Smerinthus jamaicensis* (Drury, 1773)
15. *Sphecodina abbottii* (Swainson, 1821)

Family Saturniidae [Wild Silk Moths]

16. *Actias luna* (Linnaeus, 1758)
17. *Antheraea polyphemus* (Cramer, 1776)
18. *Automeris io* (Fabricius, 1775)
19. *Sphingicampa bicolor* (Harris, 1841)

Family Arctiidae [Tiger Moths]

20. *Apantesis nais* (Drury, 1773)
21. *Apantesis phalerata* (Harris, 1841)

22. *Apantesis vittata* (Fabricius, 1787)
23. *Cisseps fulvicollis* (Hübner, 1818)
24. *Cisthene tenuifascia* Harvey, 1875
25. *Cisthene unifascia* Grote & Robinson, 1868
26. *Cycnia oregonensis* (Stretch, 1873)
27. *Cycnia tenera* Hübner, 1818
28. *Cycnia* sp.
29. *Estigmene acrea* (Drury, 1773)
30. *Euerythra phasma* Harvey, 1876
31. *Grammia arge* (Drury, 1773)
32. *Grammia figurata* (Drury, 1773)
33. *Grammia oithona* (Strecker, 1878)
34. *Grammia parthenice* (Kirby, 1837)
35. *Haploa clymene* (Brown, 1776)
36. *Haploa reversa* (Stretch, 1885)
37. *Holomelina aurantiaca* (Hübner, 1831)
38. *Holomelina costata* (Stretch, 1885)
39. *Hyphantria cunea* (Drury, 1773)
40. *Hypoprepia miniata* (Kirby, 1837)
41. *Spilosoma congrua* (Walker, 1855)
42. *Spilosoma dubia* (Walker, 1855)
43. *Spilosoma virginica* (Fabricius, 1798)

Family Noctuidae [Owlet Moths]

44. *Catocala abbreviatella* Grote, 1872
45. *Catocala amatrix* (Hübner, 1813)
46. *Catocala amestris* Strecker, 1874
47. *Catocala amica* (Hübner, 1818)
48. *Catocala coccinata* Grote, 1872
49. *Catocala delilah* Strecker, 1874
50. *Catocala herodias* Strecker, 1876
51. *Catocala ilia* (Cramer, 1776)
52. *Catocala illecta* Walker, 1858
53. *Catocala innubens* Guenée, 1852
54. *Catocala maestosa* Hulst, 1884
55. *Catocala micronympha* Guenée, 1852
56. *Catocala minuta* Edwards, 1864
57. *Catocala muliercula* Guenée, 1852
58. *Catocala nuptialis* Walker, 1858
59. *Catocala piatrix* Grote, 1864
60. *Catocala similis* Hy. Edwards, 1864
61. *Catocala ultronia* (Hübner, 1823)
62. *Catocala* sp. (cf. *semirelicta*)
63. *Melaporphyria immortua* Grote, 1874
64. *Schinia alencis* (Harvey, 1875)
65. *Schinia arcigera* (Guenée, 1852)
66. *Schinia chrysella* (Grote, 1874)

67. *Schinia citrinella* (Grote & Robinson, 1870)
68. *Schinia cupes* (Grote, 1875)
69. *Schinia gaurae* (Smith, 1797)
70. *Schinia gracilentata* Hübner, 1818
71. *Schinia jaguarina* (Guenée, 1852)
72. *Schinia lynx* (Guenée, 1852)
73. *Schinia mortua* (Grote, 1864)
74. *Schinia obscurata* Strecker, 1898
75. *Schinia rivulosa* (Guenée, 1852)
76. *Schinia saturata* (Grote, 1874)
77. *Schinia snowi* (Grote, 1875)
78. *Schinia trifascia* (Hübner, 1818)
79. *Schinia volupia* (Fitch, 1868)

Family Notodontidae [Prominent Moths]

80. *Cerura candida* Lintner, 1878
81. *Clostera apicalis* (Walker, 1855)
82. *Dasylophia anguina* (Smith, 1797)
83. *Datana angusii* Grote & Robinson, 1866
84. *Datana perspicua* Grote & Robinson, 1865
85. *Furcula cinerea* (Lintner, 1878)
86. *Gluphisia lintneri* (Grote, 1877)
87. *Gluphisia septentrionis* Walker, 1855
88. *Heterocampa guttivitta* (Walker, 1855)
89. *Heterocampa obliqua* Packard, 1864
90. *Heterocampa subrotata* Harvey, 1874
91. *Heterocampa umbrata* Walker, 1855
92. *Hippia packardii* (Morrison, 1875)
93. *Hyarpax venus* Neumoegen, 1892
94. *Hyperaeschra tortuosa* Tepper, 1881
95. *Litodonta hydromeli* Harvey, 1876
96. *Lochmaeus bilineata* (Packard, 1864)
97. *Nadata gibbosa* (Smith, 1797)
98. *Nerice bidentata* Walker, 1855
99. *Oligocentria lignicolor* (Walker, 1855)
100. *Peridea basitriens* (Walker, 1855)
101. *Schizura leptinoides* (Grote, 1864)
102. *Schizura unicornis* (Smith, 1797)

Family Sphingidae (Sphinx Moths or Hawkmoths)

According to the data base for Sphingidae in the Moths of North America web site, 37 species had been recorded previously for Oklahoma (Opler, 2002). To our knowledge there has been no detailed publication that treats the Sphingidae of the state. During our survey in 2003, we found 15 species of the family and this represents about 40% of the species recorded for the state.

Notable among the species we found, was a catalpa tree with large numbers of Catalpa sphinx (*Ceratomia catalpae*) caterpillars. With the exception of two disjunct county records in other states, this is the westernmost location for the species. Similarly for the walnut sphinx (*Amorpha juglandis*), the record for Fort Sill is one of the most western for the species. For Abbott's sphinx (*Sphecodina abbottii*), the Fort Sill record is the second record for Oklahoma, and one of the westernmost. The species is known from two Nebraska counties that are at the same longitude. For the lettered sphinx (*Deidamia inscriptum*), the Comanche County record is the westernmost in Oklahoma and Texas, although there are record further west in Nebraska.

Amphion floridensis Clark – Nessus Sphinx

The Nessus Sphinx is a resident of Eastern North America, from Nova Scotia and Maine south to Florida; west to Wisconsin, Nebraska, Colorado, and Texas. Its caterpillars feed on grape (*Vitis*), ampelopsis (*Ampelopsis*), and cayenne pepper (*Capsicum*). Several broods occur from February-September. On Fort Sill only one specimen was found, occurring in August along East Cache Creek in the East Range.

Ceratomia amyntor (Geyer) – Elm Sphinx

The Elm Sphinx is a resident of Nova Scotia west to Saskatchewan and western North Dakota and Colorado; south to central Florida, the Gulf Coast, Texas, and New Mexico. There are two broods in the south from March-October. On Fort Sill, the Elm Sphinx is uncommon occurring only in August on the East Range and Medicine Bluff areas.

Ceratomia catalpae (Boisduval) – Catalpa Sphinx

The catalpa sphinx is a resident of Maine west to Iowa, Colorado, Oklahoma, and Nebraska; south to Florida, the Gulf States, and Texas. Its caterpillars feed on plants of the genus *Catalpa*. There are two flights from May to September. On Fort Sill *C. catalpae* was only sighted as caterpillars in June along Medicine Creek, West Range.

Sphingidae plate

Ceratomia undulosa (Walker) – Waved Sphinx

The waved sphinx is a resident of Maine west to Alberta, western North Dakota, and Colorado; south to Florida, the Gulf Coast, and Texas. Its caterpillars feed on ash (*Fraxinus*), privet (*Ligustrum*), oak (*Quercus*), hawthorn (*Crataegus*), and fringe tree (*Chionanthus*). There are two broods in the south from March-October. On Fort Sill the Waved Sphinx occurred from April through August in both the East and West Ranges.

Darapsa myron (Cramer) – Virginia Creeper Sphinx

The Virginia Creeper Sphinx is a resident of Maine south to Florida; west to North Dakota, Nebraska, New Mexico, and Texas. Its caterpillars feed on Virginia creeper (*Parthenocissus quiquefolia*), grape (*Vitis*), *Ampelopsis*, and *Viburnum*. There are two broods from March-September. On Fort Sill the Virginia Creeper Sphinx occurred in April, July, and August near Ketch Lake.

Deidamia inscriptum (Harris) – Lettered Sphinx

The Lettered Sphinx is resident of New Hampshire south to northern Florida; west to Minnesota, Nebraska, Oklahoma, and Texas. Its caterpillars feed on grape (*Vitis*), ampelopsis (*Ampelopsis*), and Virginia Creeper (*Parthenocissus*). There is one brood from March-June. On Fort Sill the Lettered Sphinx occurred in March throughout the East and West Ranges.

Eumorpha achemon (Drury) – Achemon Sphinx

The Achemon Sphinx is resident of Maine west to North Dakota and southern Oregon; south to Florida, southern California and Mexico. Its caterpillars feed on grape (*Vitis*), and ampelopsis (*Ampelopsis*). There are two flights from May-August in the south. On Fort Sill the Achemon Sphinx was rare, only one specimen was collected in July near the Natural Resource Building.

Hemaris diffinis (Boisduval) – Snowberry Clearwing

The Snowberry Clearwing is resident to the Northwest Territories and British Columbia south to southern California and Baja California Norte; east through most the United States to Maine and Florida. Its caterpillars feed on snowberry (*Symphoricarpos*) honeysuckle (*Lonicera*), dogbane (*Apocynum*), and dwarf bush honeysuckle (*Diervilla*). There are two broods from March-August. On Fort Sill the Snowberry Clearwing occurred fairly commonly from May through August on the East and West Ranges.

Hyles lineata (Fabricius) – White-lined Sphinx

The White-lined Sphinx is resident to Central America north through Mexico and the West Indies to most of the United States and southern Canada. Its caterpillars feed on a wide diversity of plants including willow weed (*Epilobium*), four-o'clock (*Mirabilis*), apple (*Malus*), evening primrose (*Oenothera*), elm (*Ulmus*), grape (*Vitis*), tomato (*Lycopersicon*), purslane (*Portulaca*), and *Fuschia*. There are two broods from February-November. On Fort Sill the White-lined Sphinx was commonly collected from March through September on the East and West Ranges.

Amorpha juglandis (J.E Smith) – Walnut Sphinx

The walnut Sphinx is resident of New England south to Florida; west to Nebraska, Oklahoma, and Texas. Its caterpillars feed on hickory (*Carya*), walnut (*Juglans*), and *Prunus* trees. On Fort Sill *L. juglandis* rarely occurred from April through June at East Cache Creek, East Range as well as the Cottonwood Grove and 10 Mile Crossing, West Range.

Manduca quinquemaculata (Haworth) – Five-spotted Hawkmoth

The Five-spotted Hawkmoth is resident to Mexico north throughout most of the United States and occasionally southern Canada, however it is uncommon in the Southeast and the Great Plains. Its caterpillars feed on potato, tobacco, tomato (*Lycopersicon*) and other plants in the nightshade family (*Solcanaceae*). There are two broods from February-November. On Fort Sill the Five-spotted Hawkmoth was uncommonly collected in April and May in the West Range and Medicine Bluffs.

Manduca sexta (Linnaeus) – Carolina Sphinx

The Carolina Sphinx is resident to Massachusetts's west across southern Michigan to Minnesota, central Colorado, and northern California; south to Florida, the Gulf Coast, Texas, New Mexico, Arizona, and southern California. Its caterpillars feed on potato, tobacco, tomato (*Lycopersicon*) and other plants in the nightshade family (*Solanaceae*). There are two broods from May-October. On Fort Sill two Carolina Sphinx specimens were collected in March and August on the East Range.

Paonias excaecatus (J.E. Smith) – Blinded Sphinx

The Blinded Sphinx is resident throughout most of the United States and southern Canada from Nova Scotia and Maine south to Florida; west to British Columbia and Washington, northern California and Arizona. Its caterpillars feed on deciduous trees including basswood (*Tilia*), willow (*Salix*), birch (*Betula*), hawthorn (*Crataegus*), poplar (*Populus*), oaks (*Quercus*), ocean spray (*Holodiscus*), and cherry (*Prunus*). There is one or two broods from May-September. On Fort Sill the Blinded Sphinx was very uncommon in May with one specimen collected on the East Range and one collected at 10 Mile Crossing, West Range.

Smerinthus jamaicensis (Drury) – Twin-spotted Sphinx

The Twin-spotted Sphinx is resident to Nova Scotia and Maine south to northern Florida; west to Manitoba, North Dakota, and Arizona. Its caterpillars feed on apple (*Malus*), peach and plum (*Prunus*), ash (*Fraxinus*), elm (*Ulmus*), poplar (*Populus*), birch (*Betula*), and willow (*Salix*). There are several flights from April-August. On Fort Sill the Twin-spotted Sphinx occurred from April through June and August at 10 Mile Crossing, West Range, Medicine Bluffs, and the Flower Transect, East Range.

Sphex abbotii (Swainson) – Abbott's Sphinx

Abbott's Sphinx is resident to northern Florida, Mississippi, and Texas; north to Nebraska. Its caterpillars feed on grape (*Vitis*), and ampelopsis (*Ampelopsis*). There is one flight from May-June. On Fort Sill one specimen of this moth was collected in June at 10 Mile Crossing, West Range.

Family Saturniidae (Wild Silk Moths)

Although there has never been a specific treatment of Saturniidae for Oklahoma, the national distribution and biology have been well described by Ferguson (1971, 1972) and Tuskes et al. (1996).

During our survey, we trapped only four species of wild silk moths Saturniidae, although 13 species were previously recorded for the Oklahoma (Opler, 2002). This represents about 31% of the state's fauna.

Our capture of Luna moths (*Actias luna*) represents the westernmost captures for Oklahoma and some of the westernmost in its entire range (Pieglar and Opler, 1993; Tuskes et al., 1996; Opler, 2002).

Plate of Saturniidae figures here

Actias luna (Linnaeus) – Luna Moth

The Luna Moth is a resident to eastern North America ranging from Nova Scotia west to Saskatchewan and North Dakota, south to central Florida, the Gulf Coast, and into Eastern Texas. Caterpillars feed on a variety of trees such as white birch (*Betula papyrifera*), persimmon (*Diospyros virginiana*), sweet gum (*Liquidambar styraciflua*) hickories (*Carya*), Walnuts (*Juglans*), and sumacs (*Rhus*). There are two broods each year. On Fort Sill the moth was uncommonly found along East Cache Creek, East Range and near 10 Mile Crossing, West Range. Fort Sill may be the most western population found for this species.

Antheraea polyphemus (Cramer) – Polyphemus Moth

The Polyphemus has a broad range and is found in most states except for Arizona and Nevada. They are found in deciduous hardwood forests. The caterpillar feeds on trees and shrubs of oak (*Quercus*), willow (*Salix*), maple (*Acer*), and birch (*Betula*). On Fort Sill the moth was uncommon and found on the West Range. Multiple broods occur in the south, however only an August brood on Fort Sill was observed.

Automeris io (Fabricius) – Io Moth

The Io Moth is resident in Eastern North America, west to the Dakotas, Nebraska, and Colorado. It occurs from Canada south to the Florida Keys, the Gulf States, Texas, and New Mexico extending south to Costa Rica. Its caterpillars feed on hackberry (*Celtis*), willow (*Salix*), mesquite (*Prosopis*), redbud (*Cercis*), currant (*Ribes*), blackberry (*Rubus*), and pear (*Pyrus*). There are two broods in the south from February through September. On Fort Sill observations of this species were made in April and August along East Cache Creek and Medicine Bluffs.

Sphingicampa bicolor (Harris) – Honey Locust Moth

The Honey Locust Moth is a resident of New England, south to Georgia; west to Nebraska, Oklahoma, Texas, and Eastern Colorado. Its caterpillars feed on honey locust (*Robinia*). There are usually three broods in the south from April through September. On Fort Sill one specimen occurred in August at East Cache Creek, East Range.

Family Arctiidae (Tiger Moths)

During our Fort Sill survey in 2003, we found 23 tiger moth species with one additional species trapped in 2002. This is approximately 66% of the 37 species reported on the Moths of North America web site (Opler, 2002). In an earlier paper on the tiger moths of Oklahoma, 20 species were recorded (Drew, 1961).



Cisthene unimacula, photo by M.C. Garhart



Cycnia tenera, photo by M.C. Garhart



Estigmene acrea, male, photo by M.C. Garhart



Grammia arge, photo by M.C. Garhart



Grammia f-pallida, photo by M.C. Garhart



Grammia oithona, photo by M.C. Garhart



Grammia parthenice, photo by M.C. Garhart

Apantesis nais (Drury) – Nais Tiger Moth

The Nais Tiger Moth is resident of Maine and Quebec south to Virginia and Kentucky; west to Nebraska, Oklahoma and Texas. Its caterpillars feed on clover (*Trifolium*), violets (Violaceae), and grasses. On Fort Sill *A. nais* occurred in June and September at the Flower Transect and Dead Coyote Road, East Range; Ketch Lake, West Range.

Apantesis phalerata (Harvey) – Harnessed Moth

The Harnessed Moth is resident of Maine and Quebec south to Florida; west to South Dakota, Colorado and Texas. Its caterpillars feed on clover (*Trifolium*), corn (*Zea*), dandelion (*Taraxacum*), and plantain (*Alisma*). On Fort Sill *A. phalerata* occurred commonly from March to September throughout the East and West Ranges.

Apantesis vittata (Fabricius) – Banded Tiger Moth

The Banded Tiger Moth is resident of Maryland south to Florida; west to Kentucky, Arkansas, Oklahoma, and Louisiana. Its caterpillars feed on dandelion (*Taraxacum*) and other low growing plants. On Fort Sill *A. vittata* occurred in April, June, July, and September at East Cache Creek, East Range; 10 Mile Crossing and Ketch Lake, West Range.

Cisseps fulvicollis (Hübner) – Yellow-collared Scape Moth

The Yellow-collared Scape Moth is resident of eastern North America. Its caterpillars feed on lichen, spike-rush (*Eleocharis*), and grasses. On Fort Sill *C. fulvicollis* occurred from April to July at the Natural Resource Building and throughout the West Range.

Cisthene tenuifascia Harvey – Thin-banded Lichen Moth

The Thin-banded Lichen Moth is resident of North Carolina south to Florida; west to Texas and Arizona. Its caterpillars feed on lichen. On Fort Sill *C. tenuifascia* occurred commonly from May to September throughout the East and West Ranges.

Cisthene unifascia Grote & Robinson

C. unifascia is resident to Texas, north to Oklahoma, Kansas; west to Colorado. On Fort Sill two specimens of *C. unifascia* were collected in September at Medicine Bluff and Lake Elmer Thomas.

Cycnia oregonensis (Stretch) – Oregon Cycnia

The Oregon Cycnia is resident of Washington south to California; east to South Dakota, Nebraska, Kansas, Oklahoma and Texas. Populations also occur in Kentucky and Pennsylvania. Its caterpillars feed on Indian hemp (*Cannabis*). On Fort Sill *C. oregonensis* occurred rarely in April and May at Medicine Bluffs, Cottonwood Grove, and 10 Mile Crossing, West Range.

Cycnia tenera

Cycnia sp.

Estigmene acrea (Drury) – Salt Marsh Moth

The Salt Marsh Moth is resident throughout most of North America. Its caterpillars feed on, and may be a pest of apple (*Malus*), cabbage (*Brassica*), clover (*Trifolium*), corn (*Zea*), cotton (*Gossypium*), peas (*Tephrosia*), potato (*Solanum*), and tobacco (*Nicotiana*). On Fort Sill *E. acrea* occurred rarely at East Cache Creek and the Flower Transect, East Range.

Euerythra phasma Harvey – Red Tailed Specter

The Red Tailed Specter is resident of Kentucky south to Florida; west to southwestern Missouri, Oklahoma and Texas. Its hostplant is unknown. On Fort Sill *E. phasma* occurred in March and April then June to August at dead Coyote Road, East Range; the Natural Resource Building, and 10 Mile Crossing, West Range.

Grammia arge (Drury) – Arge Tiger Moth

The Arge Tiger Moth is resident of New Jersey south to Florida; west to Nebraska, Kansas, Oklahoma, and Texas. Its caterpillars feed on cactus, sunflowers, cotton (*Gossypium*), and grape (*Vitis*). On Fort Sill *G. arge* occurred from April to September throughout the installation, especially in the West Range.

Grammia figurata (Drury) – Figured Tiger Moth

The Figured Tiger Moth is resident of Nova Scotia south to Georgia; west to Kansas, Oklahoma, New Mexico, and Texas. Its caterpillars feed on a wide variety of low growing plants including clover (*Trifolium*), and plantain (*Alisma*). On Fort Sill *G. figurata* occurred in April, June to August at the Natural Resource Building, Medicine Bluff, and throughout the West Range.

Grammia oithona (Strecker) – Oithona Tiger Moth

The Oithona Tiger Moth is resident of Maine south to Tennessee, Mississippi, and Louisiana; west to Nebraska, eastern Kansas and Oklahoma. Its caterpillars feed on clover (*Trifolium*), painted-cup (*Castilleja*), and wild pea (*Tephrosia*). On Fort Sill, *G. oithona* occurred from April to September throughout the East and West Ranges.

Grammia parthenice (Kirby) – Parthenice Tiger Moth

The Parthenice Tiger Moth is resident of Montana south to Arizona and New Mexico; east to Kentucky and western Florida. Populations also occur in Connecticut. Its caterpillars

feed on dandelion (*Taraxacum*), ironweed (*Vernonia*), and thistles (*Cirsium*). On Fort Sill *G. parthenice* was abundant in September throughout the East and West Ranges.

Haploa clymene (Brown) – Clymene Moth

The Clymene Moth is resident of Quebec and New England, south to western Florida; west to Nebraska, Oklahoma and Texas. Its caterpillars feed on oak (*Quercus*), willow (*Salix*), *Prunus*, and *Eupatorium*. On Fort Sill one specimen was collected in June from 10 Mile Crossing, West Range.

Haploa reversa (Stretch) – Reversed Haploa

The Reversed Haploa is resident of Nebraska south to Oklahoma and Texas; west to Colorado and New Mexico. Its caterpillars feed on apple (*Malus*), and trees in the Genus *Prunus*. On Fort Sill *H. reversa* occurred commonly in May throughout the East and West Ranges

Holomelina aurantiaca (Hübner) – Orange Holomelina

The Orange Holomelina is resident of New England south to Florida and the Gulf Coast; west to Kansas, Oklahoma and Texas. Its caterpillars feed on dandelion (*Taraxacum officinale*). On Fort Sill, *H. aurantiaca* occurred from April to July at the Flower Transect, East Range; the Natural Resource Building, and throughout the West Range.

Holomelina costata (Stretch)

H. costata is resident of California east to Oklahoma and Texas. On Fort Sill *H. costata* occurred in April, May, and September at Dead Coyote Road, East Range; 10 Mile Crossing, and Lake Elmer Thomas, West Range.

Hyphantria cunea (Drury) – Fall Webworm Moth

The Fall Webworm Moth is resident throughout North America. Its caterpillars feed on, and is a pest to ash (*Fraxinus*), hickory (*Carya*), maple (*Acer*), oak (*Quercus*), walnut (*Juglans*), and apple (*Malus*). On Fort Sill *H. cunea* occurred rarely from April to June and August at East Cache Creek, East Range; the Natural Resource Building, and 10 Mile Crossing, West Range.

Hypoprepia miniata (Kirby) – Scarlet-winged Lichen Moth

The Scarlet-winged Lichen Moth is resident throughout most of North America, From New England south to Georgia; west to Montana, Wyoming, Colorado, Texas and Arizona. Its caterpillars feed on tree lichens. On Fort Sill *H. miniata* occurred abundantly from May to September throughout the East and West Ranges.

Spilosoma congrua Walker – Agreeable Tiger Moth

The Agreeable Tiger Moth is resident Maine south to Florida; west to Wyoming, Colorado and New Mexico. Its caterpillars feed on dandelion (*Taraxacum*) and pigweed (*Amaranthus*). On Fort Sill *S. congrua* occurred rarely in April at East Cache Creek.

Spilosoma dubia (Walker) – Dubious Tiger Moth

The Dubious Tiger Moth is resident of Nova Scotia, and New England, south to northern Florida; west into Louisiana and Texas. It is also found in South Dakota. Its caterpillars feed on cherry (*Prunus*), and perhaps plantain (*Alisma*). On Fort Sill, *S. dubia* occurred rarely in April at the Natural Resource Building and 10 Mile Crossing, West Range. Fort Sill Records are the first in Oklahoma.

Spilosoma virginica (Fabricius) – Virginia Tiger Moth

The Virginia Tiger Moth is resident throughout North America. Its caterpillars feed on birch (*Betula*), cabbage, corn (*Zea*), maple (*Acer*), squash (*Cucurbita*), sunflower, tobacco (*Nicotiana*), walnut (*Juglans*), willows (*Salix*), *Prunus*, and *Ribes* spp. On Fort Sill, *S. virginica* occurred in April, June, and August throughout the East and West Ranges.

Family Notodontidae (Prominent Moths)

There has been no previous publication on the fauna of Notodontidae known to occur in Oklahoma. Packard (1895) treats the North American species, but does not provide detailed distributional information. The Moths of North American web site (Opler, 2002) reports of 17 species of Notodontidae for Oklahoma, but data from only a few museum collections. We trapped 23 species on Fort Sill in 2003, an indication of how poorly known this family is for the state. This is six more species than were known for the entire state! Many of the species that we found represent new western range extensions or are near the westernmost portion of their range.

Plate of Notodontidae here

Cerura candida Lintner

On Fort Sill *C. candida* occurred rarely in July and August at the Flower Transect, East Range, Lake Elmer Thomas, West Range; and the Quannah Range.

Clostera apicalis (Walker)

On Fort Sill a single specimen of *C. apicalis* occurred in March at East Cache Creek on the East Range.

Dasylophia anguina (J.E. Smith)

On Fort Sill *D. anguina* occurred in April and one specimen in August at Dead Coyote Road, East Range and 10 Mile Crossing, West Range.

Datana angusii Grote & Robinson – Angus's Datana

Angus's Datana is resident of The North East south to Florida; west to Missouri and Texas. Its caterpillars feed on birch (*Betula*), butternut (*Juglans*), hickory (*Carye*), linden (*Tilia*), and walnut (*Juglans*). On Fort Sill *D. angusii* rarely occurred in May and August at East Cache Creek, East Range, the Natural Resource Building and 10 Mile Crossing, West Range.

Datana perspicua Grote & Robinson – Spotted Datana

The Spotted Datana is resident of southern Ontario south to Florida; west to Missouri and Texas. Its caterpillars feed on sumac (*Rhus*). On Fort Sill *D. perspicua* occurred in August at Lake Elmer Thomas, West Range; Dead Coyote Road, and the Flower Transect, East Range.

Furcula cinerea (Walker)

On Fort Sill one specimen of *F. cinerea* occurred in August at the Cottonwood Grove, West Range.

Gluphisia lintneri (Grote)

On Fort Sill *G. lintneri* occurred in April, June and July at East Cache Creek, East Range; the Natural Resource Building, and the Cottonwood Grove, West Range.

Gluphisia septentrionis Walker – Common Gluphisia

The Common Gluphisia is resident throughout North America. Its caterpillars feed on poplar (*Populus*). On Fort Sill *G. septentrionalis* occurred rarely from March to

May throughout the East and West Ranges as well as the Natural Resource Building and Medicine Bluff.

Heterocampa guttivitta (Walker) – Maple Prominent

The Maple Prominent is resident throughout North America. Its caterpillars feed on apple (*Malus*), beech (*Fagus*), birch (*Betula*), maple (*Acer*), and sumac (*Rhus*). On Fort Sill *H. guttivitta* occurred in April at East Cache Creek, East Range; the Natural Resource Building and 10 Mile Crossing, West Range.

Heterocampa obliqua Packard,

On Fort Sill *H. obliqua* occurred rarely in April, May and August at Lake Elmer Thomas and Ketch Lake, West Range.

Heterocampa subrotata Harvey

On Fort Sill *H. subrotata* occurred rarely in June, July and August at the Natural Resource Building and Medicine Bluffs.

Heterocampa umbrata Walker

On Fort Sill *H. umbrata* occurred from April through August at East Cache Creek, East Range; the Natural Resource Building, and throughout the West Range.

Hippia packardii (Morrison)

On Fort Sill *H. packardii* occurred in April, and June through September on the East Range, at the Natural Resource Building, and at 10 Mile Crossing, West Range.

Hyparpax venus Neumoegen

On Fort Sill *H. venus* occurred in April, and June through August at Lake Elmer Thomas.

Hyperaeschra tortuosa Tepper

On Fort Sill *H. tortuosa* occurred in March to May, and in July and August at East Cache Creek, East Range; the Natural Resource Building, Medicine Bluffs, and throughout the West Range.

Litodonta hydromeli Harvey

On Fort Sill *L. hydromeli* occurred from June through August at east Cache Creek, East Range; the Natural Resource Building, and Lake Elmer Thomas, West Range.

Lochmaeus bilineata (Packard) – Double-lined Prominent

The Double-lined Prominent is resident throughout North America. Its caterpillars feed on basswood (*Tilia*), beech (*Fagus*), birch (*Betula*), elm (*Ulmus*), linden (*Tilia*), and oak (*Quercus*). On Fort Sill *L. bilineata* occurred rarely in April at east Cache Creek, East Range; Lake Elmer Thomas and Ketch Lake, West Range.

Nadata gibbosa (J.E. Smith)

On Fort Sill *N. gibbosa* occurred commonly in March through August through the East and West Ranges.

Nerice bidentata Walker – Double-toothed Prominent

The Double-toothed Prominent is resident throughout North America. Its caterpillars feed on Poplar (*Populus*). On Fort Sill *N. bidentata* occurred frequently from March to June and August at East Cache Creek, East Range; the Natural Resource Building, Medicine Bluff, and 10 Mile Crossing, West Range.

Oligocentria lignicolor (Walker)

On Fort Sill one specimen of *O. lignicolor* was collected in August and the Natural Resource Building.

Peridea basitriens (Walker) – Oval-Based Prominent

The Oval Based Prominent is resident to Nova Scotia south to Kentucky; west to Missouri and Mississippi. Its caterpillars feed on oak (*Quercus*). On Fort Sill *P. basitriens* occurred in April at east Cache Creek, East Range; 10 Mile Crossing and Lake Elmer Thomas, West Range.

Schizura leptinoides (Grote) – Black-blotched Schizura

The Black-blotched Schizura is resident throughout eastern North America. Its caterpillars feed on apple (*Malus*), beech (*Fagus*), oak (*Quercus*), poplar (*Populus*), and walnut (*Juglans*). On Fort Sill *S. leptinoides* occurred at east Cache Creek, East Range; 10 Mile Crossing, and Ketch Lake, West Range.

Schizura unicornis (J.E. Smith)

On Fort Sill *S. unicornis* occurred rarely in April and August at Medicine Bluff and 10 Mile Crossing.

Family Noctuidae (Owlet Moths)
Genus *Catocala* (Underwing Moths)

Prior to our study, 59 species of *Catocala* had been collected in Oklahoma (Gall, in litt.). During our 2003 Ft. Sill survey, we collected 19 species – 32% of the state fauna. We found one new state record, *Catocala muliercula*. This species' normal range is far to the east of Oklahoma and we believe our specimen was a long-distance wind-blown stray.

Plate of Catocala here

Catocala abbreviatella Grote

C. abbreviatella is resident of the western United States, east to Manitoba and Florida. Its caterpillars feed on lead plant (*Amorpha*). On Fort Sill *C. abbreviatella* occurred in May throughout the East and West Ranges.

Catocala amatrix (Hübner) – Sweetheart Underwing

The Sweetheart Underwing is resident of southern Canada and Maine, south to Florida; west throughout North America. Its caterpillars feed on willow (*Salix*), and poplar (*Populus*). On Fort Sill the Sweetheart occurred only in August on the West Range.

Catocala amestris Strecker

C. amestris is resident of Texas, east to the Carolinas and Florida; north to Wisconsin and Illinois. Its caterpillars feed on lead plant (*Amorpha*) and locust (*Robinia*). On Fort Sill *C. amestris* occurred in May and June near the Natural Resource Building, Medicine Bluffs, and throughout the West Range.

Catocala amica (Hübner)

C. amica is resident of Ontario and Maine south to Florida; west throughout North America. Its caterpillars feed on oak (*Quercus*). On Fort Sill the moth was collected in June and July at the Natural Resource Building and throughout the West Range.

Catocala coccinata Grote – Scarlet Underwing

The Scarlet Underwing is resident of Manitoba and Quebec south to Florida; west throughout the Eastern United States. Its caterpillars feed on Oak (*Quercus*). On Fort Sill *C. coccinata* occurred in May and June at the Natural Resource Building and Throughout the West Range.

Catocala delilah Strecker

C. delilah is resident of the western United States east to Illinois and Mississippi. Its caterpillars feed on oak (*Quercus*). On Fort Sill one specimen was collected in May from Lake Elmer Thomas, West Range.

Catocala herodias Strecker – Herodias Underwing

The Herodias Underwing is resident of Massachusetts, Virginia, along the eastern coast; south to the Carolinas; west throughout North America. Its caterpillars feed on oak (*Quercus*). On Fort Sill one specimen was collected in May at Lake Elmer Thomas.

Catocala ilia (Cramer) – Iliia Underwing

The Ilia Underwing is resident of southern Canada, Nova Scotia south to Florida; west throughout Eastern North America. Its caterpillars feed on oak (*Quercus*). On Fort Sill the Ilia Underwing occurred in May and June only on the West Range.

Catocala illecta Walker – Magdalen Underwing

The Magdalen Underwing is resident of southwestern Ontario, south to South Carolina; west to Texas. Its caterpillars feed on honey locust (*Gleditsia*) and lead plant (*Amorpha*). On Fort Sill the Magdalen occurred rarely in May at East Cache Creek and Medicine Bluffs.

Catocala innubens Guenée

C. innubens is resident of southern Canada south to Florida; west throughout the United States. Its caterpillars feed on honey locust (*Gleditsia*). On Fort Sill only two specimens were collected, in June and July near the Natural Resource Buildings.

Catocala maestosa Hulst

C. maestosa is resident of New York south to Florida; west throughout eastern North America. Its caterpillars feed on walnut (*Juglans*), and Hickory (*Carya*). On Fort Sill two specimens were collected in June and September on the East Range.

Catocala micronympha Guenée – Tiny Nymph Underwing

Catocala micronympha is resident of Ontario, New Hampshire, south to Florida; west throughout North America. Its caterpillars feed on oak (*Quercus*). On Fort Sill the moth occurred in May from East Cache Creek, East Range, Medicine Bluffs, and Lake Elmer Thomas, West Range.

Catocala minuta Hy. Edwards – Little Underwing

Catocala minuta is resident of New York, south to Florida; west throughout North America. Its caterpillars feed on honey locust (*Gleditsia*). On Fort Sill three specimens were collect in May from East Cache Creek, East Range, Medicine Bluff and 10 Mile Crossing, West Range.

Catocala muliercula Guenée

C. muliercula is resident of Connecticut south to Florida; west to Texas. Its caterpillars feed on bayberry (*Myrica cerifera*). On Fort Sill one specimen of *C. muliercula* was collected in April at 10 Mile Crossing, West Range.

Catocala nuptialis Walker

C. nuptialis is resident of Illinois and Wisconsin; west throughout North America. Its caterpillars feed on lead plant (*Amorpha*) and locust (*Robinia*). On Fort Sill one specimen of *C. nuptialis* was collected in April at 10 Mile Crossing, West Range.

Catocala piatrix Grote

C. piatrix is resident of southern Canada, Maine south to Florida; west throughout Eastern North America. Its caterpillars feeds on walnut (*Juglans*), and hickory (*Carya*). On Fort Sill the moth occurred from June through September at LETRA, Ketch Lake, and Medicine Bluffs, West Range as well as East Cache Creek, East Range.

Catocala similis Hy. Edwards

C. similis is resident of Ontario, Quebec, and Maine south to Florida; west throughout North America. Its caterpillars feed on oak (*Quercus*). On Fort Sill the moth occurred in May at Lake Elmer Thomas, West Range.

Catocala ultronia (Hübner) – Dark Red Underwing

Catocala ultronia is resident of southern Manitoba and Nova Scotia, south to Florida; West to Oklahoma. Its caterpillars feed on apple (*Malus*), cherries and plums (*Prunus*). On Fort Sill, the Dark Red Underwing occurred in May and June throughout the East and West Ranges including the Natural Resource Building and Medicine Bluffs.

Genera *Schinia* and *Melaporphyria* (Flower Moths)

Prior to our study, there were 41 species of *Schinia* known from Oklahoma (Hart, 2003). We were able to collect 17 species (42% of state fauna).

Plate of Schinia here

Melaporphyria immortua Grote

M. immortua is resident of southern New England; west to Colorado, Manitoba and Saskatchewan. This species is not in the target genus *Schinia*, however it is closely related and was considered a *Schinia* species until recently. *M. immortua* is a very rare species. On Fort Sill one specimen was collected in August at 10 Mile Crossing, West Range.

Schinia alencis (Harvey)

On Fort Sill *S. alencis* was rarely collected in August at Medicine Bluffs and 10 Mile Crossing, West Range and one specimen at the Flower Transect, East Range.

Schinia arcigera (Guenée)

S. arcigera is resident of Nova Scotia; west through Ontario, Manitoba, and Saskatchewan, south through the central United States to Florida and Mexico. Its caterpillars feed on asters (*Aster*). On Fort Sill *S. arcigera* occurred rarely in August and September at the Flower Transect, East Range and Medicine Bluffs.

Schinia chrysella (Grote)

S. chrysella is resident of Oklahoma, Kansas, and southern Nebraska south to Monterrey, Mexico; west to Colorado and New Mexico. Its caterpillars feed on Nuttail (*Amphiachyris dracunculoides*). On Fort Sill, *S. chrysella* was found in August and September throughout the East and West Ranges.

Schinia citrinella (Grote & Robinson)

S. citrinella is resident of the Gulf Coast of Texas north through the Great Plains to northern Colorado and southern Nebraska; west to California. Its caterpillars feed on *Croton*. On Fort Sill one specimen occurred in July at 10 Mile Crossing, West Range.

Schinia cupes (Grote)

S. cupes is resident of central Texas; west to southern California and north to the San Joaquin Valley. Its caterpillars feed on Benthum (*Orthocarpus purpurascens*). On Fort Sill a single specimen occurred in April at Ketch Lake, West Range.

Schinia gaurae (J.E. Smith)

S. gaurae is resident from Illinois; west through the Canadian prairie and south to southern Texas. Its caterpillars feed on *Gaurae*. On Fort Sill the moth occurred from July through September at the Flower Transect, East Range and throughout the West Range.

Schinia gracilentata Hübner

S. gracilentata is resident of New York south to Georgia and southern Texas; west to Nebraska. Its caterpillars feed on Sumpweed (*Iva*). On Fort Sill *S. gracilentata* occurred in August at the Natural Resource Building, Medicine Bluff, and on the West Range.

Schinia jaguarina (Guenée)

S. jaguarina is resident of Alberta south to Texas. Its caterpillars feed on *Psoralea*. On Fort Sill the moth occurred from May through August at the Flower Transect, East Range and Medicine Bluffs as well as throughout the West Range.

Schinia lynx (Guenée)

S. lynx is resident of New England south to Florida; west to southern Texas and Wisconsin. Its caterpillars feed on lamarck (*Heterotheca subaxillaris*). On Fort Sill two specimens were collected in August from the East Range.

Schinia mortua (Grote)

S. mortua is resident of Minnesota south to Texas; west to the Pacific Coast. Its caterpillars feed on willdenow (*Grindelia*). On Fort Sill the moth occurred rarely in August at Medicine Bluff and Lake Elmer Thomas, West Range.

Schinia obscurata Strecker

S. obscurata is resident of southern Ontario south to Pennsylvania; west to the Midwestern States. Its caterpillars feed on *Erigeron*. On Fort Sill one specimen occurred in May at Lake Elmer Thomas, West Range.

Schinia rivulosa (Guenée)

S. rivulosa is resident of New England, south to central Florida and southern Texas; west to Nebraska and Arizona. Its caterpillars feed on low ragweed (*Ambrosia*). On Fort Sill rarely in August on the West Range.

Schinia saturata (Grote)

S. saturata is resident of New England south to Florida; west to Nebraska, Texas, and Arizona. Its caterpillars feed on Nuttail (*Pityopsis*). On Fort Sill the moth occurred rarely in August at the Cottonwood Grove and Lake Elmer Thomas, West Range.

Schinia snowi (Grote)

S. snowi is resident of Nebraska and Kansas south to northern Texas; west to the Colorado foothills. Its caterpillars feed on *Allium*. On Fort Sill one specimen was collected in May from Lake Elmer Thomas, West Range.

Schinia trifascia Hübner

S. trifascia is resident of Massachusetts south to Florida and southern Texas; west through southern Ontario and the United States. Its caterpillars feed on joe-pie-weed (*Eupatorium*). On Fort Sill the moth occurred rarely in August only on the West Range.

Schinia volupia (Fitch)

S. volupia is resident of the Gulf Coast of Texas north to Nebraska and Colorado; west to New Mexico. Its caterpillars feed on *Gaillardia*. On Fort Sill the moth occurred in June at Medicine Bluff and throughout the West Range.

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Management Considerations

Lakes, Ponds, Reservoirs

It has been estimated that, in the future, about 15% of all known North American dragonfly species are at risk of extinction (Dunkle 2000). Most of these species are endemic to the Pacific Coast, Florida, the New England Coast, and the Central Gulf of Mexico. Generally, those species of dragonflies and damselflies occurring in Oklahoma are rather widespread and common species, but several species are exceptional, as indicated above. Fort Sill contains a large number of standing water habitats, ponds, lakes, and reservoirs. However, many of these contain fish that reduce dragonfly and damselfly populations by 80-90%. It is recommended that several permanent ponds may be left unstocked of fish, or only stocked with fish species that are not known to be insectivorous, thereby allowing for the establishment of sustainable populations of dragonflies and damselflies. Nymphs of this order of insects are extremely voracious predators, and therefore high densities of species are uncommon in any body of water (Corbet 1999). Consequently, several ponds need to be available as habitats. Also, a buffer zone of at least 100 feet of undisturbed vegetation should be left for the protection of emerging and perching adults.

Streams

The stream environment reflects the geochemical and meteorological conditions, the prevailing terrestrial vegetation, and other characteristics of the watershed. Any major alteration of the watershed characteristics, especially dams in the case of Fort Sill influence the stream environment. The major stream systems, East Cache Creek, Medicine Creek, Blue Beaver Creek, and West Cache Creek have impoundments, and are subject to downstream effects. The primary effects by the reservoirs on these Fort Sill streams appear to be alteration of water flow regimes. Usually, early in the season, additional above normal discharges occur, often causing scouring of the substrate. In the late summer and fall and during drought years, water is held, resulting in low or no releases of water. Additionally, during high precipitation events, large releases of water into the streams can occur.

Stewart and Stark (2002) discuss stonefly management concerns and approaches. Stonefly nymphs require stable bottom substrates. The winter stoneflies, *Allocapnia* and *Taeniopteryx* require a functional hyporheic zone, free of silt. Extreme disturbance of the substrate by unnatural stream hydrological events and sedimentation should be minimized or avoided. Also, protection of streamside vegetation should be a priority, to prevent further erosion. It was observed that routinely heavy vehicles often traversed or crossed stream channels. Streams such as Medicine Creek, Blue Beaver Creek and Quannah Creek need to be protected from this type of unnecessary perturbation. It is also recommended that if future changes are made to outlet structures of the dams or stream channel are altered, that considerations be discussed protecting the aquatic insects of these streams.

It must be emphasized that the aquatic habitats of Fort Sill are surprisingly productive and diverse in the number of different species, and many of these species are rare or not found in the surrounding region outside Fort Sill. Combining the surveys (in progress) of other major aquatic insect groups, the mayflies (Ephemeroptera), bugs (Heteroptera), dobsonflies, fishflies, and alderflies (Megaloptera), caddisflies (Trichoptera), and aquatic beetles (Coleoptera), in addition to the flies (Diptera) and other non insect groups reported by Vaughn and Obermeyer (2002), at least 425 species will be known from Fort Sill. This is a remarkable number of species occurring in region of Oklahoma, an area that has had dramatic anthropogenic disturbances in form of intensive agriculture and the drought-assisted dust bowls of the 1920's and 1930's.

Woodlands

As a result of our survey of selected moth groups in 2003, we found that many species represented the westernmost or near westernmost records. The habitats on Fort Sill that are responsible for such western range extensions are the deciduous forests found on bottomland soils along the principal streams that grace Fort Sill.

The forests contain mature pecan (*Carya illinoensis*), walnuts (*Juglans*), bur oak (*Quercus macrocarpa*), and sycamore (*Platanus*) among others (Johnson et al., 1990). We found some woodlands heavily altered with monotonous understory stands of introduced grasses and weeds. On the other hand most such woodlands were in good to excellent condition and, based on our trap results, contained a rich biota of native moths and other insects. The presence of a good population of Luna moths (*Actias luna*), an extremely rich array of tree-feeding prominent moths (Notodontidae), and rare species such as the red-tailed specter (*Euerythra phasma*) supports this observation. We strongly recommend that particular attention be focused on maintaining the integrity of such woodlands on the installation to the maximum extent practicable.

APPENDIX 1. Species added to Checklist of Fort Sill Insects found in 2002

This annotated list provides information on species found in 2003 for the primary 2002 survey groups (Coleoptera: Carabidae, Cicindelidae, Cerambycidae; Lepidoptera: Papilionidae, Pieridae, Lycaenidae, Nymphalidae and Hesperidae, Kondratieff et al., 2003).

Coleoptera (Beetles)

Family Carabidae (Ground Beetles)

Previously, 102 species of ground beetles were reported from Fort Sill. An additional six species were collected in 2003. The bombardier beetle, *Brachinus elongatulus* Chaudoir is apparently a new state record.

Family Cicindelidae (Tiger Beetles)

In the 2002 survey, eleven species of tiger beetles were reported from Fort Sill. Five additional species were collected in 2003. This increase is probably due, in part, to a heavier focus on efforts to collect the relatively undisturbed short grass prairie habitats of Quanah Range. *Cicindela ocellata rectilatera* Chaudoir represents a new state record for Oklahoma.

Family Cerambycidae (Longhorned Beetles)

Thirty-four species of longhorned beetles have been reported from Fort Sill. An additional 12 species were collected in 2003. This large number of additional records is due to additional sampling of woodland habitats on Fort Sill, a habitat not focused on previously. Currently, 56 species of longhorned beetles are known from Fort Sill, over half of the total of 106 species known from the state.

Lepidoptera (Butterflies): Papilionoidea and Hesperioidea

The following are seven butterfly species that we found in 2003, but were not seen in 2002. For further details on Oklahoma butterflies, please refer to Dole et al. (2004) or Opler (1998).

Family Papilionidae (Swallowtails)

Papilio cresphontes Cramer – Giant Swallowtail

The Giant Swallowtail is resident throughout eastern North America; west to the Rocky Mountains, south through the desert Southwest to South America. Its caterpillars feed on members of the citrus family (*Rutaceae*) including *Citrus* species, prickly ash (*Zanthoxylum americanum*), and hop tree (*Ptelea trifoliata*). There are two broods in the north from May to September. On Fort Sill several individuals of *P. cresphontes* were

observed in April and May at Lake Elmer Thomas and 10 Mile Crossing, West Range then in August at Lake Elmer Thomas, 10 Mile Crossing, and The Quanah Range.

Family Pieridae (Whites and Sulphurs)

Eurema mexicana Boisduval – Mexican Yellow

The Mexican yellow is resident of Central America north to South Texas and the Southwest; common vagrant in Great Plains and Southwest deserts; rare migrant to Mississippi, Arkansas, Illinois, and Michigan. Its caterpillars feed on *Acacia* and *Diphysa* in the pea family (Fabaceae). There are many flights all year in the south, migrants move north in the summer. On Fort Sill *E. mexicana* was very common from April to June in flower meadows throughout the West Range.

Zerene cesonia (Stoll) – Southern Dogface

The Southern Dogface is resident of South America north to southern Texas and peninsular Florida. Stray or temporary resident from central California northeast through the Great Lakes area and all the eastern states. Its caterpillars feed on plants in the pea family (Fabaceae) including alfalfa (*Medicago sativa*); prairie clovers (*Pentalostemon*), indigo (*Dalea*), and clover (*Trifolium*) species. There are three flights in the southern states from May to June, July to August, and September to April. On Fort Sill *Z. cesonia* was found in April on the West Range and September on the Quanah Range.

Family Lycaenidae (Gossamer-wings)

Calycopis cecrops (Fabricius) – Red Banded Hairstreak

The Red Banded Hairstreak is resident of the southeastern United States from Long Island south through Florida, west through entire area to southeast Kansas, eastern Oklahoma, and eastern Texas. Strays to eastern Nebraska, northern Illinois, and Michigan. Its caterpillars feed on the fallen leaves of wax myrtle (*Myrica cerifera*), dwarf sumac (*Rhus copallina*), staghorn sumac (*R. typhina*), and several oaks (*Quercus*). There are two broods in the north from April to October. On Fort Sill *C. cecrops* occurred in August and September at the natural Resource Building.

Family Nymphalidae (Brush-footed Butterflies)

Agraulis vanillae (Linnaeus) – Gulf Fritillary

The Gulf Fritillary is resident of south America north through Central America, Mexico, and the West Indies to the southern United States. Wanders north to the central United States; rare northward. Its caterpillars feed on species of passion-vine including maypops (*Passiflora incarnata*) and running pop (*P. foetida*). There are multiple broods throughout the year in south Florida and South Texas, January-November in the north. On Fort Sill, *A. vanillae* occurred in August and September only on the Quanah Range.

Family Hesperidae (Skippers)

Celotes nesus (W.H. Edwards) – Common Streaky Skipper

The Common Streaky Skipper is resident of southern Arizona, southern New Mexico, and west Texas south to northern Mexico. A rare stray to southern Oklahoma and northern Louisiana. Its caterpillars feed on globemallows (*Sphaeralcea*) and violet sida (*Sida filipes*). There are several broods from March through November. On Fort Sill, we found *C. nesus* occurred along a rocky ravine just west of Lake Elmer Thomas on the West Range in March and April, although the species could occur for much of the year. Although, we search the same locality several times in 2002, the species was not seen. Thus it may be only a vagrant or temporary resident on Fort Sill.

Copaeodes aurantiaca (Hewitson) – Orange Skipperling

The Orange Skipperling is resident of southern California, southern Arizona, southern New Mexico, and west Texas south through Central America to Panama. Strays to eastern Texas, central Arkansas, central Kansas, and Colorado. Its caterpillars feed on various grasses including Bermuda grass (*Cynodon dactylon*), sideoats grama (*Bouteloua curtipendula*), and green spangletop (*Leptochloa dubia*). There are many broods from February to November in Texas; March to December in southern California; April to October in the north. On Fort Sill *C. aurantiaca* occurred in March and April in the West Range.

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APPENDICES

Appendix 1. Acronyms and abbreviations used in Odonata and Plecoptera data bases (Appendices 2 and 3).

Acronym	Full Name
Ck.	Creek
E.	east
ER	East Range
jct.	Junction
LETRA	Lake Elmer Thomas Recreation Area
mi	mile
N.	north
NRB	Natural Resource Building
QR	Quanah Range
Rd.	road
S.	south
W.	west
WR	West Range

Appendix 2- The Anisoptera (Dragonflies) and Zygoptera (Damselflies) Odonata collected at Fort Sill,

Oklahoma (No_Spec = Number of specimens, Date = month/day/year, Stage A= adult I=immature).

Suborder	Family	Subfamily	Scientific Name	Author	No_Spec	Date	Stage
Anisoptera	Aeshnidae						
			<i>Anax junius</i>	(Drury)			
			Hab_Afil		No_Spec	Date	Stage
			ER, E. Cache Creek-S. Boundary Rd.		3	10/11/2002	A
			ER, Lake George		1	9/19/2003	A
			ER, Lake George		1	4/27/2003	A
			ER, NRB		1	3/31/2003	A
			QR, Pottawatomie Pond		1	8/12/2003	A
			WR, Medicine Creek-4 mi Crossing		1	9/20/2003	A
			WR, Punchbowl Rd. jct. LETRA Rd.		1	7/1/2003	A
			<i>Basiaeschna janata</i>	(Say)			
			Hab_Afil		No_Spec	Date	Stage
			WR, LETRA		1	8/11/2002	I
			WR, Medicine Creek-Punchbowl Rd.		1	4/24/2003	A
			WR, Medicine Creek-Punchbowl Rd.		1	8/11/2002	I
	Cordulegastridae						
			<i>Cordulegaster obliqua</i>	(Say)			
			Hab_Afil		No_Spec	Date	Stage
			ER		1	6/11/2002	A
	Corduliidae	Corduliinae					
			<i>Epitheca cynosura</i>	(Say)			
			Hab_Afil		No_Spec	Date	Stage
			ER, Clear Lake		2	4/27/2003	A
			ER, E. Cache Creek-S. Boundary Rd.		4	4/24/2002	A
			QR, W. Cache Creek-Falcon Gate Rd.		1	4/27/2003	A
			WR, LETRA		2	4/25/2003	A
			<i>Epitheca petechialis</i>	(Muttkowski)			
			Hab_Afil		No_Spec	Date	Stage
			ER, E. Cache Creek-S. Boundary Rd.		1	4/24/2002	A
			QR, Rock Creek-Falcon Gate Rd.		1	4/27/2003	A
			QR, W. Cache Creek-Falcon Gate Rd.		1	4/24/2003	A

Suborder	Family	Subfamily	Scientific Name	Author	No_Spec	Date	Stage
			<i>Epitheca princeps</i>	Hagen			
			Hab_Afil		No_Spec	Date	Stage
			ER, Clear Lake		1	6/11/2003	A
			ER, Lake George		1	9/19/2003	A
			ER, Larke Lake		1	6/11/2003	A
			QR, Pottawatomie Pond		1	7/1/2003	A
			WR, Blue Beaver Ck.-McKenzie Hill Rd.		1	6/11/2003	A
			WR, Blue Beaver Ck.-McKenzie Hill Rd.		1	7/2/2003	A
			WR, LETRA		1	7/2/2003	A
			WR, Medicine Creek-Punchbowl Rd.		2	7/1/2003	A
			WR, Medicine Creek-Punchbowl Rd.		1	6/11/2002	A
			<i>Epitheca semiaquea</i>	(Burmeister)			
			Hab_Afil		No_Spec	Date	Stage
			ER, E. Cache Creek-S. Boundary Rd.		1	4/24/2002	A
		Macromiinae					
			<i>Didymops transversa</i>	(Say)			
			Hab_Afil		No_Spec	Date	Stage
			QR, W. Cache Creek-Falcon Gate Rd.		2	4/27/2003	A
			WR, Engineer Pond		1	10/11/2002	I
			<i>Macromia illinoensis</i>	(Selys)			
			<i>georgina</i>				
			Hab_Afil		No_Spec	Date	Stage
			WR, Medicine Creek-Punchbowl Rd.		1	7/1/2003	A
			<i>Macromia pacifica</i>	Hagen			
			Hab_Afil		No_Spec	Date	Stage
			WR, Medicine Creek-Punchbowl Rd.		1	10/11/2002	A
			WR, Medicine Creek-Punchbowl Rd.		1	7/1/2003	A
		Gomphidae					
			<i>Dromogomphus spinosus</i>	Selys			
			Hab_Afil		No_Spec	Date	Stage
			ER, E. Cache Creek-S. Boundary Rd.		1	6/13/2002	A
			QR, W. Cache Creek-Falcon Gate Rd.		1	8/12/2003	A
			WR, Medicine Creek-Punchbowl Rd.		1	8/12/2003	A
			WR, Medicine Creek-Punchbowl Rd.		1	7/1/2003	A
			WR, Medicine Creek-Punchbowl Rd.		3	7/1/2003	A

Suborder	Family	Subfamily	Scientific Name	Author	No_Spec	Date	Stage
			<i>Dromogomphus spoliatus</i>	(Hagen)			
			Hab_Afil		No_Spec	Date	Stage
			ER, E. Cache Creek-S. Boundary Rd.		1	9/14/2002	A
			ER, Lake George		1	8/12/2003	A
			ER, Larke Lake		1	6/11/2003	A
			WR, Engineer Pond		1	6/14/2002	A
			WR, Medicine Creek-Punchbowl Rd.		1	9/20/2003	A
			WR, Medicine Creek-Punchbowl Rd.		1	10/11/2002	I
			<i>Erpetogomphus designatus</i>	Hagen in Selys			
			Hab_Afil		No_Spec	Date	Stage
			ER, E. Cache Creek-S. Boundary Rd.		2	6/13/2002	A
			ER, E. Cache Creek-S. Boundary Rd.		2	9/14/2002	A
			ER, E. Cache Creek-S. Boundary Rd.		4	9/13/2002	A
			ER, Lake George		1	6/10/2003	A
			QR, W. Cache Creek-Falcon Gate Rd.		1	7/1/2003	A
			WR, Blue Beaver Ck.-McKenzie Hill Rd.		1	9/20/2003	A
			WR, Medicine Creek-4mi Crossing		2	7/3/2003	A
			WR, Medicine Creek-Punchbowl Rd.		3	6/12/2002	A
			WR, Medicine Creek-Punchbowl Rd.		3	8/12/2003	A
			WR, Medicine Creek-Punchbowl Rd.		2	6/14/2002	A
			WR, Medicine Creek-Punchbowl Rd.		1	6/1/2003	A
			WR, Medicine Creek-Punchbowl Rd.		2	7/1/2003	A
			WR, Medicine Creek-Punchbowl Rd.		1	7/1/2003	A
			<i>Gomphus externus</i>	Hagen			
			Hab_Afil		No_Spec	Date	Stage
			ER, E. Cache Creek-S. Boundary Rd.		1	4/27/2003	A
			ER, E. Cache Creek-S. Boundary Rd.		1	4/27/2003	A
			WR, Blue Beaver Ck.-McKenzie Hill Rd.		1	6/10/2003	A
			<i>Gomphus militaris</i>	Hagen			
			Hab_Afil		No_Spec	Date	Stage
			ER		1	6/2/2002	A
			ER, E. Cache Creek-S. Boundary Rd.		4	6/10/2003	A
			ER, E. Cache Creek-S. Boundary Rd.		1	8/12/2002	A
			ER, Lake George		1	8/12/2003	A
			ER, Larke Lake		1	6/11/2003	A
			QR, Pottawatomie Pond		1	7/1/2003	A
			QR, Pottawatomie Pond		3	7/1/2003	A
			QR, Pottawatomie Pond		1	8/12/2003	A

Suborder	Family	Subfamily	Scientific Name	Author	No_Spec	Date	Stage
			QR, Rock Creek-Falcon Gate Rd.		2	7/1/2003	A
			QR, W. Cache Creek-Falcon Gate Rd.		1	7/1/2003	A
			QR, W. Cache Creek-Falcon Gate Rd.		1	4/27/2003	A
			WR		1	6/24/2003	A
			WR, Blue Beaver Ck.-McKenzie Hill Rd.		2	7/2/2003	A
			WR, LETRA		3	7/2/2003	A
			WR, Medicine Creek-Punchbowl Rd.		1	4/24/2003	A
			<i>Gomphus ozarkensis</i>	Westfall			
			Hab_Afil		No_Spec	Date	Stage
			ER, E. Cache Creek-S. Boundary Rd.		2	4/24/2002	A
			<i>Hagenius brevistylus</i>	Selys			
			Hab_Afil		No_Spec	Date	Stage
			WR, Medicine Creek-Punchbowl Rd.		1	10/11/2002	I
			WR, Medicine Creek-Punchbowl Rd.		1	7/1/2003	A
			<i>Phyllogomphoides stigmatus</i>	(Say)			
			Hab_Afil		No_Spec	Date	Stage
			ER, Clear Lake		2	6/11/2003	A
			QR, Pottawatomie Pond		1	8/12/2003	A
			QR, W. Cache Creek-Falcon Gate Rd.		1	8/12/2003	A
			WR, Blue Beaver Ck.-McKenzie Hill Rd.		1	7/2/2003	A
			WR, LETRA		4	7/2/2003	A
			WR, LETRA		1	7/2/2003	A
			WR, Medicine Creek-4mi Crossing		2	7/3/2003	A
			WR, Medicine Creek-Punchbowl Rd.		2	7/1/2003	A
			<i>Progomphus obscurus</i>	(Rambur)			
			Hab_Afil		No_Spec	Date	Stage
			ER		3	6/3/2002	A
			ER, E. Cache Creek-S. Boundary Rd.		1	9/14/2002	A
			QR, Rock Creek-Falcon Gate Rd.		3	7/1/2003	A
			QR, W. Cache Creek-Falcon Gate Rd.		1	7/1/2003	A
			WR, Blue Beaver Ck.-McKenzie Hill Rd.		1	6/9/2003	A
			WR, Blue Beaver Ck.-McKenzie Hill Rd.		3	7/2/2003	A
			WR, Medicine Creek-Punchbowl Rd.		3	7/1/2003	A
			<i>Stylurus plagiatus</i>	(Selys)			
			Hab_Afil		No_Spec	Date	Stage
			ER, E. Cache Creek-S. Boundary Rd.		1	9/19/2003	A

Libellulidae

Suborder	Family	Subfamily	Scientific Name	Author	No_Spec	Date	Stage
			<i>Brechmorhoga mendax</i>	(Hagen)			
			Hab_Afil		No_Spec	Date	Stage
			ER, Medicine Creek-Peachtree Crossing		2	6/12/2003	A
			WR, Medicine Creek-Punchbowl Rd.		2	9/20/2003	A
			WR, Medicine Creek-Punchbowl Rd.		1	7/1/2003	A
			<i>Celithemis eponina</i>	(Drury)			
			Hab_Afil		No_Spec	Date	Stage
			ER		1	6/2/2002	A
			ER, Clear Lake		1	6/10/2003	A
			ER, E. Cache Creek-S. Boundary Rd.		2	8/12/2002	A
			ER, Lake George		1	6/10/2003	A
			ER, Lake Geroge		2	8/12/2003	A
			ER, Lake Geroge		2	9/19/2003	A
			QR, nr Falcon Gate		1	8/12/2003	A
			QR, Pottawatomie Pond		4	9/19/2003	A
			QR, Pottawatomie Pond		1	8/12/2003	A
			WR		1	8/18/2003	A
			WR, LETRA		4	7/2/2003	A
			WR, LETRA		5	9/14/2002	A
			WR, LETRA		1	9/20/2003	A
			WR, LETRA		1	6/10/2003	A
			WR, Medicine Creek-4mi Crossing		3	8/10/2002	A
			<i>Celithemis fasciata</i>	Kirby			
			Hab_Afil		No_Spec	Date	Stage
			ER, mixed grass		1	6/2/2002	A
			WR		1	6/3/2002	A
			WR, LETRA		2	7/2/2003	A
			WR, Medicine Creek-Punchbowl Rd.		1	7/1/2003	A
			<i>Dythemis fugax</i>	Hagen			
			Hab_Afil		No_Spec	Date	Stage
			ER, E. Cache Creek-S. Boundary Rd.		2	8/12/2002	A
			ER, mixed grass		3	6/11/2002	A
			ER, mixed grass		2	9/13/2002	A
			QR, Pottawatomie Pond		1	8/12/2003	A
			QR, W. Cache Creek-Falcon Gate Rd.		1	8/12/2003	A
			WR, Blue Beaver Ck.-McKenzie Hill Rd.		1	7/2/2003	A
			WR, LETRA		1	9/20/2003	A

Suborder	Family	Subfamily	Scientific Name	Author	No_Spec	Date	Stage
			WR, LETRA		1	7/2/2003	A
			WR, LETRA		1	7/2/2003	A
			WR, Medicine Creek-4mi Crossing		1	7/3/2003	A
			WR, Medicine Creek-4mi Crossing		2	8/10/2002	A
			<i>Dythemis velox</i>	Hagen			
			Hab_Afil		No_Spec	Date	Stage
			ER, E. Cache Creek-S. Boundary Rd.		1	6/10/2003	A
			QR, W. Cache Creek-Falcon Gate Rd.		1	8/12/2003	A
			WR, Blue Beaver Ck.-McKenzie Hill Rd.		1	6/9/2003	A
			WR, LETRA		1	6/13/2002	A
			WR, Medicine Creek-4mi Crossing		1	8/10/2002	A
			WR, Medicine Creek-4mi Crossing		1	7/3/2003	A
			WR, Medicine Creek-Punchbowl Rd.		1	9/20/2003	A
			WR, Medicine Creek-Punchbowl Rd.		1	8/12/2003	A
			WR, Medicine Creek-Punchbowl Rd.		2	7/1/2003	A
			<i>Erythemis simplicicollis</i>	(Say)			
			Hab_Afil		No_Spec	Date	Stage
			ER, Clear Lake		2	6/11/2003	A
			ER, E. Cache Creek-S. Boundary Rd.		1	6/10/2003	A
			ER, Larke Lake		1	6/11/2003	A
			QR, ponds .5mi E. Falcon Gate		1	8/12/2003	A
			QR, Pottawatomie Pond		1	8/12/2003	A
			QR, Pottawatomie Pond		1	9/19/2003	A
			QR, Pottawatomie Pond		1	7/1/2003	A
			QR, Pottawatomie Pond		1	8/12/2003	A
			QR, W. Cache Creek-Falcon Gate Rd.		1	8/12/2003	A
			QR, W. Cache Creek-Falcon Gate Rd.		2	7/1/2003	A
			WR		2	6/24/2003	A
			WR		1	8/18/2003	A
			WR		1	6/3/2002	A
			WR, Blue Beaver Ck.-McKenzie Hill Rd.		5	7/2/2003	A
			WR, Ketch Lake		4	9/20/2003	A
			WR, LETRA		1	9/14/2002	A
			WR, LETRA		3	7/2/2003	A
			WR, LETRA		1	6/10/2003	A
			WR, Medicine Creek-4mi Crossing		6	8/10/2002	A
			WR, Medicine Creek-Punchbowl Rd.		2	9/14/2002	A

Suborder	Family	Subfamily	Scientific Name	Author	No_Spec	Date	Stage
			<i>Ladona deplanata</i>	(Rambur)			
			Hab_Afil		No_Spec	Date	Stage
			WR, LETRA		1	4/25/2003	A
			<i>Libellula incesta</i>	Hagen			
			Hab_Afil		No_Spec	Date	Stage
			WR		1	8/18/2003	A
			<i>Libellula luctuosa</i>	Burmeister			
			Hab_Afil		No_Spec	Date	Stage
			ER		1	6/11/2003	A
			ER		3	6/3/2002	A
			ER, E. Cache Creek-S. Boundary Rd.		1	7/1/2003	A
			ER, E. Cache Creek-S. Boundary Rd.		1	6/10/2003	A
			ER, Lake Geroge		1	9/19/2003	A
			ER, Larke Lake		3	6/11/2003	A
			ER, Medicine Creek-Peachtree Crossing		1	6/12/2003	A
			QR, ponds .5mi E. Falcon Gate		2	8/12/2003	A
			QR, W. Cache Creek-Falcon Gate Rd.		1	7/1/2003	A
			WR		1	6/3/2002	A
			WR		1	5/26/2003	A
			WR, Blue Beaver Ck.-McKenzie Hill Rd.		2	6/10/2003	A
			WR, Blue Beaver Ck.-McKenzie Hill Rd.		1	9/19/2003	A
			WR, Blue Beaver Ck.-McKenzie Hill Rd.		1	7/2/2003	A
			WR, Blue Beaver Ck.-McKenzie Hill Rd.		1	6/12/2003	A
			WR, LETRA		2	7/2/2003	A
			WR, LETRA		2	9/14/2002	A
			WR, Medicine Creek-4mi Crossing		4	8/10/2002	A
			WR, Medicine Creek-Punchbowl Rd.		3	7/1/2003	A
			<i>Libellula lydia</i>	Drury			
			Hab_Afil		No_Spec	Date	Stage
			ER, E. Cache Creek-S. Boundary Rd.		1	4/27/2003	A
			ER, E. Cache Creek-S. Boundary Rd.		1	4/24/2002	A
			ER, Lake George		2	6/10/2003	A
			WR		1	5/26/2003	A
			WR, Medicine Creek-Punchbowl Rd.		1	7/1/2003	A
			WR, Medicine Creek-Punchbowl Rd.		2	8/12/2003	A
			<i>Libellula pulchella</i>	Drury			
			Hab_Afil		No_Spec	Date	Stage

Suborder	Family	Subfamily	Scientific Name	Author	No_Spec	Date	Stage
			ER, E. Cache Creek-S. Boundary Rd.		1	9/13/2002	A
			ER, Lake Geroge		1	8/15/2003	A
			<i>Pachydiplax longipennis</i>	(Burmeister)			
			Hab_Afil		No_Spec	Date	Stage
			ER, Lake Geroge		1	4/27/2003	A
			ER, Lake Geroge		1	8/12/2003	A
			QR, Pottawatomie Pond		1	8/12/2003	A
			WR		1	6/3/2002	A
			<i>Pantala flavescens</i>	(Fabricius)			
			Hab_Afil		No_Spec	Date	Stage
			ER, Medicine Creek-Peachtree Crossing		1	6/12/2003	A
			QR, Pottawatomie Pond		1	7/1/2003	A
			WR		1	6/24/2003	A
			WR, Blue Beaver Ck.-McKenzie Hill Rd.		1	10/11/2002	A
			WR, Blue Beaver Ck.-McKenzie Hill Rd.		1	9/20/2003	A
			WR, LETRA		1	7/2/2003	A
			<i>Pantala hymenaea</i>	(Say)			
			Hab_Afil		No_Spec	Date	Stage
			WR, LETRA		2	7/2/2003	A
			<i>Perithemis tenera</i>	(Say)			
			Hab_Afil		No_Spec	Date	Stage
			ER, E. Cache Creek-S. Boundary Rd.		1	6/10/2003	A
			ER, E. Cache Creek-S. Boundary Rd.		2	8/12/2002	A
			ER, Lake Geroge		1	8/12/2003	A
			ER, mixed grass		1	9/14/2002	A
			QR, ponds .5mi E. Falcon Gate		2	8/12/2003	A
			WR, Blue Beaver Ck.-McKenzie Hill Rd.		1	6/12/2003	A
			WR, Ketch Lake		3	9/20/2003	A
			WR, LETRA		1	7/2/2003	A
			WR, Medicine Creek-4mi Crossing		1	8/10/2002	A
			<i>Sympetrum corrupta</i>	(Hagen)			
			Hab_Afil		No_Spec	Date	Stage
			ER		1	3/31/2003	A
			ER, E. Cache Creek-S. Boundary Rd.		1	4/24/2002	A
			ER, E. Cache Creek-S. Boundary Rd.		1	3/31/2003	A
			WR		3	5/26/2003	A
			WR, Blue Beaver Ck.-McKenzie Hill Rd.		3	10/11/2002	A

Suborder	Family	Subfamily	Scientific Name	Author	No_Spec	Date	Stage
			WR, Engineer Pond		1	10/11/2002	A
			WR, LETRA		1	4/24/2002	A
			<i>Sympetrum vicina</i>	(Hagen)			
			Hab_Afil		No_Spec	Date	Stage
			WR, Blue Beaver Ck.-McKenzie Hill Rd.		2	10/11/2002	A
			<i>Tramea lacerata</i>	Hagen			
			Hab_Afil		No_Spec	Date	Stage
			ER, Clear Lake		1	6/11/2003	A
			ER, Lake Geroge		1	9/19/2003	A
			ER, Lake Geroge		3	4/27/2003	A
			QR, nr. Falcon Gate		1	8/12/2003	A
			QR, Pottawatomie Pond		2	8/12/2003	A
			WR		1	5/26/2003	A
			WR, LETRA		1	9/20/2003	A
			WR, Medicine Creek-Punchbowl Rd.		1	9/20/2003	A
			<i>Tramea onusta</i>	Hagen			
			Hab_Afil		No_Spec	Date	Stage
			ER, Lake Geroge		1	4/27/2003	A
			ER, tall grass		1	9/14/2002	A

Zygoptera

Calopterygidae

			<i>Hetaerina americana</i>	(Fabricius)			
			Hab_Afil		No_Spec	Date	Stage
			ER		1	6/2/2002	A
			ER, E. Cache Creek-S. Boundary Rd.		1	4/27/2003	A
			ER, E. Cache Creek-S. Boundary Rd.		1	8/12/2003	A
			ER, E. Cache Creek-S. Boundary Rd.		1	7/1/2003	A
			ER, E. Cache Creek-S. Boundary Rd.		3	9/13/2002	A
			WR		2	5/26/2003	A
			WR, Medicine Creek-4mi Crossing		1	8/10/2002	A
			WR, Medicine Creek-Punchbowl Rd.		1	8/12/2003	A
			WR, Medicine Creek-Punchbowl Rd.		1	7/1/2003	A
			WR, Medicine Creek-Punchbowl Rd.		4	10/11/2002	A
			WR, Medicine Creek-Punchbowl Rd.		2	9/14/2002	A
			<i>Hetaerina titia</i>	(Drury)			
			Hab_Afil		No_Spec	Date	Stage

Suborder	Family	Subfamily	Scientific Name	Author	No_Spec	Date	Stage
			ER, E. Cache Creek-S. Boundary Rd.		1	8/12/2003	A
			WR, Medicine Creek-4mi Crossing		1	7/3/2003	A
			WR, Medicine Creek-Punchbowl Rd.		1	7/1/2003	A
			WR, Medicine Creek-Punchbowl Rd.		1	8/12/2003	A
	Coenagrionidae						
			<i>Argia apicale</i>	(Say)			
			Hab_Afil		No_Spec	Date	Stage
			ER, Lake George		1	8/12/2003	A
			QR, W. Cache Creek-Falcon Gate Rd.		1	7/1/2003	A
			WR, Medicine Creek-4mi Crossing		1	8/10/2002	A
			<i>Argia immunda</i>	(Hagen)			
			Hab_Afil		No_Spec	Date	Stage
			WR, Blue Beaver Ck.-McKenzie Hill Rd.		2	9/20/2003	A
			<i>Argia moestum</i>	(Hagen)			
			Hab_Afil		No_Spec	Date	Stage
			ER		7	6/2/2002	A
			ER, E. Cache Creek-S. Boundary Rd.		4	9/19/2003	A
			ER, E. Cache Creek-S. Boundary Rd.		4	8/12/2003	A
			ER, E. Cache Creek-S. Boundary Rd.		1	7/1/2003	A
			ER, E. Cache Creek-S. Boundary Rd.		4	9/13/2002	A
			ER, Lake George		1	8/12/2003	A
			QR, W. Cache Creek-Falcon Gate Rd.		1	8/12/2003	A
			QR, W. Cache Creek-Falcon Gate Rd.		1	7/1/2003	A
			WR		1	6/24/2003	A
			WR, Blue Beaver Ck.-McKenzie Hill Rd.		5	9/20/2003	A
			WR, LETRA		2	9/20/2003	A
			WR, Medicine Creek-4mi Crossing		2	8/10/2002	A
			WR, Medicine Creek-Punchbowl Rd.		1	9/20/2003	A
			WR, Medicine Creek-Punchbowl Rd.		2	6/12/2002	A
			<i>Argia sedula</i>	(Hagen)			
			Hab_Afil		No_Spec	Date	Stage
			ER, E. Cache Creek-S. Boundary Rd.		1	9/19/2003	A
			ER, E. Cache Creek-S. Boundary Rd.		2	8/12/2003	A
			WR, Blue Beaver Ck.-McKenzie Hill Rd.		1	9/20/2003	A
			WR, Medicine Creek-4mi Crossing		1	9/20/2003	A
			WR, Medicine Creek-4mi Crossing		6	8/10/2002	A
			WR, Medicine Creek-Punchbowl Rd.		1	7/1/2003	A

Suborder	Family	Subfamily	Scientific Name	Author	No_Spec	Date	Stage
			<i>Argia translata</i>	Hagen in Selys			
			Hab_Afil		No_Spec	Date	Stage
			WR, Blue Beaver Ck.-McKenzie Hill Rd.		1	10/11/2002	A
			WR, Blue Beaver Ck.-McKenzie Hill Rd.		5	9/20/2003	A
			WR, Medicine Creek-4mi Crossing		3	7/3/2003	A
			WR, Medicine Creek-Punchbowl Rd.		1	9/20/2003	A
			<i>Enallagma aspersum</i>	(Hagen)			
			Hab_Afil		No_Spec	Date	Stage
			QR, Pottawatomie Pond		1	7/1/2003	A
			<i>Enallagma basidens</i>	Calvert			
			Hab_Afil		No_Spec	Date	Stage
			ER		1	8/12/2002	A
			ER, Lake George		1	9/19/2003	A
			ER, Medicine Creek-Peachtree Crossing		1	6/12/2003	A
			QR, ponds .5mi E. Falcon Gate		1	8/12/2003	A
			QR, Pottawatomie Pond		4	7/1/2003	A
			QR, W. Cache Creek-Falcon Gate Rd.		1	4/25/2003	A
			WR, Medicine Creek-4mi Crossing		2	8/10/2002	A
			WR, Medicine Creek-Punchbowl Rd.		2	7/1/2003	A
			<i>Enallagma civile</i>	(Hagen)			
			Hab_Afil		No_Spec	Date	Stage
			ER, E. Cache Creek-S. Boundary Rd.		3	9/19/2003	A
			ER, Lake George		8	9/19/2003	A
			ER, mixed grass		1	9/13/2002	A
			QR, ponds .5mi E. Falcon Gate		9	9/19/2003	A
			QR, Pottawatomie Pond		1	8/12/2003	A
			QR, Pottawatomie Pond		9	9/19/2003	A
			QR, Pottawatomie Pond		7	9/19/2003	A
			QR, Rock Creek-Falcon Gate Rd.		2	9/19/2003	A
			QR, W. Cache Creek-Falcon Gate Rd.		1	4/25/2003	A
			QR, W. Cache Creek-Falcon Gate Rd.		1	8/12/2003	A
			WR, Blue Beaver Ck.-McKenzie Hill Rd.		1	10/11/2002	A
			WR, Blue Beaver Ck.-McKenzie Hill Rd.		6	9/20/2003	A
			WR, Engineer Pond		15	9/20/2003	A
			WR, Ketch Lake		9	9/20/2003	A
			WR, LETRA		5	9/20/2003	A
			WR, Medicine Creek-4mi Crossing		1	9/20/2003	A
			WR, Medicine Creek-Punchbowl Rd.		1	10/11/2002	A

Suborder	Family	Subfamily	Scientific Name	Author	No_Spec	Date	Stage
				WR, Medicine Creek-Punchbowl Rd.	6	9/20/2003	A
				WR, Medicine Creek-Punchbowl Rd.	1	7/1/2003	A
				WR, Medicine Creek-Punchbowl Rd.	1	8/12/2003	A
			<i>Enallagma exsulans</i>	(Hagen)			
			Hab_Afil		No_Spec	Date	Stage
				ER, E. Cache Creek-S. Boundary Rd.	2	8/12/2003	A
				QR, Pottawatomie Pond	1	7/1/2003	A
			<i>Enallagma praevarum</i>	(Hagen)			
			Hab_Afil		No_Spec	Date	Stage
				WR, Blue Beaver Ck.-McKenzie Hill Rd.	1	10/11/2002	A
			<i>Enallagma signatum</i>	(Hagen)			
			Hab_Afil		No_Spec	Date	Stage
				ER, Lake George	3	9/20/2003	A
				WR, Engineer Road	1	9/20/2003	A
				WR, Ketch Lake	1	9/19/2003	A
				WR, Medicine Creek-4mi Crossing	1	9/20/2003	A
			<i>Enallagma vesperum</i>	Calvert			
			Hab_Afil		No_Spec	Date	Stage
				WR, LETRA	1	9/20/2003	A
			<i>Ischnura demorsa</i>	(Hagen)			
			Hab_Afil		No_Spec	Date	Stage
				QR, Pottawatomie Pond	3	9/19/2003	A
				WR, LETRA	1	9/20/2003	A
			<i>Ischnura denticollis</i>	(Burmeister)			
			Hab_Afil		No_Spec	Date	Stage
				WR, Medicine Creek-4mi Crossing	1	9/20/2003	A
			<i>Ischnura perparva</i>	(McLachlan in Selys)			
			Hab_Afil		No_Spec	Date	Stage
				WR, LETRA	1	9/20/2003	A
			<i>Ischnura positum</i>	(Hagen)			
			Hab_Afil		No_Spec	Date	Stage
				ER, Clear Lake	1	4/27/2003	A
				ER, E. Cache Creek-S. Boundary Rd.	1	6/10/2003	A
				QR, Rock Creek-Falcon Gate Rd.	1	4/27/2003	A
				QR, W. Cache Creek-Falcon Gate Rd.	1	4/25/2003	A

Suborder	Family	Subfamily	Scientific Name	Author	No_Spec	Date	Stage
			WR, Ketch Lake		1	9/20/2003	A
			WR, LETRA		1	9/20/2003	A
			WR, Medicine Creek-4mi Crossing		1	8/10/2002	A
			<i>Ischnura verticalis</i>	(Say)			
			Hab_Afil		No_Spec	Date	Stage
			ER		1	8/12/2002	A
			ER, E. Cache Creek-S. Boundary Rd.		2	4/24/2002	A
			ER, Lake George		1	8/12/2003	A
			QR, W. Cache Creek-Falcon Gate Rd.		5	4/25/2002	A
			WR, Medicine Creek-4mi Crossing		1	8/10/2002	A
			<i>Telebasis salvum</i>	(Hagen)			
			Hab_Afil		No_Spec	Date	Stage
			ER, E. Cache Creek-S. Boundary Rd.		1	9/19/2003	A
			WR, Medicine Creek-4mi Crossing		1	8/10/2002	A
	Lestidae						
			<i>Lestes alacer</i>	Hagen			
			Hab_Afil		No_Spec	Date	Stage
			QR, Pottawatomie Pond		4	7/1/2003	A
			<i>Lestes disjunctus australis</i>	Walker			
			Hab_Afil		No_Spec	Date	Stage
			ER, E. Cache Creek-S. Boundary Rd.		1	8/12/2003	A
			QR, Pottawatomie Pond		4	9/20/2003	A
			QR, Pottawatomie Pond		5	9/19/2003	A
			QR, Pottawatomie Pond		2	7/1/2003	A

Appendix 3 - The Plecoptera (Stoneflies) of Fort Sill, Oklahoma (No_Spec = Number of specimens, Date = month/day/year, Stage A= adult I=immature).

Family	Scientific Name	Author			
Capniidae	<i>Allocaupnia granulata</i>	(Claassen)			
	Hab_Afil		No_Spec	Date	
	Stage				
	ER, Medicine Creek-Peachtree Crossing		1	2/5/2003	A
	ER, Medicine Creek-Peachtree Crossing		5	2/5/2003	A
	QR, Falcon Gate Rd.		4	2/5/2003	A
	QR, Fort Sill border of Wichita NWR		25	2/5/2003	A
	QR, Quanah Creek-Falcon Gate Rd.		1	2/5/2003	A
	QR, Quanah Creek-Falcon Gate Rd.		18	2/5/2003	A
	QR, Rock Creek-Falcon Gate Rd.		74	2/5/2003	A
	QR, Rock Creek-Falcon Gate Rd.		1	2/5/2003	A
	QR, W. Cache Creek-Falcon Gate Rd.		72	2/5/2003	A
	QR, W. Cache Creek-Falcon Gate Rd.		16	2/5/2003	A
	WR, Blue Beaver Ck.-McKenzie Hill Rd.		1	2/5/2003	A
	WR, Blue Beaver Ck.-McKenzie Hill Rd.		25	2/5/2003	A
	WR, Medicine Creek-Punchbowl Rd.		96	2/5/2003	A
	WR, Medicine Creek-Punchbowl Rd.		1	2/5/2003	A
Leuctridae	<i>Zealeuctra claasseni</i>	(Frison)			
	Hab_Afil		No_Spec	Date	
	Stage				
	QR, Fort Sill border of Wichita NWR		29	2/5/2003	A
	QR, Quanah Creek-Falcon Gate Rd.		24	2/5/2003	A
	QR, W. Cache Creek-Falcon Gate Rd.		23	2/5/2003	A
	QR, W. Cache Creek-Falcon Gate Rd.		6	2/5/2003	A
	WR, Blue Beaver Ck.-McKenzie Hill Rd.		1	2/5/2003	A
	WR, Blue Beaver Ck.-McKenzie Hill Rd.		33	2/5/2003	A
	WR, Medicine Creek-Punchbowl Rd.		1	2/5/2003	A
	WR, Medicine Creek-Punchbowl Rd.		3	2/5/2003	A
Perlidae	<i>Neoperla choctaw</i>	Stark and Baumann			
	Hab_Afil		No_Spec	Date	
	Stage				
	QR, Rock Creek-Falcon Gate Rd.		4	7/2/2003	A
	QR, W. Cache Creek-Falcon Gate Rd.		4	7/2/2003	A
	WR, Blue Beaver Ck.-McKenzie Hill Rd.		15	6/30/2003	A
	WR, Blue Beaver Ck.-McKenzie Hill Rd.		31	7/1/2003	A
	WR, Punchbowl Rd. Jct. LETRA Rd.		2	7/1/2003	A

Family	Scientific Name	Author			
	<i>Perlesta decipiens</i>	(Walsh)			
	Hab_Afil		No_Spec	Date	
	Stage				
	ER		11	6/24/2003	A
	ER, E. Cache Creek-Hoyle Bridge		7	4/27/2003	I
	ER, E. Cache Creek-S. Boundry Rd.		17	6/13/2002	A
	ER, E. Cache Creek-S. Boundry Rd.		2	4/27/2003	A
	ER, E. Cache Creek-S. Boundry Rd.		9	6/10/2003	A
	ER, E. Cache Creek-S. Boundry Rd.		2	4/25/2003	A
	ER, E. Cache Creek-S. Boundry Rd.		47	6/16/2003	A
	ER, Medicine Creek-Peachtree Crossing		14	6/11/2003	A
	ER, NRB		19	6/12/2002	A
	ER, NRB		34	5/28/2003	A
	ER, NRB		6	6/10/2003	A
	QR, Rock Creek-Falcon Gate Rd.		1	4/27/2003	I
	QR, Rock Creek-Falcon Gate Rd.		38	7/2/2003	A
	QR, Rock Creek-Falcon Gate Rd.		83	7/2/2003	A
	QR, W. Cache Creek-Falcon Gate Rd.		1	7/2/2003	A
	WR		1	6/24/2003	A
	WR, Blue Beaver Ck.-McKenzie Hill Rd.		26	6/10/2003	A
	WR, Blue Beaver Ck.-McKenzie Hill Rd.		6	7/1/2003	A
	WR, Medicine Creek-Punchbowl Rd.		2	5/25/2003	I
	WR, Medicine Creek-Punchbowl Rd.		1	6/30/2003	A
	WR, Medicine Creek-Punchbowl Rd.		3	6/11/2003	A
	WR, Medicine Creek-Punchbowl Rd.		86	6/13/2002	A
Perlodidae					
	<i>Hydroperla crosbyi</i>	(Needham and Claassen)			
	Hab_Afil		No_Spec	Date	
	Stage				
	ER, E. Cache Creek-S. Boundry Rd.		4	2/5/2003	I
	ER, E. Cache Creek-S. Boundry Rd.		1	2/5/2003	A
	QR, Fort Sill border of Wichita NWR		25	2/5/2003	A
	QR, W. Cache Creek-Falcon Gate Rd.		1	2/5/2003	A
Taeniopterygidae					
	<i>Taeniopteryx burksi</i>	Ricker and Ross			
	Hab_Afil		No_Spec	Date	
	Stage				
	QR, Fort Sill border of Wichita NWR		3	2/5/2003	A
	WR, Medicine creek-Punchbowl Rd.		1	2/5/2003	A
	WR, Medicine creek-Punchbowl Rd.		25	2/5/2003	A

Appendix 4. Lepidoptera collected in each trap sample by visit

Trap E-1 Flower Transect N 34 42' 32.3" W 98 16' 59.9"

		March	April	May	June	July	August	September	
Sphingidae	<i>Hyles lineata</i> (Fabricius, 1775)	0	0	0	0	2	0	0	
	<i>Manduca sexta</i> (Linnaeus, 1783)	1	0	0	0	0	0	0	
	<i>Paonias excaecatus</i> (J.E. Smith, 1797)	0	0	1	0	0	0	0	
	<i>Smerinthus jamaicensis</i> (Drury, 1773)	0	0	1	0	0	0	0	
Arctiidae	<i>Apantesis nais</i> (Drury, 1773)	0	0	0	0	0	0	2	
	<i>Apantesis phalerata</i> (Harris, 1841)	0	11	0	0	0	3	37	
	<i>Cisthene tenuifascia</i> Harvey, 1875	0	0	3	0	1	0	5	
	<i>Estigmene acrea</i> (Drury, 1773)	0	0	0	0	0	1	0	
	<i>Grammia arge</i> (Drury, 1773)	0	0	4	0	0	0	0	
	<i>Grammia oithona</i> (Strecker, 1878)	0	0	1	0	0	0	1	
	<i>Grammia parthenice</i> (Kirby, 1837)	0	0	0	0	0	0	17	
	<i>Haploa reversa</i> (Stretch, 1885)	0	0	8	0	0	0	0	
	<i>Holomelina aurantiaca</i> (Hübner, 1831)	0	0	1	0	0	0	0	
	<i>Hypoprepia miniata</i> (Kirby, 1837)	0	0	139	0	0	0	0	
	<i>Spilosoma virginica</i> (Fabricius, 1798)	0	1	0	0	0	2	0	
	Noctuidae	<i>Catocala abbreviatella</i> Grote, 1872	0	0	1	0	0	0	0
		<i>Catocala maestosa</i> Hulst, 1884	0	0	0	0	0	0	1
<i>Schinia alencis</i> (Harvey, 1875)		0	0	0	0	0	0	1	
<i>Schinia arcigera</i> (Guenée, 1852)		0	0	0	0	0	1	10	
<i>Schinia chrysella</i> (Grote, 1874)		0	0	0	0	0	2	10	
<i>Schinia gaurae</i> (Smith, 1797)		0	0	0	0	0	3	1	
<i>Schinia jaguarina</i> (Guenée, 1852)		0	0	1	0	0	0	0	
<i>Schinia lynx</i> (Guenée, 1852)		0	0	0	0	0	1	0	
Notodontidae	<i>Cerura candida</i> Lintner, 1878	0	0	0	0	0	1	0	
	<i>Datana perspicua</i> Grote & Robinson, 1865	0	0	0	0	0	2	0	
	<i>Gluphisia septentrionis</i> Walker, 1855	0	1	0	0	0	0	0	
	<i>Hippia packardii</i> (Morrison, 1875)	0	0	0	0	2	0	0	

TOTALS	1	13	160	0	5	16	85
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Trap E-2 Dead Coyote Rd. N 34 39' 5" W 98 17' 30"

		March	April	May	June	July	August	September
Sphingidae	<i>Ceratomia amyntor</i> (Geyer, 1835)	0	0	0	0	2	1	0
	<i>Manduca sexta</i> (Linnaeus, 1783)	0	0	0	0	0	1	0
Arctiidae	<i>Apantesis nais</i> (Drury, 1773)	0	0	0	1	0	0	0
	<i>Apantesis phalerata</i> (Harris, 1841)	0	22	0	4	0	5	4
	<i>Cisthene tenuifascia</i> Harvey, 1875	0	0	7	0	3	0	2
	<i>Euerythra phasma</i> Harvey, 1876	0	0	0	0	1	0	0
	<i>Grammia arge</i> (Drury, 1773)	0	0	1	0	0	0	0
	<i>Grammia oithona</i> (Strecker, 1878)	0	0	0	4	0	0	0
	<i>Grammia parthenice</i> (Kirby, 1837)	0	0	0	0	0	0	4
	<i>Haploa reversa</i> (Stretch, 1885)	0	0	33	0	0	0	0
	<i>Holomelina costata</i> (Stretch, 1885)	0	0	0	0	0	0	2
	<i>Hypoprepia miniata</i> (Kirby, 1837)	0	0	138	0	15	0	6
	<i>Spilosoma virginica</i> (Fabricius, 1798)	0	1	0	0	0	0	0
Noctuidae	<i>Catocala abbreviatella</i> Grote, 1872	0	0	1	0	0	0	0
	<i>Catocala ultronia</i> (Hübner, 1823)	0	0	0	1	0	0	0
	<i>Schinia chrysellata</i> (Grote, 1874)	0	0	0	0	0	1	0
	<i>Schinia lynx</i> (Guenée, 1852)	0	0	0	0	0	2	0
Notodontidae	<i>Dasylophia anguina</i> (J.E. Smith, 1797)	0	4	0	0	0	1	0
	<i>Datana perspicua</i> Grote & Robinson, 1865	0	0	0	0	0	14	0
	<i>Nadata gibbosa</i> (J.E. Smith, 1797)	0	0	0	0	1	0	0
	TOTALS	0	27	180	10	22	25	18

Trap E-3 East Cache Cr. N 34 38' 36.1" W 98 21' 37.4"

		March	April	May	June	July	August	September	
Sphingidae	<i>Amphion floridensis</i> Clark, 1920	0	0	0	0	1	0	0	
	<i>Ceratomia undulosa</i> (Walker, 1856)	0	0	0	0	1	1	0	
	<i>Deidamia inscriptum</i> (Harris, 1839)	5	0	0	0	0	0	0	
	<i>Hemaris diffinis</i> (Boisduval, 1836)	0	0	0	0	1	1	0	
	<i>Hyles lineata</i> (Fabricius, 1775)	0	0	0	0	1	0	0	
	<i>Amorpha juglandis</i> (J.E. Smith, 1797)	0	1	0	1	0	0	0	
Saturniidae	<i>Actias luna</i> (Linnaeus, 1758)	1	1	0	0	0	0	0	
	<i>Automeris io</i> (Fabricius, 1775)	0	1	0	0	0	1	0	
	<i>Sphingicampa bicolor</i> (Harris, 1841)	0	0	0	0	0	1	0	
Arctiidae	<i>Apantesis phalerata</i> (Harris, 1841)	0	0	0	0	3	0	1	
	<i>Apantesis vittata</i> (Fabricius, 1787)	0	3	0	0	0	0	0	
	<i>Cisthene tenuifascia</i> Harvey, 1875	0	0	0	0	7	0	0	
	<i>Estigmene acrea</i> (Drury, 1773)	0	1	0	0	0	0	0	
	<i>Grammia oithona</i> (Strecker, 1878)	0	0	0	0	3	0	0	
	<i>Grammia parthenice</i> (Kirby, 1837)	0	0	0	0	0	0	11	
	<i>Haploa reversa</i> (Stretch, 1885)	0	0	1	0	0	0	0	
	<i>Hyphantria cunea</i> (Drury, 1773)	0	1	0	0	0	0	0	
	<i>Hypoprepia miniata</i> (Kirby, 1837)	0	0	0	36	0	0	12	
	<i>Spilosoma congrua</i> (Walker, 1855)	0	3	0	0	0	0	0	
	<i>Spilosoma virginica</i> (Fabricius, 1798)	0	0	0	0	0	1	0	
	Noctuidae	<i>Catocala illecta</i> Walker, 1858	0	0	1	0	0	0	0
		<i>Catocala maestosus</i> Hulst, 1884	0	0	0	1	0	0	0
<i>Catocala micronympha</i> Guenée, 1852		0	0	1	0	0	0	0	
<i>Catocala minuta</i> Edwards, 1864		0	0	1	0	0	0	0	
<i>Catocala piatrix</i> Grote, 1864		0	0	0	0	0	0	2	
Notodontidae	<i>Clostera apicalis</i> (Walker, 1855)	1	0	0	0	0	0	0	
	<i>Datana angusii</i> Grote & Robinson, 1866	0	0	5	0	0	0	0	
	<i>Gluphisia lintneri</i> (Grote, 1877)	0	1	0	0	2	0	0	
	<i>Gluphisia septentrionis</i> Walker, 1855	2	1	0	0	1	0	0	
	<i>Heterocampa guttivitta</i> (Walker, 1855)	0	2	0	0	0	0	0	
<i>Heterocampa umbrata</i> Walker, 1855	0	0	3	1	0	0	0		

<i>Hippia packardii</i> (Morrison, 1875)	0	2	0	0	0	0	2
<i>Hyperaeschra tortuosa</i> Tepper, 1881	0	3	1	0	0	0	0
<i>Litodonta hydromeli</i> Harvey, 1876	0	0	0	1	0	0	0
<i>Lochmaeus bilineata</i> (Packard, 1864)	0	1	0	2	0	0	0
<i>Nadata gibbosa</i> (Smith, 1797)	1	1	3	5	0	3	0
<i>Nerice bidentata</i> Walker, 1855	0	2	1	2	0	0	0
<i>Peridea basitriens</i> (Walker, 1855)	0	2	0	0	0	0	0
<i>Schizura leptinoides</i> (Grote, 1864)	0	2	0	1	0	0	0
TOTALS	10	28	17	50	20	8	28

Trap M-1 Natural Res Bldg N 34 41' 6.4" W 98 24' 23.2"

		March	April	May	June	July	August	September
Spingidae	<i>Eumorpha achemon</i> (Drury, 1773)	0	0	0	0	1	0	0
Saturniidae	<i>Antheraea polyphemus</i> (Cramer, 1776)	0	0	0	0	0	1	0
Arctiidae	<i>Apantesis phalerata</i> (Harris, 1841)	0	0	0	0	13	0	0
	<i>Cisseps fulvicollis</i> (Hübner, 1818)	0	0	0	0	1	0	0
	<i>Cisthene tenuifascia</i> Harvey, 1875	0	0	1	0	1	0	0
	<i>Euerythra phasma</i> Harvey, 1876	2	2	0	1	0	1	0
	<i>Grammia arge</i> (Drury, 1773)	0	0	0	0	2	0	1
	<i>Grammia figurata</i> (Drury, 1773)	0	0	0	1	0	0	0
	<i>Grammia parthenice</i> (Kirby, 1837)	0	0	0	0	0	0	3
	<i>Holomelina aurantiaca</i> (Hübner, 1831)	0	0	0	2	0	0	0
	<i>Hyphantria cunea</i> (Drury, 1773)	0	0	1	1	0	0	0
	<i>Hypoprepia miniata</i> (Kirby, 1837)	0	0	114	26	14	17	3
Noctuidae	<i>Spilosoma dubia</i> (Walker, 1855)	0	2	0	0	0	0	0
	<i>Catocala abbreviatella</i> Grote, 1872	0	0	2	0	0	0	0
	<i>Catocala amestris</i> Strecker, 1874	0	0	0	1	0	0	0
	<i>Catocala amica</i> (Hübner, 1818)	0	0	0	1	0	0	0

	<i>Catocala coccinata</i> Grote, 1872	0	0	1	0	0	0	0
	<i>Catocala innubens</i> Guenée, 1852	0	0	0	1	1	0	0
	<i>Catocala muliercula</i> Guenée, 1852	0	0	0	1	0	0	0
	<i>Catocala nuptialis</i> Walker, 1858	0	0	0	1	0	0	0
	<i>Catocala ultronia</i> (Hübner, 1823)	0	0	1	3	0	0	0
	<i>Schinia gracilentata</i> Hübner, 1818	0	0	0	0	0	1	0
	<i>Schinia jaguarina</i> (Guenée, 1852)	0	0	1	0	0	0	0
Notodontidae	<i>Datana angusii</i> Grote & Robinson, 1866	0	0	1	0	0	0	0
	<i>Gluphisia lintneri</i> (Grote, 1877)	0	0	0	1	0	0	0
	<i>Gluphisia septentrionis</i> Walker, 1855	0	0	1	0	0	0	0
	<i>Heterocampa guttivitta</i> (Walker, 1855)	0	2	0	0	0	0	0
	<i>Heterocampa subrotata</i> Harvey, 1874	0	0	0	1	0	1	0
	<i>Heterocampa umbrata</i> Walker, 1855	0	0	11	0	1	6	0
	<i>Hippia packardii</i> (Morrison, 1875)	0	0	0	2	0	1	0
	<i>Hyperaeschra tortuosa</i> Tepper, 1881	1	0	9	0	0	1	0
	<i>Litodonta hydromeli</i> Harvey, 1876	0	0	0	0	0	1	0
	<i>Lochmaeus bilineata</i> (Packard, 1864)	0	0	1	6	0	1	0
	<i>Nadata gibbosa</i> (J.E. Smith, 1797)	3	0	0	3	0	6	0
	<i>Nerice bidentata</i> Walker, 1855	7	0	5	1	0	0	0
	<i>Oligocentria lignicolor</i> (Walker, 1855)	0	0	0	0	0	1	0
	<i>Peridea basitriens</i> (Walker, 1855)	0	0	2	0	0	3	0
							9	11
	TOTALS	13	6	151	53	34	50	18

Trap M-2 Medicine Bluff N 34 41' 13.1" W 98 24' 55.6"

		March	April	May	June	July	August	September
Sphingidae	<i>Ceratomia amyntor</i> (Geyer, 1835)	0	0	0	0	0	1	0
	<i>Deidamia inscriptum</i> (Harris, 1839)	2	0	0	0	0	0	0
	<i>Hemaris diffinis</i> (Boisduval, 1836)	0	0	2	0	0	0	0

	<i>Hyles lineata</i> (Fabricius, 1775)	2	0	0	0	2	0	0
	<i>Manduca quinquemaculata</i> (Haworth, 1803)	0	1	0	0	0	0	0
	<i>Smerinthus jamaicensis</i> (Drury, 1773)	0	1	0	0	0	0	0
Saturniidae	<i>Actias luna</i> (Linnaeus, 1758)	0	1	0	0	0	0	0
Arctiidae	<i>Apantesis phalerata</i> (Harris, 1841)	2	0	0	0	5	2	2
	<i>Cisthene tenuifascia</i> Harvey, 1875	0	0	0	0	2	0	2
	<i>Cisthene unifascia</i> Grote & Robinson, 1868	0	0	0	0	0	0	4
	<i>Cynia oregonensis</i> (Stretch, 1873)	0	1	0	0	0	0	0
	<i>Grammia arge</i> (Drury, 1773)	0	0	1	0	0	0	0
	<i>Grammia figurata</i> (Drury, 1773)	0	0	0	0	2	0	0
	<i>Grammia oithona</i> (Strecker, 1878)	0	1	0	0	4	0	0
	<i>Grammia parthenice</i> (Kirby, 1837)	0	0	0	0	0	0	10
	<i>Haploa reversa</i> (Stretch, 1885)	0	0	2	0	0	0	0
	<i>Holomelina aurantiaca</i> (Hübner, 1831)	0	1	0	15	2	0	0
	<i>Hypoprepia miniata</i> (Kirby, 1837)	0	0	0	0	31	22	5
Noctuiidae	<i>Catocala abbreviatella</i> Grote, 1872	0	0	3	0	0	0	0
	<i>Catocala amestris</i> Strecker, 1874	0	0	0	1	0	0	0
	<i>Catocala illecta</i> Walker, 1858	0	0	3	0	0	0	0
	<i>Catocala micronympha</i> , Guenée, 1852	0	0	1	0	0	0	0
	<i>Catocala minuta</i> Edwards, 1864	0	0	2	0	0	0	0
	<i>Catocala piatrix</i> Grote, 1864	0	0	0	0	1	0	0
	<i>Catocala ultronia</i> (Hübner, 1823)	0	0	2	0	0	0	0
	<i>Schinia alencis</i> (Harvey, 1875)	0	0	0	0	0	1	0
	<i>Schinia arcigera</i> (Guenée, 1852)	0	0	0	0	0	0	1
	<i>Schinia chrysellata</i> (Grote, 1874)	0	0	0	0	0	2	0
	<i>Schinia gracilentata</i> Hübner, 1818	0	0	0	0	0	1	0
	<i>Schinia mortua</i> (Grote, 1864)	0	0	0	0	0	1	0
	<i>Schinia voluptaria</i> (Fitch, 1868)	0	0	0	1	0	0	0
Notodontidae	<i>Gluphisia septentrionis</i> Walker, 1855	0	2	0	0	0	0	0
	<i>Heterocampa subrotata</i> Harvey, 1874	0	0	0	0	1	0	0
	<i>Hyperaeschra tortuosa</i> Tepper, 1881	0	0	0	0	0	1	0
	<i>Lochmaeus bilineata</i> (Packard, 1864)	0	0	0	0	0	1	0
	<i>Nadata gibbosa</i> (J.E. Smith, 1797)	0	0	1	0	0	0	0
	<i>Nerice bidentata</i> Walker, 1855	0	0	1	0	0	0	0
	<i>Schizura unicornis</i> (J.E. Smith, 1797)	0	0	0	0	1	0	0

Totals 6 8 18 17 50 32 24

Table XX

Trap W-1 Cottonwood Grove N 34 42' 23.3" W 98 25' 40.7"

		March	April	May	June	July	August	September
Sphingidae	<i>Ceratomia undulosa</i> (Walker, 1856)	0	0	0	0	0	3	0
	<i>Amorpha juglandis</i> (J.E. Smith, 1797)	0	0	1	0	0	0	0
Saturniidae	<i>Antheraea polyphemus</i> (Cramer, 1776)	0	0	0	0	0	1	0
Arctiidae	<i>Apantesis phalerata</i> (Harris, 1841)	0	22	0	0	3	6	0
	<i>Cisseps fulvicollis</i> (Hübner, 1818)	0	1	0	0	1	0	0
	<i>Cisthene tenuifascia</i> Harvey, 1875	0	0	3	0	0	1	2
	<i>Cisthene unifascia</i> Grote & Robinson, 1868	0	0	0	0	0	0	0
	<i>Cyrcia oregonensis</i> (Stretch, 1873)	0	1	1	0	0	0	0
	<i>Grammia arge</i> (Drury, 1773)	0	5	9	0	0	0	1
	<i>Grammia figurata</i> (Drury, 1773)	0	4	0	0	0	3	0
	<i>Grammia oithona</i> (Strecker, 1878)	0	5	0	0	3	0	0
	<i>Grammia parthenice</i> (Kirby, 1837)	0	0	0	0	0	0	31
	<i>Haploa reversa</i> (Stretch, 1885)	0	0	2	0	0	0	0
	<i>Hypoprepia miniata</i> (Kirby, 1837)	0	0	0	0	48	32	0
	Noctuidae	<i>Catocala amatrix</i> (Hübner, 1813)	0	0	0	0	0	1
<i>Catocala coccinata</i> Grote, 1872		0	0	1	0	0	0	0
<i>Schinia chrysellia</i> (Grote, 1874)		0	0	0	0	0	9	0
<i>Schinia gaurae</i> (J.E. Smith, 1797)		0	0	0	0	0	1	0
<i>Schinia mortua</i> (Grote, 1864)		0	0	0	0	0	23	0
<i>Schinia rivulosa</i> (Guenée, 1852)		0	0	0	0	0	1	0
<i>Schinia saturata</i> (Grote, 1874)		0	0	0	0	0	1	0
<i>Schinia trifascia</i> Hübner, 1818		0	0	0	0	0	1	0
Notodontidae	<i>Furcula cinerea</i> (Lintner, 1878)	0	0	0	0	0	4	0
	<i>Gluphisia lintneri</i> (Grote, 1877)	0	0	0	0	1	0	0
	<i>Gluphisia septentrionis</i> Walker, 1855	0	1	4	0	0	0	0

<i>Hyperaeschra tortuosa</i> Tepper, 1881	0	0	1	0	0	0	0
<i>Nadata gibbosa</i> (J.E. Smith, 1797)	0	0	1	0	0	0	0
Totals	0	39	23	0	56	87	34

Trap W-2 10 Mile Crossing N 34 42' 58.2" W 98 29' 9.7"

		March	April	May	June	July	August	September
Sphingidae	<i>Ceratomia catalpae</i> (Boisduval, 1875)	0	0	0	270	0	0	0
	<i>Ceratomia undulosa</i> (Walker, 1856)	0	0	0	2	0	1	0
	<i>Deidamia inscriptum</i> (Harris, 1839)	1	0	0	0	0	0	0
	<i>Amorpha juglandis</i> (J.E. Smith, 1797)	0	2	0	0	0	1	0
	<i>Paonias excaecata</i> (J.E. Smith, 1797)	0	0	1	0	0	0	0
	<i>Smerinthus jamaicensis</i> (Drury, 1773)	0	0	0	1	0	1	0
	<i>Sphecodina abbottii</i> (Swainson, 1821)	0	0	0	1	0	0	0
	Saturniidae	<i>Actias luna</i> (Linnaeus, 1758)	1	0	0	0	0	0
Arctiidae	<i>Apantesis phalerata</i> (Harris, 1841)	0	0	0	0	0	0	1
	<i>Apantesis vittata</i> (Fabricius, 1787)	0	4	0	2	0	0	2
	<i>Cisseps fulvicollis</i> (Hübner, 1818)	0	0	0	3	3	0	0
	<i>Cisthene tenuifascia</i> Harvey, 1875	0	0	3	0	8	0	4
	<i>Cycnia oregonensis</i> (Stretch, 1873)	0	1	0	0	0	0	0
	<i>Euerythra phasma</i> Harvey, 1876	0	7	0	3	1	0	0
	<i>Grammia arge</i> (Drury, 1773)	0	1	0	1	1	0	0
	<i>Grammia figurata</i> (Drury, 1773)	0	1	0	2	1	0	0
	<i>Grammia parthenice</i> (Kirby, 1837)	0	0	0	0	0	0	5
	<i>Haploa clymene</i> (Brown, 1776)	0	0	0	1	0	0	0
	<i>Haploa reversa</i> (Stretch, 1885)	0	0	3	0	0	0	0
	<i>Holomelina aurantiaca</i> (Hübner, 1831)	0	1	0	1	0	0	0
	<i>Holomelina costata</i> (Stretch, 1885)	0	0	0	0	0	0	1
	<i>Hyphantria cunea</i> (Drury, 1773)	0	0	0	0	0	2	0
	<i>Hypoprepia miniata</i> (Kirby, 1837)	0	0	206	23	49	28	1
<i>Spilosoma dubia</i> (Walker, 1855)	0	5	0	0	0	0	0	

Noctuidae	<i>Spilosoma virginica</i> (Fabricius, 1798)	0	1	0	2	0	3	0
	<i>Catocala amica</i> (Hübner, 1818)	0	0	0	0	3	0	0
	<i>Catocala ilia</i> (Cramer, 1776)	0	0	2	0	0	0	0
	<i>Catocala minuta</i> (Hy. Edwards, 1864)	0	0	1	0	0	0	0
	<i>Melaperphyria immortua</i> Grote, 1874	0	0	0	0	0	1	0
	<i>Schinia alencis</i> (Harvey, 1875)	0	0	0	0	0	1	0
	<i>Schinia chrysellata</i> (Grote, 1874)	0	0	0	0	0	1	0
	<i>Schinia citrinella</i> (Grote & Robinson, 1870)	0	0	0	0	1	0	0
	<i>Schinia gaurae</i> (J.E. Smith, 1797)	0	0	0	0	0	1	0
	<i>Schinia gracilentata</i> Hübner, 1818	0	0	0	0	0	3	0
	<i>Schinia mortua</i> (Grote, 1864)	0	0	0	0	0	0	0
	<i>Schinia rivulosa</i> (Guenée, 1852)	0	0	0	0	0	1	0
	<i>Schinia trifasciata</i> Hübner, 1818	0	0	0	0	0	1	0
Notodontidae	<i>Dasylophia anguina</i> (J.E. Smith, 1797)	0	1	0	0	0	0	0
	<i>Datana angusii</i> Grote & Robinson, 1866	0	0	0	0	0	2	0
	<i>Heterocampa guttivitta</i> (Walker, 1855)	0	6	0	0	0	1	0
	<i>Heterocampa umbrata</i> Walker, 1855	0	2	2	0	1	1	0
	<i>Hippia packardii</i> (Morrison, 1875)	0	7	0	0	0	1	0
	<i>Hyperaeschra tortuosa</i> Tepper, 1881	0	2	0	0	0	0	0
	<i>Lochmaeus bilineata</i> (Packard, 1864)	0	0	1	1	0	2	0
	<i>Nadata gibbosa</i> (J.E. Smith, 1797)	0	0	2	0	0	0	0
	<i>Nerice bidentata</i> Walker, 1855	0	0	0	0	0	1	0
	<i>Peridea basitriens</i> (Walker, 1855)	0	2	0	0	0	1	0
	<i>Schizura leptinoides</i> (Grote, 1864)	0	2	0	2	0	0	0
	<i>Schizura unicornis</i> (J.E. Smith, 1797)	0	2	0	0	0	0	0
	Total	2	47	221	315	68	54	14

Trap W-3

Lower LETRA N 34 43' 12.7" W 98 31' 49"

		March	April	May	June	July	August	September	
Sphingidae	<i>Manduca quinquemaculata</i> (Haworth, 1803)	0	0	1	0	0	0	0	
Arctiidae	<i>Apantesis phalerata</i> (Harris, 1841)	0	0	0	6	0	0	9	
	<i>Cisseps fulvicollis</i> (Hubner, 1818)	0	0	1	1	3	0	0	
	<i>Grammia arge</i> (Drury, 1773)	0	0	0	0	0	0	2	
	<i>Grammia oithona</i> (Strecker, 1878)	0	2	0	1	0	0	0	
	<i>Grammia parthenice</i> (Kirby, 1837)	0	0	0	0	0	0	24	
	<i>Haploa reversa</i> (Stretch, 1885)	0	0	2	0	0	0	0	
	<i>Hypoprepia miniata</i> (Kirby, 1837)	0	0	0	35	0	46	8	
	<i>Spilosoma virginica</i> (Fabricius, 1798)	0	1	0	0	1	1	0	
Noctuidae	<i>Catocala abbreviatella</i> Grote, 1872	0	0	2	0	0	0	0	
	<i>Catocala amestris</i> (Strecker, 1874)	0	0	0	2	0	0	0	
	<i>Catocala amica</i> (Hübner, 1818)	0	0	0	2	0	0	0	
	<i>Catocala coccinata</i> Grote, 1872	0	0	5	0	0	0	0	
	<i>Catocala ilia</i> (Cramer, 1776)	0	0	2	0	0	0	0	
	<i>Catocala micronympha</i> , Guenée, 1852	0	0	1	0	0	0	0	
	<i>Catocala similis</i> Hy. Edwards, 1864	0	0	1	0	0	0	0	
	<i>Schinia chrysellata</i> (Grote, 1874)	0	0	0	0	0	2	0	
	<i>Schinia gracilentata</i> Hübner, 1818	0	0	0	0	0	1	0	
	<i>Schinia jaguarina</i> (Guenée, 1852)	0	0	0	0	0	2	0	
	<i>Schinia snowi</i> (Grote, 1875)	0	0	2	0	0	0	0	
	<i>Schinia volupia</i> (Fitch, 1868)	0	0	0	4	0	0	0	
	Notodontidae	<i>Cerura candida</i> Lintner, 1878	0	0	0	0	0	1	0
		<i>Datana perspicua</i> Grote & Robinson, 1865	0	0	0	0	0	3	0
<i>Gluphisia septentrionis</i> Walker, 1855		0	0	1	0	0	0	0	
<i>Heterocampa umbrata</i> Walker, 1855		0	0	2	0	0	0	0	
<i>Hyparpax venus</i> Neumoegen, 1892		0	0	0	0	0	1	0	
<i>Hyperaeschra tortuosa</i> Tepper, 1881		1	0	0	0	0	0	0	
<i>Litodonta hydromeli</i> Harvey, 1876		0	0	0	4	0	0	0	
<i>Nadata gibbosa</i> (J.E. Smith, 1797)		0	0	1	0	0	1	0	

Total 1 3 21 55 4 58 43

Trap W-4 Upper LETRA N 34 43' 10.6" W 98 31' 56"

		March	April	May	June	July	August	September	
Sphingidae	<i>Deidamia inscriptum</i> (Harris, 1839)	1	0	0	0	0	0	0	
	<i>Hemaris diffinis</i> (Boisduval, 1836)	0	0	1	0	0	0	0	
	<i>Hyles lineata</i> (Fabricius, 1775)	0	0	3	3	0	0	0	
Saturniidae	<i>Automeris io</i> (Fabricius, 1775)	0	0	1	0	0	0	0	
Arctiidae	<i>Apantesis phalerata</i> (Harris, 1841)	0	0	0	4	0	0	1	
	<i>Cisseps fulvicollis</i> (Hübner, 1818)	0	1	0	1	3	0	0	
	<i>Cisthene tenuifascia</i> (Harvey, 1875)	0	0	2	0	2	0	0	
	<i>Cisthene unifascia</i> Grote & Robinson, 1868	0	0	0	0	0	0	6	
	<i>Grammia arge</i> (Drury, 1773)	0	0	1	0	0	0	1	
	<i>Grammia figurata</i> (Drury, 1773)	0	0	1	2	0	0	1	
	<i>Grammia oithona</i> (Strecker, 1878)	0	0	0	0	1	1	0	
	<i>Grammia parthenice</i> (Kirby, 1837)	0	0	0	0	0	0	40	
	<i>Haploa reversa</i> (Stretch, 1885)	0	0	1	0	0	0	0	
	<i>Holomelina aurantiaca</i> (Hübner, 1831)	0	0	0	1	0	0	0	
	<i>Hypoprepia miniata</i> (Kirby, 1837)	0	0	255	48	76	43	15	
	Noctuidae	<i>Catocala abbreviatella</i> Grote, 1872	0	0	1	0	0	0	0
		<i>Catocala amica</i> (Hübner, 1818)	0	0	0	2	0	0	0
<i>Catocala coccinata</i> Grote, 1872		0	0	6	0	0	0	0	
<i>Catocala delilah</i> Strecker, 1874		0	0	1	1	0	0	0	
<i>Catocala herodias</i> Strecker, 1876		0	0	1	0	0	0	0	
<i>Catocala ilia</i> (Cramer, 1776)		0	0	2	2	0	0	0	
<i>Catocala micronympha</i> , Guenée, 1852		0	0	1	0	0	0	0	
<i>Catocala piatrix</i> Grote, 1864		0	0	0	0	0	1	0	
<i>Catocala similis</i> Hy. Edwards, 1864		0	0	1	0	0	0	0	
<i>Schinia chrysellata</i> Grote, 1874		0	0	0	0	0	3	0	
<i>Schinia gaurae</i> (J.E. Smith, 1797)	0	0	0	0	2	0	0		

	<i>Schinia jaguarina</i> (Guenée, 1852)	0	0	5	1	2	0	0
	<i>Schinia mortua</i> (Grote, 1864)	0	0	0	0	0	1	0
	<i>Schinia obscurata</i> Strecker, 1898	0	0	1	0	0	0	0
	<i>Schinia rivulosa</i> (Guenée, 1852)	0	0	0	0	0	1	0
	<i>Schinia saturata</i> (Grote, 1874)	0	0	0	0	0	1	0
	<i>Schinia volupia</i> (Fitch, 1868)	0	0	0	7	0	0	0
Notodontidae	<i>Cerura candida</i> Lintner, 1878	0	0	0	0	1	0	0
	<i>Heterocampa obliqua</i> Packard, 1864	0	0	1	0	1	0	0
	<i>Heterocampa umbrata</i> Walker, 1855	0	0	4	1	0	3	0
	<i>Hyparpax venus</i> Neumoegen, 1892	0	1	0	1	1	3	0
	<i>Hyperaeschra tortuosa</i> Tepper, 1881	1	0	1	0	2	4	0
	<i>Litodonta hydromeli</i> Harvey 1876	0	0	0	2	1	1	0
	<i>Lochmaeus bilineata</i> Packard, 1864	0	1	0	0	2	0	0
	<i>Nadata gibbosa</i> (J.E. Smith, 1797)	0	0	1	3	0	6	0
	<i>Peridea basitriens</i> (Walker, 1855)	0	6	0	0	0	2	0
	Total	2	9	291	79	94	70	64

Trap W-5 Ketch Lake N 34 42' 38.4" W 98 35' 28.9"

		March	April	May	June	July	August	September
Sphingidae	<i>Ceratomia undulosa</i> (Walker, 1856)	0	4	0	0	0	1	0
	<i>Darapsa myron</i> (Cramer, 1780)	0	1	0	0	1	1	0
	<i>Hemaris diffinis</i> (Boisduval, 1836)	0	0	0	0	0	1	0
	<i>Hyles lineata</i> (Fabricius, 1775)	0	0	0	0	0	2	2
Arctiidae	<i>Apantesis nais</i> (Drury, 1773)	0	0	0	1	0	0	0
	<i>Apantesis phalerata</i> (Harris, 1841)	0	4	0	4	0	0	4
	<i>Apantesis vittata</i> (Fabricius, 1787)	0	0	0	0	1	0	0
	<i>Cisseps fulvicollis</i> (Hübner, 1818)	0	0	0	1	0	0	0
	<i>Cisthene tenuifascia</i> Harvey, 1875	0	0	0	0	4	0	0
	<i>Grammia arge</i> (Drury, 1773)	0	2	0	0	0	1	1

	<i>Grammia parthenice</i> (Kirby, 1837)	0	0	0	0	0	0	20
	<i>Haploa reversa</i> (Stretch, 1885)	0	0	3	0	0	0	0
	<i>Holomelina aurantiaca</i> (Hübner, 1831)	0	0	0	0	1	0	0
	<i>Hypoprepia miniata</i> (Kirby, 1837)	0	0	168	23	12	8	3
	<i>Spilosoma virginica</i> (Fabricius, 1798)	0	1	0	0	0	0	0
Noctuidae	<i>Catocala abbreviatella</i> (Grote, 1872)	0	0	1	0	0	0	0
	<i>Catocala amatrix</i> (Hübner, 1813)	0	0	0	0	0	1	0
	<i>Catocala amestris</i> (Strecker, 1874)	0	0	2	0	0	0	0
	<i>Catocala coccinata</i> Grote, 1872	0	0	1	0	0	0	0
	<i>Catocala ilia</i> (Cramer, 1776)	0	0	2	0	0	0	0
	<i>Catocala piatrix</i> Grote, 1864	0	0	0	1	0	2	0
	<i>Catocala ultronia</i> (Hübner, 1823)	0	0	1	0	0	0	0
	<i>Schinia cupes</i> (Grote, 1875)	0	1	0	0	0	0	0
	<i>Schinia jaguarina</i> (Guenée, 1852)	0	0	0	0	1	1	0
	<i>Schinia volupia</i> (Fitch, 1868)	0	0	0	2	0	0	0
Notodontidae	<i>Heterocampa obliqua</i> Packard, 1864	0	1	0	0	0	0	0
	<i>Heterocampa umbrata</i> Walker, 1855	0	0	1	0	0	0	0
	<i>Lochmaeus bilineata</i> (Packard, 1864)	0	1	0	0	0	0	0
	<i>Schizura leptinoides</i> (Grote, 1864)	0	3	1	0	0	0	0
	<i>Litodonta hydromeli</i> Harvey, 1876	0	0	0	2	0	0	0
	Total	0	18	180	34	20	18	30

Appendix 6. Additional records of Ground Beetles (Carabidae), Tiger Beetles (Cicindelidae), and Longhorned Beetles (Cerambycidae) for Fort Sill, Oklahoma.

Family	Scientific Name	Author	
Carabidae	<i>Amara impuncticollis</i>	(Say)	
	Hab_Afil		No_Spec
	ER		1
	<i>Brachinus elongatulus</i>	(Chaudoir)	
	Hab_Afil		No_Spec
	ER, E. Cache Creek-S. Boundry Rd.		1
	<i>Morion monilicornis</i>	(Latreille)	
	Hab_Afil		No_Spec
	ER		1
	<i>Omophron nitidum</i>	LeConte	
	Hab_Afil		No_Spec
	ER, E. Cache Creek-S. Boundry Rd.		1
	ER, Lake George		1
	QR, W. Cache Creek-Falcon Gate Rd.		1
	<i>Scarites quadriceps</i>	Chaudoir	
Hab_Afil		No_Spec	
ER, E. Cache Creek-S. Boundry Rd.		1	
QR, Pottawatomie Pond		1	
<i>Stenocrepis cupreus</i>	(Chaudoir)		
Hab_Afil		No_Spec	
WR		1	
Cerambycidae	<i>Aneflomorpha sp.</i>		
	Hab_Afil		No_Spec
	ER		1
	WR		1
	<i>Anelaphus villosus</i>	(Fabricius)	
	Hab_Afil		No_Spec
	ER, E. Cache Creek-S. Boundry Rd.		6
ER, NRB		3	
QR, W. Cache Creek-Falcon Gate Rd.		2	

Family	Scientific Name	Author	
	WR, 10mi Crossing		1
	WR, Ketch Lake		10
	<i>Anelphus moestus moestus</i>	(LeConte)	
	Hab_Afil		No_Spec
	ER, NRB		2
	WR		3
	<i>Ataxia crypta</i>	(Say)	
	Hab_Afil		No_Spec
	ER		3
	ER, E. Cache Creek-S. Boundry Rd.		1
	WR		1
	<i>Distenia undatus</i>	(Fabricius)	
	Hab_Afil		No_Spec
	ER, E. Cache Creek-S. Boundry Rd.		1
	<i>Elaphidion mucronatus</i>	(Say)	
	Hab_Afil		No_Spec
	ER, Lake George		1
	<i>Enaphalodes atomarius</i>	(Drury)	
	Hab_Afil		No_Spec
	ER, NRB		2
	<i>Enaphalodes rufulum</i>	(Haldeman)	
	Hab_Afil		No_Spec
	QR, Rock Creek-Falcon Gate Rd.		1
	QR, Rock Creek-Falcon Gate Rd.		1
	<i>Megacyllene decora</i>	(Olivier)	
	Hab_Afil		No_Spec
	ER, S. Boundry Road-at eastern most corner of base		1
	<i>Moneilema armatum</i>	LeConte	
	Hab_Afil		No_Spec
	ER, E. Cache Creek-S. Boundry Rd.		1
	ER, Parks Hill		1
	QR, W. Cache Creek-Falcon Gate Rd.		1

Family	Scientific Name	Author	
	<i>Oberea tripunctata</i>	(Swederus)	
	Hab_Afil		No_Spec
	ER, Clear Lake		1
	<i>Obrium maculatum</i>	(Olivier)	
	Hab_Afil		No_Spec
	WR, Blue Beaver Cr. @ McKenzie Hill Rd.		1
	<i>Phymatodes varius</i>	(Fabricius)	
	Hab_Afil		No_Spec
	QR, W. Cache Creek-Falcon Gate Rd.		1
	<i>Plinthocoelium suaveolens</i>	(Linnaeus)	
	Hab_Afil		No_Spec
	WR, Punch Bowl Rd. E. LETRA Rd.		1
	<i>Stenocorus cinnamoptera</i>	(Randall)	
	Hab_Afil		No_Spec
	ER, E. Cache Creek-S. Boundry Rd.		24
	ER, NRB		2
	WR, 10mi Crossing		12
	WR, Ketch Lake		7
	<i>Tessaropa tenuipes</i>	(Haldeman)	
	Hab_Afil		No_Spec
	ER, E. Cache Creek-S. Boundry Rd.		1
	<i>Xylotrechus colonus</i>	(Fabricius)	
	Hab_Afil		No_Spec
	ER, Parks Hill		1
	WR		1
Cicindelidae			
	<i>Cicindela cuprascens</i>	LeConte	
	Hab_Afil		No_Spec
	QR, Pottawatomie Pond		1
	<i>Cicindela obsoleta vulturina</i>	LeConte	
	Hab_Afil		No_Spec
	QR, ponds .5mi E. Falcon Gate		35
	QR, ponds .5mi E. Falcon Gate		35

Family	Scientific Name	Author	
	QR, Pottawatomie Pond		4
	QR, W. Cache Creek-Falcon Gate Rd.		5
	WR, Blue Beaver Cr. @ McKenzie Hill Rd.		1
	WR, LETRA		1
	WR, Punchbowl Rd. 2mi W. LETRA		4
	<i>Cicindela ocellata</i>	Chaudoir	
	<i>rectilatera</i>		
	Hab_Afil		No_Spec
	QR, Pottawatomie Pond		3
	QR, Pottawatomie Pond		10
	<i>Cicindela rufiventris</i>	LeConte	
	<i>cumatilis</i>		
	Hab_Afil		No_Spec
	WR, Punchbowl Rd. 2mi. E. LETRA		1
	<i>Cicindela tenuisignata</i>	LeConte	
	Hab_Afil		No_Spec
	QR, Pottawatomie Pond		4
	QR, Pottawatomie Pond		1

