Mayfly fauna of New Mexico

W. P. McCafferty
*Purdue University, West Lafayette, Indiana*

C. R. Lugo-Ortiz
*Purdue University, West Lafayette, Indiana*

G. Z. Jacobi
*New Mexico Highlands University, Las Vegas, New Mexico*

Follow this and additional works at: [https://scholarsarchive.byu.edu/gbn](https://scholarsarchive.byu.edu/gbn)

**Recommended Citation**
Available at: [https://scholarsarchive.byu.edu/gbn/vol57/iss4/1](https://scholarsarchive.byu.edu/gbn/vol57/iss4/1)

This Article is brought to you for free and open access by the Western North American Naturalist Publications at BYU ScholarsArchive. It has been accepted for inclusion in Great Basin Naturalist by an authorized editor of BYU ScholarsArchive. For more information, please contact scholarsarchive@byu.edu, ellen_amatangelo@byu.edu.
MAYFLY FAUNA OF NEW MEXICO

W.P. McCafferty1, C.R. Lugo-Ortiz1, and G.Z. Jacobi2

ABSTRACT.—An inventory and analysis of the mayfly (Insecta, Ephemeroptera) fauna of New Mexico, based on the published literature and study of extensive materials from diverse collections, indicate the presence of 12 families, 37 genera, and 81 species. Of these species, 25 represent new state records: Acentrella turbida, Ameletus falsus, A. sparsatus, Baetis adonis, B. bicaudatus, B. flavistriga, Baetodes deficiens, Caenis latipennis, Callibaetis fluctuans, Cinygmula par, Ephemerella simulans, Hexagenia bilineata, Isomachia sico, Labiobasis propinquus, Lachlania saskatchewanensis, Leptophlebia bradleyi, Leucrocuta petesi, Neochoroterpes nanita, Paraleptophlebia debils, P. heteronea, Procloeon conturbatum, Rhithrogena plena, R. robusta, R. vitta, and Thraulodes gonzalesi. Baetodes deficiens represents a new USA record. For 37 of the 56 previously reported and confirmed species, 124 new county records are provided. With respect to continental affinities, 4 species are western, 27 southwestern, 13 widespread, 1 is a southern USA species, and 1 eastern. For the major drainage systems in the state, the Gila system is the most species rich with 48 species, followed by the Rio Grande (46), Pecos (38), Canadian (28), and San Juan (25). Relationships between drainage systems and between New Mexico and broadly adjoining states are discussed. Lachlania denqueenae, the only endemic species in New Mexico, occurs in the Gila system and is rare and endangered. Certain other species from the Gila system also are noted as being at risk. From other drainages, B. adonis, Ephemerella mollitia, and L. petesi also are of some concern at the national level. Additional species that are rare in New Mexico and are of concern at least at the state level include Ametopus albrighti, C. fluctuans, H. bilineata, L. breddlei, N. nanita, P. conturbatum, and R. hugeni.

Key words: Ephemeroptera, New Mexico, species inventory.


1Department of Entomology, Purdue University, West Lafayette, IN 47907.
2Environmental Science and Management, New Mexico Highlands University, Las Vegas, NM 87701.

283
Durfee and Kondratieff 1995, Lugo-Ortiz and McCafferty 1995c, Zloty 1996). Based on reports of these workers, 56 species of mayflies have been known from New Mexico prior to this study.

Six species of mayflies were described originally from New Mexico and thus have their type localities within the state. These species are *Ametropus albrighti* Traver, *Cloeodes macroplanellus* Waltz and McCafferty, *Homoeoneuria aleni* Pescador and Peters, *Lachlania den-cyanae* Koss, *Rhithrogena undulata* (Banks), and *Thraulodes brunneus* Koss. Only *L. den-cyanae* has proven to be endemic to New Mexico.

Our interests in the New Mexico mayfly fauna first developed in the mid-1960s when one of us (WPM) became involved in extensive collecting excursions across the state with Arwin Provonsha and Dick Koss. All of the material from those trips eventually came into the possession of WPM and Purdue University in the 1970s. Those collections and another collection made by WPM, Arwin Provonsha, and Dan Bloodgood in the early 1980s have contributed significantly to previous published revisionary studies of mayflies as well as the present study. In the late 1970s another of us (GZJ) became involved with the New Mexico Environment Department and later joined the faculty of New Mexico Highlands University. GZJ, his students, and colleagues have sampled mayflies in New Mexico for several years, often in association with various ecological studies. Another of us (CRL) developed extensive expertise on the systematics of southwestern mayflies while conducting research on the mayflies of Mesoamerica, and his familiarity with the Mexican fauna has been invaluable in the assessment of New Mexico.

The aforementioned collections of mayflies along with materials loaned or donated to us from Brigham Young University, Colorado State University, and the University of Utah have provided a large body of material upon which we have based much of the present study. We also review all published data relevant to the New Mexico mayfly fauna, provide extensive new site records for those species previously known from New Mexico, and provide new state records for an additional 25 species. We offer commentary on drainage distribution of each of the New Mexico species and synthesize all specific data and analyze the fauna as a whole with respect to faunal elements within it. Importantly, our data have served as the bases for evaluating a number of New Mexico species that can now be seen to be at environmental risk either within the state or nationally. A fine account of the history of New Mexico's hydrologic setting, beginning with the influences of the 12th-century pueblo-dwelling Native Americans, can be found in The Fishes of New Mexico by Sublette et al. (1990).

**Study Area**

New Mexico (Fig. 1) is the 5th largest state in the USA, covering some 195,685 km². It possesses a diverse geologic and topographic landscape, with elevations ranging from slightly less than 1050 m at Red Bluff Reservoir in the southeastern part of the state, where the Pecos River enters Texas, to over 4550 m at Wheeler Peak in the Sangre de Cristo Mountains, approximately 50 km south of the Colorado border. Although New Mexico is the 3rd most arid state in the USA, it does receive 108,176 hectare meters of water annually either as precipitation or inflow (Harris 1984). There is significant precipitation in some higher elevations, while lower elevations are typical of deserts (see Eisenhood 1979). For example, the eastern slopes of the Sangre de Cristo Mountains and Jemez Mountains in the north central part of the state receive over 150 cm of precipitation per year, mainly as snow; Mount Taylor in the western sector, the Mogollon Mountains in the southwestern sector, and the Sacramento Mountains in the south central sector of the state receive 80–120 cm of precipitation; and southern valleys such as the Rio Grande and Tularosa receive 40 cm or less.

Five major and 3 minor drainage systems in the southwestern USA have headwaters or near-headwater flow in New Mexico. An in-depth treatment of these systems has been given by Sublette et al. (1990); however, the following brief discussion will serve the immediate purposes of this study.

The Canadian River drainage system headwaters are in the northern Sangre de Cristo Mountains. The Canadian River flows eastward through the Canadian Escarpment from the Las Vegas and Raton plateaus into the northern panhandle of Texas. In the same area of New Mexico but north of the Canadian, the Dry Cimarron River (not to be confused with
the Cimarron River in Colfax County, which is a tributary of the Canadian River within New Mexico, flows eastward off the Trinidad Escarpment and the north slope of Capulin Mountain (mainly the northern tier of Union County). These 2 river drainage systems are part of the larger Arkansas River drainage system, a major south central tributary of the Mississippi River drainage system.

Headwater streams of the Pecos River drainage originate from the southern Sangre de Cristo Mountains. The Pecos River flows southward for about 640 km through the Pecos Plains of New Mexico into west Texas, exiting New Mexico in Eddy County, and ending with its confluence with the Rio Grande at the Texas-Mexico border.

The Rio Grande, the 5th largest river in the USA, has its headwaters in south central Colorado. It flows almost directly south for over 720 km through New Mexico. The Rio Chama in Rio Arriba County is a major tributary of...
the Rio Grande drainage system in northern New Mexico.

Two rivers in northwestern New Mexico are part of the middle Colorado River drainage system. The 640-km-long San Juan River, with headwaters in southern Colorado, flows for about 190 km in New Mexico (mainly San Juan County) to the four corners area of Utah, Colorado, New Mexico, and Arizona, and then through extreme southeastern Utah to Lake Powell and the Colorado River. The small Zuni River, which originates in the Zuni Mountains in New Mexico south of the San Juan River, flows mainly in southern McKinley County west to the Little Colorado River in northern Arizona.

Two main rivers in southwestern New Mexico are part of the lower Colorado River drainage system. The San Francisco River drainage system originates in eastern Arizona, but a major portion of it flows in southwestern New Mexico (Catron County) before returning to Arizona, where it joins the Gila River. Headwaters of the Gila River drainage system are located near Mogollon Baldy, a peak over 3500 m high in the Mogollon Mountains. The Gila River flows for about 160 km (mainly in Grant County) to the Arizona border and continues through southern Arizona until it joins the Colorado River in the extreme southwestern corner of Arizona. The Mimbres River is also in southwestern New Mexico (Grant and Luna counties) but is internally drained.

Four physiographic divisions (provinces and plateaus) are found in New Mexico (see Snead 1979). The Canadian, Cimarron, Dry Cimarron, and Pecos rivers are found in the Great Plains Province. These rivers have dissected lava-capped plateaus and buttes and have their lower courses on broad, alluvial plains. The lower two-thirds of the Rio Grande is in the Mexican Highlands section of the Basin and Range Plateau, where upper tributaries are in isolated block-faulted mountains separated by broad plains. The upper one-third of the Rio Grande is in the Rocky Mountain Province. There, tributary streams in the Jemez and south Sangre de Cristo Mountains are separated by lava plateaus and alluvial plains. The San Juan, Zuni, San Francisco, and Gila rivers are part of the Intermontane Plateau, where landforms consist of canyon and plateaus of sedimentary or igneous rock.

Methods and Presentation

Extensive collections of New Mexico mayflies were examined and material was identified to species whenever possible. Collections are noted in the data section with the following acronyms: BYU (Brigham Young University Collection, Provo, Utah), CSU (Colorado State University Collection, Fort Collins, Colorado), NMHU (New Mexico Highlands University Collection, Las Vegas, New Mexico), and PERC (Purdue Entomological Research Collection, West Lafayette, Indiana).

In the Species Accounts section of this work, species are presented alphabetically by family, genus, and species. Species that are newly reported for New Mexico are indicated with an asterisk. For each species, numerous data are given. First, useful descriptions of adults and larval stages of the species are referenced under the heading Descriptions. Such data are important because keys for the species are generally not available and such descriptions are part of the basis for species identification. In most cases the original description is noted and if a subsequent, more comprehensive and useful description is available, it is referenced also, as are published keys when pertinent. Historical names used in such works, if different from the current name, are also indicated so that descriptive data can be easily tracked.

If the species is newly reported for New Mexico, the complete locale data upon which the record is based are given under the heading New Records. The collection source acronym is always indicated first and if more than one collection is involved, data are presented alphabetically by collection source. If the species was a previously reported species, then the previous distributional data are given in short form under the heading Previous Records by noting only the county and body of water name and the bibliographic reference. If we have discovered additional county records, then these are given again in the same short form described above along with an indication of the collection source under the heading New County Records. Because these data are often extensive, the short form of new county records is used to conserve space. However, if the reader is interested in the entire locale information, it can be accessed from curators of the various collections indicated.
All species have a Remarks section associated with them. This generally includes a review of the overall distribution of the species, with particular attention to states surrounding New Mexico. Distribution of the species within New Mexico is also noted with respect to the drainage systems involved. Counties and drainage systems may be located using Figure 1. Other pertinent taxonomic or environmental information may also be included in the remarks.

The Faunistics section contains an analysis of the fauna in terms of its broad affinities, and inter- and intrastate relationships. Species of special note because of their rarity and environmental susceptibility are also noted here.

**Species Accounts**

**Ameletidae**

**Ameletus doddsianus**  
Zloty, 1996


**Previous Records.**—Zloty (1996): Taos Co.

**New County Records.**—CSU: Sierra Co (N fork Palomas Cr). NMHU: Santa Fe Co (Rio en Medio). PERC: Grant Co (Cherry Cr).

**Remarks.**—Zloty (1996) provided no details of his report of this species in Taos County, New Mexico; however, one of us (GZJ) has collected material of this species from the same county at a Rio Hondo (Lake Fork) beaver pond. Zloty also reported the species from Arizona, Colorado, and Utah. Certain specimens reported as *A. subnotatus* in Colorado by McCafferty et al. (1993) belong to this recently described species, and the historical confusion of what is now *A. doddsianus* and *A. subnotatus* was discussed by Zloty (1996). The occurrence of this species in New Mexico in the Gila River and upper Rio Grande drainage systems represents the southernmost part of its known range.

**Ameletus falsus**  
McDunnough, 1931

**Descriptions.**—Adult: McDunnough (1938a); see also Zloty (1996). Larva: McDunnough (1938).  


**Remarks.**—This western species was reported from Alberta, British Columbia, Colorado, Idaho, and Montana by Zloty (1996). Lugo-Ortiz and McCafferty (1990) reported it from Arizona. Records of *A. aequispina* McDunnough in Colorado (McCafferty et al. 1993) are also applicable to this species. In New Mexico, *A. sparsatus* has been taken only from the far southeastern part of the state in the lower Pecos River drainage system.

**Ametropodidae**

**Ametropus albrighti**  
Traver, 1935


**Previous Records.**—Traver (1935): San Juan Co (San Juan R).

**Remarks.**—This psammophilous species was originally described from near Farmington, New Mexico, by Traver (1935). Since then it has been reported only from the Green River in southwestern Wyoming and northeastern Utah (Edmunds and Musser 1966) and the Yampa River in northeastern Colorado (Allen...
and Edmunds 1976), both of which are part of the upper Colorado River drainage system. In New Mexico it is known from the San Juan River drainage system in the extreme northwestern corner of the state, which is associated with the middle Colorado River drainage system. It remains to be seen if the species still exists in New Mexico.

Baetidae

*Acentrella insignificans* (McDunnough), 1926

**DESCRIPTIONS.**—Adult: McDunnough (1926) as *Baetis insignificans* McDunnough. Larva: Morihara and McCafferty (1979a) as *B. insignificans*.

**PREVIOUS RECORDS.**—Morihara and McCafferty (1979a) as *Baetis insignificans*: Grant Co (Gila R); Mora Co (Mora R); San Juan Co (San Juan R). Durfee and Kondratieff (1995): Catron Co (Taylor Cr).

**NEW COUNTY RECORDS.**—CSU: Dona Ana Co (Radium Springs). NMHU: Colfax Co (Cieneguilla Cr); Lincoln Co (Rio Ruidoso); San Miguel Co (Pecos R); Rio Arriba Co (Rio Chama); Sierra Co (Rio Grande). PERC: Catron Co (Cottonwood Cr, Gila R, Taylor Cr); Tularosa R, San Francisco R); San Miguel Co (Pecos R, Sapello R).

**REMARKS.**—This relatively common western species is known from all Mexican and USA states adjoining New Mexico, excluding Oklahoma (see McCafferty et al. 1993, Lugo-Ortiz and McCafferty 1995a, 1995b, McCafferty et al. 1997); however, it has not been taken in Mexico. In New Mexico, *A. turbida* has been found in the northern areas of both the Rio Grande and Pecos River drainage systems.

• *Baetis adonis*
  Traver, 1935


**REMARKS.**—This poorly known species is a small-sized member of the *rhodoni* group that was previously known only from the San Gabriel Mountains in California (Traver 1935). Its discovery in New Mexico in the northern Pecos River drainage system therefore represents a significant range extension.

• *Baetis bicaudatus*
  Dods, 1923

**DESCRIPTIONS.**—Adult: Dods (1923). Larva: Dods (1923); see also Morihara and McCafferty (1979a).


**REMARKS.**—This relatively widespread western species is found in mountainous streams, and it reaches the southernmost limits of its range in New Mexico. Although common in Colorado (McCafferty et al. 1993), it has not been taken in Arizona, Mexico, or Texas. In New Mexico it has been collected from all major drainage systems except the San Juan
River in the extreme northwestern part of the state. With the exception of Alaska and parts of Canada, *Baetis bicaudalus* is most commonly confined to higher elevations.

*Baetis caelestis*  
Allen and Murvosh, 1983  

**DESCRIPTlONS.**—Adult: unknown. Larva: Morihara and McCafferty (1979a) as *B. sp. A.*  

**PREVIOUS RECORDs.**—Morihara and McCafferty (1979a) as *Baetis* sp. A: Catron Co (San Francisco R); Otero Co (Penasco R).  

**NEW COUNTY RECORDS.**—BYU: Grant Co (Sapillo Cr).  

**REMARKS.**—*Baetis caelestis* is a relatively common southwestern species, presently known from Arizona (Lugo-Ortiz and McCafferty 1995a), Baja California (Allen and Murvosh 1983), Chihuahua (Lugo-Ortiz and McCafferty 1996a), and Texas (McCafferty and Davis 1992). In New Mexico, where it was originally found by Morihara and McCafferty (1979a), it is known from the Gila, lower Pecos, and San Francisco River drainage systems in the southern part of the state.

*Baetis flavistriga*  
McDunnough, 1921  

**DESCRIPTlONS.**—Adult: McDunnough (1921). Larva: Ide (1937); see also Morihara and McCafferty (1979a).  

**NEW RECORDS.**—PERC: San Juan Co, San Juan R, river mile 165, 1820 m, 29-VI-1960 (larva).  

**REMARKS.**—This relatively widespread North American species is known mainly from the eastern half of the continent but also from the Black Hills of South Dakota (McCafferty 1990) and several localities in Colorado (see McCafferty et al. 1993); it was recently found in the Colorado drainage area of west central Utah (McCafferty and MacDonald 1994). McCafferty and Davis (1992) reported it from Texas, and Lugo-Ortiz and McCafferty (1994) found it in the adjoining Mexican state of Chihuahua. In New Mexico, *B. flavistriga* has been taken only in the San Juan River drainage system.

*Baetis magnus*  
McCafferty and Waltz, 1986  

**DESCRIPTlONS.**—Adult: Durfee and Kondratieff (1993). Larva: Morihara and McCafferty (1979a) as *B. sp. B.*  

**PREVIOUS RECORDs.**—Morihara and McCafferty (1979a) as *Baetis* sp. B: Grant Co (Cherry Cr).  

**NEW COUNTY RECORDS.**—NMHU: Colfax Co (Canadian R); Sierra Co (Main Diamond Cr); Torrence Co (Cañón de Tájique). PERC: Catron Co (Glenwood, Gila R, Pueblo Cr); Lincoln Co (Eagle Cr, Rio Ruídos).  

**REMARKS.**—This western species was originally described as *Baetis* sp. B by Morihara and McCafferty (1979a), based on larvae from New Mexico, and it was later named by McCafferty and Waltz (1986). Known from western Nebraska to Panama (Lugo-Ortiz and McCafferty 1993, 1996a), it appears to be particularly common in Arizona, New Mexico, and Colorado (see also McCafferty and Waltz 1986, Durfee and Kondratieff 1993). We have recently identified larvae of this species collected by Kondratieff and Baumann in March 1993 from the San Sabo River in Menard County, southwest central Texas. *Baetis magnus* is one of the few species of mayflies now known to occur in both the Nearctic and Neotropical biogeographic regions. In New Mexico it is now known from all major drainage systems except the San Juan River (part of the middle Colorado drainage system); however, it has been taken from the Colorado drainage system in Arizona and Colorado.

*Baetis notos*  
Allen and Murvosh, 1987  

**DESCRIPTlONS.**—Adult: Durfee and Kondratieff (1995). Larva: Morihara and McCafferty (1979a) as *B. sp. C.*  

**PREVIOUS RECORDs.**—Morihara and McCafferty (1979a) as *Baetis* sp. C: Catron Co (Gila R), Durfee and Kondratieff (1995): Catron Co (Taylor Cr).  

**NEW COUNTY RECORDS.**—NMHU: Colfax Co (Gieneguilla Cr); Grant Co (Gila R, Gieneguilla Cr). PERC: Grant Co (Gila R).  

**REMARKS.**—This southwestern species is also known from Arizona (Morihara and McCafferty 1979a), Colorado (Ward and Stanford 1990), and Texas (McCafferty and Davis 1992). It was recently discovered in Veracruz by Lugo-Ortiz and McCafferty (1994) and thus it is expected to occur in northern Mexico also. Durfee and Kondratieff (1995) reared this species from Taylor Creek in Catron County, New Mexico. It has been collected in New Mexico
only in the Gila, Canadian, and San Francisco River drainage systems.

**Baetis tricaudatus**

Dodds, 1923

**DESCRIPTIONS.**—Adult: Dodds (1923). Larva: Dodds (1923); see also Morihara and McCafferty (1979a).

**PREVIOUS RECORDS.**—Peters and Edmunds (1961) as *Baetis intermedius*: San Juan Co (San Juan R). Morihara and McCafferty (1979a): Catron Co (San Francisco R); Mora Co (Mora R); Otero Co (Río Penasco); Río Arriba Co (Río Brazos); San Miguel Co (Pecos R).

**NEW COUNTY RECORDS.**—BYU: Grant Co (Turkey Cr, Gila R, Sapillo Cr); Lincoln Co (Río Hondo). NMHU: Colfax Co (Canadian R, Cieneguilla Cr); Eddy Co (Río Penasco); Grant Co (Black Canyon, Cieneguilla Cr); Guadalupe Co (Pecos R); Lincoln Co (Río Ruidoso); San doval Co (Río Cebolla, Antonio Cr); Santa Fe Co (Río Grande); Sierra Co (Main Diamond Cr, South Diamond Cr); Taos Co (Red R, Río Costilla). PERC: Colfax Co (Cimarron R); Grant Co (Cherry Cr); Lincoln Co (Eagle Cr, Río Ruidoso); San doval Co (Jemez R); Santa Fe Co (Río Grande, Tesuque Cr); Taos Co (Goose Cr, La Junta Cr, Pueblo Cr, Red R, Santa Barbara R).

**REMARKS.**—This species is known from throughout most of North America, including Mexico (Lugo-Ortiz and McCafferty 1994), and it is probably the most widespread and ubiquitous *Baetis* on the continent. Likewise, it is now known from all major drainage systems in New Mexico.

*Baetodes deficiens*

Cohen and Allen, 1972

**DESCRIPTIONS.**—Adult: unknown, but subimagos were described by Flowers (1987). Larva: Cohen and Allen (1972).

**NEW RECORDS.**—BYU: Grant Co, Sapillo Cr, jct with Gila R, 1555 m, 26-V-1985, B. Jensen (larvae).

**REMARKS.**—This is essentially a Mexican species. It has been known from the Mexican states of Guerrero, Jalisco, Morelos, Sonora, and Veracruz (see McCafferty and Lugo-Ortiz 1996). Its discovery in New Mexico is important because it represents a new USA record. In New Mexico it has been taken only from the Gila River drainage system in the Intermontane Plateau.

**Baetodes edmundsi**

Koss, 1972


**PREVIOUS RECORDS.**—Koss (1972): Grant Co (Gila R).

**NEW COUNTY RECORDS.**—NMHU: San Miguel Co (Canadian R).

**REMARKS.**—In addition to New Mexico, *Baetodes edmundsi* has been reported from Arizona (Koss 1972), Texas (Edmunds 1950), and the Mexican states of Sinaloa and Sonora (Allen and Murvosh 1987a). In New Mexico it has been taken only from the Gila and Canadian River drainage systems, in the far southwest and northeast regions of the state, respectively.

**Callibaetis ferrugineus hageni**

Eaton, 1885

**DESCRIPTIONS.**—Adult: Eaton (1885) as *Callibaetis hageni* Eaton. Larva: Dodds (1923) as *C. fusca* Dodds.

**PREVIOUS RECORDS.**—Peters and Edmunds (1961) as *Callibaetis nigricus*: San Juan Co (San Juan R).


**REMARKS.**—This relatively widespread western subspecies ranges from Alaska southward to Arizona (Lugo-Ortiz and McCafferty 1995a) and New Mexico, and it is one of the most common mayflies in Colorado, where it was treated under the synonym *C. americanus* Banks by McCafferty et al. (1993). The extensive synonymy of the species can be found in McCafferty and Waltz (1990) and McCafferty (1996). *Callibaetis ferrugineus hageni* is not known from Texas, and therefore Arizona and New Mexico apparently represent its southeastern range limits. It has been taken in ponds and lakes in wide-ranging areas of New Mexico as well as from the San Juan River.

*Callibaetis fluctuans*

(Walsh), 1862

**DESCRIPTIONS.**—Adult: Walsh (1862) as *Clote fluctuans*; see also Traver (1935). Larva: Burks (1953).

**NEW RECORDS.**—BYU and PERC: Eddy Co, Castle Cr, Black River Village, 14-I-1987, Baumann, Sargent, and Kondratieff (larvae).
REMARKS.—This species is known from across the continent but is most common in the Midwest. It has been taken as far west as California and Oregon in the north, but with respect to areas surrounding New Mexico, it has been reported only from Colorado (McCafferty et al. 1993) and Texas (Lugo-Ortiz and McCafferty 1995b). The isolated sample of this species from the extreme southern part of the Pecos River drainage system in New Mexico represents the southernmost limits of its western range. In southern Utah, C. fluctuans has historically been misidentified as C. montanus Eaton.

Callibaetis montanus
Eaton, 1885


PREVIOUS RECORDS.—Traver (1935): San Juan Co (San Juan R); Socorro Co (Rio Grande).

NEW COUNTY RECORDS.—PERC: Catron Co (Gila R), Dona Ana Co (Rio Grande).

REMARKS.—Callibaetis montanus has been correctly reported from Arizona and New Mexico south to Nicaragua (Eaton 1885, 1892, Banks 1900, Traver 1935, McCafferty and Lugo-Ortiz 1992). Records of the species north of Arizona and New Mexico (e.g., Edmunds 1954, Newell 1970, Rahel and Kolar 1990) are evidently misidentifications of C. fluctuans, and records of it in Texas are probably all or mostly attributable to C. punctilusus McCafferty and Provonsha (see McCafferty and Provonsha 1993, Lugo-Ortiz and McCafferty 1994). In New Mexico it has been taken from diverse areas of the Gila River, San Juan River, and Rio Grande drainage systems.

Callibaetis pictus
(Eaton), 1871

DESCRIPTIONS.—Adult: Eaton (1871) as Baetis pictus Eaton. Larva: Seemann (1927) as C. pacificus Seemann; see also Lugo-Ortiz and McCafferty (1996b).


NEW COUNTY RECORDS.—BYU: Grant Co (Turkey Cr); Rio Arriba Co (Vaceros Canyon). CSU: Sierra Co (Circle Seven Cr). PERC: Catron Co (Gila National Forest); Chaves Co (Roswell); Grant Co (Cherry Cr, Sapillo Cr; Turkey Cr, Gila R); Lincoln Co (Tucson Mts); McKinley Co (Thoroean); Sandoval Co (Galisteo Cr); San Miguel Co (Pecos R); Santa Fe Co (Galisteo Cr).

REMARKS.—This species occurs throughout western North America as far east as South Dakota (McCafferty 1990) and Texas (McCafferty and Davis 1992), and south to Costa Rica (Lugo-Ortiz and McCafferty 1996b). It is apparently one of the most common species of Callibaetis in New Mexico, where it has been taken in the Gila River, Pecos River, Rio Grande, and Zuni River drainage systems.

Camelobaetidius musseri
(Traver and Edmunds), 1968

DESCRIPTIONS.—Adult: unknown. Larva: Traver and Edmunds (1968) as Dactylobaetis musseri Traver and Edmunds; see also Lugo-Ortiz and McCafferty (1995c).

PREVIOUS RECORDS.—Allen and Chao (1978a) as Dactylobaetis naticus: San Juan Co (San Juan R); as Dactylobaetis trivialis: Colfax Co (Cimarron R).

NEW COUNTY RECORDS.—CSU and PERC: Catron Co (W fork Gila R, Gila R, San Francisco R). NMHU: Catron Co (San Francisco R); Grant Co (E fork Gila R).

REMARKS.—This species is widespread in Mexico and Central America (Traver and Edmunds 1968, Lugo-Ortiz and McCafferty 1995c). Lugo-Ortiz and McCafferty (1995c) have recently shown that C. salinus Allen and Chao, which had been taken in the USA in Arizona and Nevada, is a junior synonym of C. musseri. In New Mexico the species appears to be restricted to the Gila and San Francisco River drainage systems in the southwestern portion of the state.

Camelobaetidius warreni
(Traver and Edmunds), 1968


PREVIOUS RECORDS.—Allen and Chao (1978a) as Dactylobaetis naticus: San Juan Co (San Juan R); as Dactylobaetis trivialis: Colfax Co (Cimarron R).

NEW COUNTY RECORDS.—CSU and PERC: Catron Co (W fork Gila R, Gila R, San Francisco R). NMHU: Catron Co (San Francisco R); Grant Co (E fork Gila R).

REMARKS.—This is the most common and widespread species of Camelobaetidius in the western USA (known from Arizona, California,
Colorado, Idaho, and Utah in addition to New Mexico), and it also ranges through Mexico (Baja California Sur, Chiapas, Chihuahua, Guerrero, Oaxaca, and Sonora) and Central America (Lugo-Ortiz and McCafferty 1995c). It has been known by many synonyms in the past as shown by Lugo-Ortiz and McCafferty (1995c), wherein C. navis (Allen and Chao) and C. trivialis (Allen and Chao), which had been reported previously from New Mexico, were synonymized with it. In New Mexico, C. warreni has been taken from the Canadian, Gila, San Juan, and San Francisco River drainage systems.

*Cloeodes macrolamellus*
Waltz and McCafferty, 1987


**PREVIOUS RECORDS.**—Waltz and McCafferty (1987): Grant Co (Cheny Cr).

**REMARKS.**—*Cloeodes macrolamellus* was originally described from New Mexico by Waltz and McCafferty (1987). More recently, it was shown also to occur in the northern Mexican states of Chihuahua and Durango (Lugo-Ortiz and McCafferty 1994) and in the USA in Arizona (Lugo-Ortiz and McCafferty 1995a). In New Mexico it is known only from the Gila River drainage system.

*Falcoon quilleri*
(Dodds), 1923

**DESCRIPTIONS.**—Adult: Dodds (1923) as *Baetis quilleri* Dodds; see also Traver (1935). Larva: Morihara and McCafferty (1979a) as *B. quilleri*; see also Lugo-Ortiz et al. (1994).

**PREVIOUS RECORDS.**—Morihara and McCafferty (1979a) as *Baetis quilleri*; Catron Co (Gila R); Grant Co (Cherry Cr, Sapillo Cr).

**NEW COUNTY RECORDS.**—BYU: Eddy Co (Castle Cr). CSU: Sierra Co (Palomas Cr). PERC: Chaves Co (Rio Penasco); Dona Ana Co (small tributary of Rio Grande); Eddy Co (Castle Cr); Lincoln Co (Rio Ruidoso).

**REMARKS.**—This highly variable species is widespread in Central America, Mexico, and southwestern, central, and eastern USA (Lugo-Ortiz et al. 1994). In New Mexico it has thus far been taken only from the southern part of the state in the Gila River, Pecos River, and Rio Grande drainage systems. It is, however, known from the Colorado River drainage system in Colorado (McCafferty et al. 1993).

*Labiobaetis apache*
McCafferty and Waltz, 1995


**PREVIOUS RECORDS.**—Peters and Edmunds (1961) as *Baetis propinquus* (Walsh): San Juan Co (San Juan R).

**REMARKS.**—This distinctive species was recently described from the Colorado drainage system of northern Arizona and western Utah by McCafferty and Waltz (1995). We have acquired and studied the original material on which Peters and Edmunds (1961) based their record of *Baetis propinquus* (now *L. propinquus*) from the San Juan River in New Mexico, and it proved to be *L. apache*. Records of *L. propinquus* from Douglas Creek near Rangely, Colorado, in the Colorado River drainage system (McCafferty et al. 1993) are also attributable to *L. apache* according to Durfee and Kondratieff (1997). The San Juan River drainage system in New Mexico is part of the middle Colorado drainage system, and thus *L. apache* remains known only from the greater Colorado drainage system in North America.

*Labiobaetis propinquus*
(Walsh), 1863

**DESCRIPTIONS.**—Adult: Walsh (1862) as *Cloe vicina* Walsh (nee Hagen); see also Morihara and McCafferty (1979b) as *Baetis propinquus* (Walsh). Larva: Berner (1940) as *Baetis spinosus* McDunnough; see also Morihara and McCafferty (1979b) as *B. propinquus*.


**REMARKS.**—This primarily central and eastern USA species evidently attains its westernmost range limits in eastern New Mexico, where we have seen it from the Canadian and Pecos River drainage systems. *Labiobaetis propinquus* was reported from Texas by McCafferty and Davis (1992) but is not known from Mexico. Published records of this species by Peters and Edmunds (1961) from the San Juan River in New Mexico are attributable to *L. apache* (see above).

*Procloeon conturbatum*
(McDunnough), 1929

**DESCRIPTIONS.**—Adult: McDunnough (1929) as *Centroptilum conturbatum* McDunnough;

NEW RECORDS.—PERC: San Juan Co, San Juan R, T32N, R6W, Sec 27, river mi 163, 1820 m, 29-VI, 16-VII-1960, W.L. Peters (male adults).

REMARKS.—Specimens from the San Juan River drainage system of northeastern New Mexico agree with the redescription of this species by Lowen and Flannagan (1991). This species is known from western Canada (see Lowen and Flannagan 1991) and in the USA from California and Wyoming (Traver 1935) and Utah (Edmunds 1954). It represents a significant addition to the New Mexico mayfly fauna.

Caenidae

*Caenis bajaensis*
Allen and Murvosh, 1983


PREVIOUS RECORDS.—Provonsha (1990): Catron Co (Gila National Forest); Grant Co (Cherry Cr.).

NEW COUNTY RECORDS.—NMHU: Mora Co (Wolf Cr).

REMARKS.—*Caenis bajaensis* is also known from Arizona, Colorado, northern Mexico, and Nebraska (Provonsha 1990). Larvae of this species are apparently restricted to sandy-bottomed areas of streams with slow to moderate current. In New Mexico it is now known from the Canadian and Gila River drainage systems.

**Caenis latipennis**
Banks, 1907


REMARKS.—The range of this species extends across Canada and the USA to southern Mexico (Provonsha 1990, Lugo-Ortiz and McCafferty 1996a). With respect to areas adjacent to New Mexico, *C. latipennis* has been reported from Colorado (McCafferty et al. 1993), Oklahoma (Traver 1935), and Arizona and Texas (Provonsha 1990). Its presence in New Mexico, where it has been taken only in the lower Pecos River drainage system, was expected.

Ephemerellidae

*Attenella margarita*
(Needham), 1927

DESCRIPTIONS.—Adult: McDunnough (1931b) as *Ephemerella margarita* Needham. Larva: Needham (1927) as E. margarita; see also Allen and Edmunds (1961) as E. margarita.


NEW COUNTY RECORDS.—NMHU: Taos Co (Costilla Cr.).

REMARKS.—Western populations of this species range from British Columbia to New Mexico (Allen and Edmunds 1961, Argyle and Edmunds 1962). It has not, however, been taken from Arizona or Texas. In New Mexico it is now known from the upper Pecos River and upper Rio Grande drainage systems. This northern region in New Mexico represents the southernmost limits of the range of this species.

*Drunella coloradensis*
(Dodds), 1923

DESCRIPTIONS.—Adult: Dodds (1923) as *Ephemerella coloradensis* Dodds. Larva: Dodds (1923) as E. coloradensis; see also Allen and Edmunds (1962) as E. coloradensis.

PREVIOUS RECORDS.—Needham (1927) as *Ephemerella coloradensis*: San Miguel Co (Pecos R). Allen and Edmunds (1962) as *Ephemerella coloradensis*: Sandoval Co (Rock Cr); Taos Co (Santa Barbara R).

REMARKS.—This relatively common western mountain species ranges from Alaska to Arizona and New Mexico (Allen and Edmunds 1962). It apparently is restricted in New Mexico to the northern mountain regions of the Pecos River and Rio Grande drainage systems.

*Drunella doddsii*
(Needham), 1927

DESCRIPTIONS.—Adult: Needham (1927) as *Ephemerella doddsii* Needham. Larva: Needham (1927) as E. doddsii; see also Allen and Edmunds (1962) as E. doddsii.

NEW COUNTY RECORDS.—NMHU: Catron Co (Gila R); Rio Arriba Co (Rio Brazos); San Miguel Co (Gallinas R, Sapello R); Taos Co (Rio Fernando de Taos). PERC: Taos Co (Rio Hondo Canyon).

REMARKS.—New Mexico is the southernmost range limit of this common western species (Allen and Edmunds 1962). It is not known from Arizona or Texas. In New Mexico it has been taken from the Canadian River, Gila River, Pecos River, and Rio Grande drainage systems.

Drchnella grandis grandis
(Eaton), 1884

DESCRIPTIONS.—Adult: Needham (1927) as Ephemerella grandis Eaton. Larva: Eaton (1884) as Ephemerella, sedis incertae, nymph #11; see also Allen and Edmunds (1962) as E. grandis grandis.


NEW COUNTY RECORDS.—BYU: Colfax Co (Vermejo R). NMHU: Colfax Co (Cieneguilla Cr); Sierra Co (Main Diamond Cr); Taos Co (Castilla Cr, Red R). PERC: Taos Co (Rio Pueblo de Taos).

REMARKS.—This subspecies of this common western species occurs in Arizona, Colorado, New Mexico, Utah, and Wyoming (Allen and Edmunds 1962). In New Mexico it occurs in mountain tributaries mainly of the Canadian River, Pecos River, and Rio Grande drainage systems. In western drainages it is known only from Gila River drainage headwaters.

Ephemerella altana
Allen, 1968


PREVIOUS RECORDS.—Allen (1968): Colfax Co (Moreno Cr); Mora Co (Mora R); San Miguel Co (Pecos R); Taos Co (Rio Grande, Rio Hondo, Rio Pueblo).

NEW COUNTY RECORDS.—PERC: Catron Co (Gila R); Grant Co (Gila R).

REMARKS.—This species has been known from Arizona and New Mexico (Allen 1968), and Lugo-Ortiz and McCafferty (1994) reported it from Baja California. In New Mexico, E. altana has been collected from the Canadian River, Pecos River, and Rio Grande drainage systems, and we provide the first records of it from the Gila River drainage system. In Arizona it has been collected from the middle Colorado River drainage system in the northeastern part of that state, and therefore it may eventually be found in all major drainages in New Mexico.

Ephemerella inermis
Eaton, 1884

DESCRIPTIONS.—Adult: Eaton (1884). Larva: Traver (1935); see also Allen and Edmunds (1965) and Johnson (1978).


NEW COUNTY RECORDS.—BYU: Hondo Co (Hondo R). NMHU: Colfax Co (Cieneguilla Cr); Lincoln Co (Rio Ruidoso). PERC: Catron Co (Gila R); Colfax Co (Cimarron R); Grant Co (Gila R); Lincoln Co (Eagle Cr, Rio Ruidoso); Mora Co (Mora R); Rio Arriba Co (Rio Brazos); San Miguel Co (Pecos R).

REMARKS.—Ephemerella inermis is a relatively common species that occurs throughout much of western North America, excluding Mexico (Allen and Edmunds 1965). Using only the keys of Allen and Edmunds (1965), one could easily confuse specimens of the mainly eastern species E. dorothea Needham, which we have seen in Texas, with this strictly western species. There are, however, unpublished discriminating characters in the larvae that can be used to separate the 2 species. It is for this reason that impending records of E. inermis from Texas require further substantiation. In New Mexico it is known from all major drainage systems.

Ephemerella infrequens
McDunnough, 1924

DESCRIPTIONS.—Adult: McDunnough (1924b). Larva: Traver (1935); see also Allen and Edmunds (1965) and Johnson (1978).


REMARKS.—This western species does not occur in Arizona or Mexico, and its only records in New Mexico are from the northern part of the state in the upper Rio Grande drainage...
system. We have not seen material of this species from New Mexico and therefore cannot be sure that previous reports were indeed of *E. infrequens*, rather than *E. inermis*, with which it has commonly been confused in the past (see Johnson 1978).

**Ephemera mollitia**
Seemann, 1927

**DESCRIPTIONS.**—Adult: Seemann (1927), larva: Seemann (1927); see also Allen and Edmunds (1965).

**PREVIOUS RECORDS.**—Traver (1935): S. San Juan Co (San Juan R).

**REMARKS.**—This species has been known only from California and the northwestern corner of New Mexico (San Juan River drainage system). Allen and Edmunds (1965) questioned the validity of Traver’s (1935) record, stating that she may have actually based the record on larvae of *E. inermis*. We have not seen the material and therefore can neither confirm nor refute the record at this time.

**Serratella micheneri**
(Traver), 1934

**DESCRIPTIONS.**—Adult: Traver (1934) as *Ephemera micheneri* Traver, larva: Traver (1934) as *E. micheneri*; see also Allen and Edmunds (1963) as *E. micheneri*.

**PREVIOUS RECORDS.**—Peters and Edmunds (1961) as *Ephemera micheneri* San Juan Co (San Juan R). Allen and Edmunds (1963) as *Ephemera micheneri*: Rio Arriba Co (San Juan R), Kilgore and Allen (1973) as *Ephemera micheneri*: Catron Co (Negrito Cr), Colfax Co, Grant Co (Little Cr).

**NEW COUNTY RECORDS.**—NMHU: Lincoln Co (Rio Ruidoso), Sandoval Co (Rio Cebolla), Santa Fe Co (Rio Grande).

**REMARKS.**—This western species is known from Arizona, Baja California, California, Colorado, New Mexico, Oregon, Washington, and Wyoming (Allen and Edmunds 1963), but it is absent from Idaho, Nevada, and Utah (essentially the Great Basin). In New Mexico it occurs in all major drainage systems.

**Serratella tibialis**
(McDunnough), 1924

**DESCRIPTIONS.**—Adult: McDunnough (1924b) as *Ephemera tibialis* McDunnough, larva: Walley (1930) as *E. tibialis*; see also Allen and Edmunds (1963) as *E. tibialis*.

**PREVIOUS RECORDS.**—Allen and Edmunds (1963) as *Ephemera tibialis*: Taos Co (Red R).

**REMARKS.**—This species occurs throughout the western USA and Canada (Allen and Edmunds 1963), but it has rarely been taken in Arizona and New Mexico. In New Mexico, *S. tibialis* has been known only from the upper Rio Grande drainage system in the Rocky Mountain Province.

**Timpanoga hecuba hecuba**
(Eaton), 1884

**DESCRIPTIONS.**—Adult: McDunnough (1935) as *Ephemera hecuba* Eaton, larva: Eaton (1884) as *Ephemera, sedis incertae, nymph #4*; see also Allen and Edmunds (1959) as *E. hecuba hecuba*.

**PREVIOUS RECORDS.**—Allen and Edmunds (1959) as *Ephemera hecuba hecuba*: San Miguel Co (Pecos R).

**NEW COUNTY RECORDS.**—NMHU: Rio Arriba Co (Rio Chama).

**REMARKS.**—This western species, which is conspicuously absent from most of the Great Basin and Arizona (Allen and Edmunds 1959), reaches the southernmost part of its range in northern New Mexico, where it is now known from the upper Pecos River and upper Rio Grande drainage systems.

**Ephemeridae**

*Ephemera simulans* Walker, 1853

**DESCRIPTIONS.**—Adult: Walker (1853); see also Traver (1935). Larva: Walley (1935); see also McCafferty (1975).


**REMARKS.**—This widespread North American burrowing species was shown by McCafferty (1975) to occur from the east coast to Idaho and Utah. It is not known from Arizona, Mexico, or Texas. The new state record from the northern portion of New Mexico in the upper Rio Grande drainage system was somewhat unexpected, given the distribution pattern of this species (McCafferty 1994).

*Hexagenia bilineata* (Say), 1824

**DESCRIPTIONS.**—Adult: Say (1824) as *Baetis bilineata* Say; see also Spieth (1941). Larva: Clemens (1913); see also McCafferty (1975).

REMARKS.—The previous obscure record of this species by Spieth (1941) from the Red River, ostensibly in New Mexico, which was further recorded by McCafferty (1975), was apparently not valid. This conclusion is based on the fact that the only Red River in New Mexico is in Taos County and that stream does not have silt/marl substrate that would be required by *Hexagenia* larvae (see Keltner and McCafferty 1986). Furthermore, the material on which Spieth (1941) based his New Mexico record was from the Oklahoma Natural History Survey; and the Red River along the Oklahoma-Texas border in the eastern parts of those states does possess substrate types required by *Hexagenia* larvae. Nonetheless, we do provide the first valid record of this species in New Mexico. The male adult from Eddy County, New Mexico (lower Pecos River drainage system), clearly possesses the beaklike penes typical of *H. bilineata*; however, both the larva and adult are very lightly pigmented, which is atypical of *H. bilineata*. Although *H. bilineata* is known from Texas and Oklahoma, it has not been found north, west, or south of New Mexico, with the exception of a record from the Mexican state of San Luis Potosí by McCafferty (1968). The most widespread species of *Hexagenia* in North America, *H. limbata* (Serville), has not been found in New Mexico but may eventually because it does occur in Colorado and Texas.

*Heptageniidae*

* *Cinygmula par* (Eaton), 1885

DESCRIPTIONS.—Adult: Eaton (1885) as *Cinygma par* Eaton. Larva: not published.

NEW RECORDS.—NMHU: San Miguel Co, Elk Mtn (elev. 3540 m), below springs, VII-1980, L.R. Smolka (male and female adults).

REMARKS.—This species occurs in the higher elevations throughout much of western North America, including Arizona (Eaton 1885) and Colorado (Dodds 1923). It is not known from Mexico or Texas. In New Mexico, *C. par* is the only species of the genus thus far taken, and it has been found only in mountain headwaters of the Pecos River.

*Epeorus albertae* (McDunnough), 1924


REMARKS.—Ward and Berner (1980) indicated that this western species tended to replace other species of *Epeorus* at lower elevations. *Epeorus albertae* is relatively common in Colorado (McCafferty et al. 1993), but it has not been taken in Arizona, Mexico, or Texas. In New Mexico it has been taken only in the northern part of the state in the upper Rio Grande drainage system.

*Epeorus decepcitcus* (McDunnough), 1924


NEW COUNTY RECORDS.—NMHU: Sierra Co (South Diamond Cr). PERC: Taos Co (Rio Hondo).

REMARKS.—Edmunds and Allen (1964) indicated that this species was confined to the intermountain western USA, and those authors were the first to indicate its occurrence in New Mexico, but they did not provide any specific locale data. Allen and Chao (1978b) recorded it from Gila County, Arizona. In New Mexico we know of this species from the upper Pecos River and upper Rio Grande drainage systems, as well as the Gila River drainage system in the southwestern part of the state.

*Epeorus longimanus* (Eaton), 1885


NEW COUNTY RECORDS.—NMHU: Lincoln Co (Río Ruidoso). PERC: Lincoln Co (Eagle Cr).

REMARKS.—*Epeorus longimanus* is the most widespread of the western species of *Epeorus*
(Edmunds and Allen 1964). It is very common at higher elevations in Colorado and Utah, but somewhat less common in Arizona and New Mexico. In New Mexico it has been taken from the Gila River, upper Pecos River, and upper Rio Grande drainage systems.

**Epeorus margarita**
Edmunds and Allen, 1964


**NEW COUNTY RECORDS.**—PERC: Grant Co (Gila R); Rio Arriba Co (Rio Brazos).

**REMARKS.**—We have numerous samples of Epeorus margarita from Catron County collected in the 1960s and 1980s. The species is by far the most common species of Epeorus found in the Gila River drainage system, and except for the Rio Brazos, a headwater stream in the upper Rio Grande drainage system, it has not been taken from the other major drainage systems in the state. Epeorus margarita was recently reported from numerous localities in the Mexican state of Chihuahua by Lugo-Ortiz and McCafferty (1996a), and the species has been known from a few localities in Arizona (Edmunds and Allen 1964) and Baja California (Allen and Murvosh 1983).

**Heptagenia elegantula**
(Eaton), 1885

**DESCRIPTIONS.**—Adult: Eaton (1885) as Rhithrogena elegantula Eaton. Larva: Needham and Christenson (1927) as R. elegantula; see also Bednarik and Edmunds (1980).


**REMARKS.**—This species is known from throughout much of western North America, including Arizona and Colorado (Eaton 1885) and Utah (Edmunds 1954). It has not been found in Mexico, Oklahoma, or Texas. Larvae of Heptagenia elegantula can be distinguished from the somewhat similar H. solitaria (see below) with the use of the key by Bednarik and Edmunds (1980). The species prefers silted streams at lower elevations, and in New Mexico it is known only from the Canadian and San Juan River drainage systems in the northern part of the state.

**Heptagenia solitaria**
McDunnough, 1924


**PREVIOUS RECORDS.**—Peters and Edmunds (1961): San Juan Co (San Juan R).

**NEW COUNTY RECORDS.**—PERC: Catron Co (Gila R); Colfax Co (Canadian R, Cimarron R); Grant Co (Gila R); Mora Co (Coyote Cr); Sandoval Co (Rio Grande).

**REMARKS.**—McCaflerry et al. (1993) noted that in Colorado this western species was found primarily on the western slope of the Colorado Plateau. It is one of the most common species of Heptagenia in the West and has also been found in the Gila River and middle Colorado drainage systems in Arizona (Lugo-Ortiz and McCafferty 1995a). It is not known from Mexico or Texas. In New Mexico it has been taken in the Canadian River, Gila River, Rio Grande, and San Juan River drainage systems.

**†Leucrocuta petersi**
(Allen), 1966


**REMARKS.**—This species was previously known only from the Green River (upper Colorado Drainage) in southwestern Wyoming and northeastern Utah (Allen 1966). New records from New Mexico are therefore significant. In New Mexico, L. petersi has been taken in the Canadian and Gila River drainage systems. It is possible that this species presently occurs only in New Mexico because of its possible extirpation in Utah and Wyoming.

**Nixe criddlei**
(McDunnough), 1927

**DESCRIPTIONS.**—Adult: McDunnough (1927)

**PREVIOUS RECORDS.**—Peters and Edmunds (1961) as *Heptagenia* sp.: San Juan Co (San Juan R); Allen and Chao (1979b) as *Heptagenia criddlei*: Catron Co (San Francisco R); Colfax Co (Cimarron R, Moreno Cr); Grant Co (Sapillo Cr); Lincoln Co (Bonito Cr, Cr at Pine Lodge); Mora Co (Mora R); Rio Arriba Co (Wolf Cr); Taos Co (Rio Hondo, Valencia Co (Blue Water Cr).

**NEW COUNTY RECORDS.**—CSU: Sierra Co (Palomas Cr). PERC: San Miguel Co (Jemez R).

**REMARKS.**—This relatively common species is known from throughout the western USA (McDunnough 1927, Traver 1935, Edmunds 1954, Peters and Edmunds 1961, Allen and Chao 1979b). *Nixe criddlei* has been taken from all major drainage systems within New Mexico.

*Nixe simplicioioides* (McDunnough), 1924

**DESCRIPTIONS.**—Adult: McDunnough (1924a) as *Heptagenia simplicioioides* McDunnough. Larva: Bednark and Edmunds (1980) as *H. simplicioioides*.

**PREVIOUS RECORDS.**—Peters and Edmunds (1961) as *Heptagenia simplicioioides*: San Juan Co (San Miguel Co (Pecos R)).

**NEW COUNTY RECORDS.**—BYU: Grant Co (Gila R, Turkey Cr); Sandoval Co (Jemez R). NMHU: Rio Arriba Co (Rio Chama). PERC: Catron Co (Gila R); Lincoln Co (Bonito Cr); Mora Co (Coyote Cr); San Miguel Co (Pecos R).

**REMARKS.**—This relatively common species is known from throughout the western USA (McDunnough 1927, Traver 1935, Edmunds 1954, Peters and Edmunds 1961, Allen and Chao 1979b). *Nixe simplicioioides* has been taken from all major drainage systems within New Mexico.

*Rhithrogena hageni*

Eaton, 1885


**PREVIOUS RECORDS.**—Allen and Chao (1979b): Taos Co (Red R).

**REMARKS.**—This western USA species is also known from Colorado (Dodds 1923) and Utah (Needham and Christenson 1927), and it is relatively common in southern areas of Colorado (e.g., McCafferty et al. 1993). In Arizona and New Mexico, *R. hageni* is known from only a single locality in each state (Allen and Chao 1979b). In New Mexico it is known from the upper Rio Grande drainage system.

*Rhithrogena morrisoni* 
(Banks), 1924

**DESCRIPTIONS.**—Adult: Banks (1924) as *Epeorus morrisoni* Banks; see also Traver 1935. Larva: Seemann (1927) as *Iron petulans* Seemann; see also key by Allen and Chao (1979b).

**PREVIOUS RECORDS.**—Allen and Chao (1979b): Colfax Co (Cimarron R); San Miguel Co (Pecos R); Taos Co (Red R, Rio Chiquito).

**NEW COUNTY RECORDS.**—NMHU: San Juan Co (San Juan R).

**REMARKS.**—This species is known from much of the West, from Alberta (McDunnough 1934) to Baja California in northern Mexico (Lugo-Ortiz and McCafferty 1994). With respect to the states adjacent to New Mexico, it is known only from Arizona (see Lugo-Ortiz and McCafferty 1995a). Although McCafferty et al. (1993) did not record *R. morrisoni* from Colorado, they noted that materials commonly identified as *R. undulata* (Banks) in Colorado and elsewhere were probably referable to this species. In New Mexico it has been taken in the northern part of the state, in the Canadian River, Pecos River, Rio Grande, and San Juan River drainage systems.

*Rhithrogena plana*

Allen and Chao, 1978


**REMARKS.**—This species was previously known only from Arizona (Allen and Chao 1979b), where it was described from the White River in Navajo County. We report it for the first time from New Mexico from the Gila River and Rio Grande drainage systems. McCafferty et al. (1993) indicated that *R. plana* may eventually prove to be a variant of *R. morrisoni*. 
*Rhithrogena robusta*
Dodd, 1923

**DESCRIPTIONS.**—Adult: Dodd (1923), Larva: Dodd (1923); see also key by Allen and Chao (1978b).


**REMARKS.**—The new New Mexico state records of the distinctive *R. robusta* represent the southernmost limits of the known range of this boreal western species. In New Mexico it has been taken in the Gila River and upper Rio Grande drainage systems. It co-occurs with *R. plana* in Grant County, where the species are distinct from each other. Cohabitation by *Rhithrogena* species is often common (Leonard and Leonard 1962, McCafferty et al. 1997).

*Rhithrogena undulata*
(Banks), 1924

**DESCRIPTIONS.**—Adult: Banks (1924) as *Epeorus undulatus* Banks. Larva: not published, but keyed by Flowers and Hilsenhoff (1975) and Allen and Chao (1978b).

**PREVIOUS RECORDS.**—Banks (1924) as *Epeorus undulatus*: Sandoval Co (Jemez R); San Juan Co (San Juan R); Allen and Chao (1978b): Colfax Co (Cimarron R); San Miguel Co (Pecos R); Taos Co (Red R).

**NEW COUNTY RECORDS.**—NMHU: Socorro Co (Rio Grande).

**REMARKS.**—*Isonychia intermedia* is known from several localities in Arizona and Chihuahua (Kondratieff and Voshell 1984, Lugo-Ortiz and McCafferty 1995a), in addition to those localities in New Mexico noted above. In New Mexico it has been taken from the Gila River, Rio Grande, and San Francisco River drainage systems in the southern part of the state. We do not expect it to be found in either the Rocky Mountain or Great Plains provinces.

*Isonychia intermedia*
(Eaton), 1885


**PREVIOUS RECORDS.**—Kondratieff and Voshell (1984): Catron Co (San Francisco R); Dona Ana Co (Rio Grande); Grant Co (Gila R).

**NEW COUNTY RECORDS.** —NMHU: Socorro Co (Rio Grande).

**REMARKS.**—*Isonychia intermedia* is known from several localities in Arizona and Chihuahua (Kondratieff and Voshell 1984, Lugo-Ortiz and McCafferty 1995a), in addition to those localities in New Mexico noted above. In New Mexico it has been taken from the Gila River, Rio Grande, and San Francisco River drainage systems in the southern part of the state. We do not expect it to be found in either the Rocky Mountain or Great Plains provinces.

*Isonychia sicca*
(Walsh), 1862


**Tricyrtodes condylus**
Allen, 1967


PREVIOUS RECORDS.—Allen (1967): Taos Co (Red R). Kilgore and Allen (1973): Catron Co (N Glenwood); Grant Co (Sapillo Cr); Sierra Co (Rio Huidoso); Rio Arriba Co (Rio Chama); Santa Fe Co (San Juan R).

REMARKS.—This southwestern species is known from Arizona (Allen 1967, Kilgore and Allen 1973, Gray 1981, Lugo-Ortiz and McCafferty 1995a), Chihuahua, and New Mexico (Lugo-Ortiz and McCafferty 1994). In New Mexico it has been taken from the Gila and Rio Grande drainage systems.

**Tricyrtodes explicatus**
(Eaton, 1892)


NEW COUNTY RECORDS.—NMIIU: Colfax Co (Cieneguilla Cr, Six-mile Cr); Eddy Co (Penasco R); Lincoln Co (Rio Huidoso); Rio Arriba Co (Rio Chama); Sierra Co (Rio Grande). PERC: San Juan Co (San Juan R).

REMARKS.—This species is known from Arizona and throughout northern Mexico (see Lugo-Ortiz and McCafferty 1995a, McCafferty and Lugo-Ortiz 1996). In New Mexico, *T. explicatus* is relatively common and is now known from the Canadian River, Pecos River,
Rio Grande, and San Juan River drainage systems. Lugo-Ortiz and McCafferty (1995a) indicated some possibility that *T. explicatus* and *T. minutus* Traver were synonymous.

**Tricorythodes minutus**

*Traver, 1935*


**PREVIOUS RECORDS.**—Kilgore and Allen (1973): Catron Co (San Francisco R); Chaves Co (Rio Penasco); Colfax Co (Ponil Cr); Grant Co (Gila R); Lincoln Co (Rio Ruidoso); Mora Co (Mora R); Rio Arriba Co (Rio Chama); Sandoval Co (Jemez R); San Juan Co (San Juan R); Sierra Co (Rio Grande); San Miguel Co (Sapello Cr); Santa Fe Co (Rio Grande); Taos Co (Taos Cr).

**REMARKS.**—*Tricorythodes minutus* is apparently widespread and ubiquitous in much of Canada and the USA. It has not been found in Mexico or Texas. It was reported as common throughout much of Colorado by McCafferty et al. (1993). In New Mexico, Kilgore and Allen (1973) have reported it from all major drainage systems, although we have not seen any material of this species from the many collections we have examined. Lugo-Ortiz and McCafferty (1995a) indicated that *T. minutus* could be easily confused with *T. explicatus* (see above).

**Leptophlebiidae**

**Choroterpes inornata**

*Eaton, 1892*


**PREVIOUS RECORDS.**—Kilgore and Allen (1973): Catron Co (San Francisco R); Colfax Co (Cimarron R); Grant Co (Gila R); Lincoln Co (Rio Ruidoso); Mora Co (Mora R); Rio Arriba Co (Rio Chama); Sandoval Co (Jemez R); San Juan Co (San Juan R); Sierra Co (Rio Grande); San Miguel Co (Sapello Cr); Santa Fe Co (Rio Grande); Taos Co (Taos Cr).

**REMARKS.**—*Choroterpes inornata* is now known from all major drainage systems except the San Juan River drainage system. Since it is found in the greater Colorado River drainage system in Arizona, Colorado, and Utah, it could eventually also be found in that drainage system in New Mexico.

*Leptophlebia bradleyi*  
*Needham, 1932*


**REMARKS.**—This species is known from the southwestern USA and Texas (Henry and Kondratieff 1982). Here we report it from New Mexico near Texas in the lower Pecos River drainage system. The New Mexico record represents the westernmost limits of its presently known range.

**Neochoroterpes kossi**  
*(Allen), 1974*


**PREVIOUS RECORDS.**—Henry (1993): Catron Co (San Francisco R).

**NEW COUNTY RECORDS.**—PERC: Grant Co (Cherry Cr, Little Cr).

**REMARKS.**—In addition to New Mexico, *N. kossi* has been known from Arizona (Allen 1974), from where it was originally described, and Texas (Henry 1993). Previous and new records from New Mexico are confined to the Gila River drainage system.

*Neochoroterpes nanita*  
*(Traver), 1934*

**DESCRIPTIONS.**—Adult: Traver (1934) as *Choroterpes nanita* Traver; see also Henry (1993). Larva: Allen (1974) as *C. nanita*; see also Henry (1993).

**NEW RECORDS.**—NMHU: San Miguel Co, Canadian R at Sanchez, 21-III-1988, L.R. Smolka (larvae).

**REMARKS.**—This species was previously known only from Texas (Traver 1934). In New Mexico it has been taken in the Canadian River drainage system, which continues east into Texas.

**Neochoroterpes oklahoma**  
*(Traver), 1934*


**PREVIOUS RECORDS.**—Henry (1993): Chaves Co (Rio Penasco); Eddy Co (Sitting Bull Falls).

**NEW COUNTY RECORDS.**—CSU: Colfax Co (Vermejo R). NMHU: Otero Co (Dog Canyon). PERC: Mora Co (Coyote Cr).

**REMARKS.**—This species, which has been known more commonly by the synonyms Chloroteres mexicanus Allen or Neochloroteres mexicana (Allen) (see McCafferty et al. 1993 and Henry 1993), is known from Colorado, parts of Mexico (including Chihuahua), Oklahoma, and Texas (see Henry 1993, McCafferty et al. 1993, Lugo-Ortiz and McCafferty 1996a). In New Mexico this species is now known from all major drainage systems with the exception of the San Francisco and San Juan River drainage systems.

*Paraleptophlebia debilis* (Walker), 1853

**DESCRIPTIONS.**—Adult: Walker 1853 as Baetis debilis Walker; see also key of Harper and Harper (1986). Larva: Ide (1930) as Leptophlebia debilis.


**REMARKS.**—This transcontinental species is known from Colorado (Ward and Stanford 1990) and Utah (Edmunds 1954) but no other states adjoining New Mexico. Its presence in New Mexico therefore appears to represent the southernmost range limits in western North America. In New Mexico, *P. debilis* is presently known from all major drainage systems with the exception of the San Francisco and San Juan River drainage systems.

*Paraleptophlebia heteronea* (McDunnough), 1924

**DESCRIPTIONS.**—Adult: McDunnough (1924a) as Leptophlebia heteronea McDunnough; see also key of Harper and Harper (1986). Larva: not published.


**REMARKS.**—McDunnough (1924a) first described *Paraleptophlebia heteronea* from Alberta. The species was misidentified from Colorado as Leptophlebia pallipes Hagen [now P. memorialis, see below] by Dodds (1923) and was similarly misidentified from Utah somewhat later by Needham and Christenson (1927). However, it was correctly reported from those states by Ward and Berner (1990) and Edmunds (1954), respectively. Our new records of this species in New Mexico are based on both the more identifiable adults as well as larvae. In New Mexico it has been taken in the northern part of the state in the Canadian River and Rio Grande drainage systems.

*Paraleptophlebia memorialis* (Eaton), 1884

**DESCRIPTIONS.**—Adult: Eaton (1884) as Leptophlebia memorialis Eaton; see also key of Harper and Harper (1986). Larva: Seemann (1927) as Leptophlebia rufivenosa Eaton 1884; see also Kilgore and Allen (1973).

**PREVIOUS RECORDS.**—Peters and Edmunds (1962) as Paraleptophlebia pallipes: San Juan Co (San Juan R); Kilgore and Allen (1973); Catron Co (Whitewater R); Lincoln Co (Cr at Pine Lodge).

**NEW COUNTY RECORDS.**—BYU: Sandoval Co (Jemez R). PERC: Colfax Co (Cimarron R); San Miguel Co (Pecos R); Rio Arriba Co (Rio Brazos); Taos Co (Pueblo Cr).

**REMARKS.**—This common western species is known from all USA states adjacent to New Mexico, except Oklahoma and Texas (Edmunds 1954, Argyle and Edmunds 1962, Kilgore and Allen 1973). *Paraleptophlebia memorialis* has often been recorded under its junior synonym Leptophlebia pallipes Hagen, which proved to be an unavailable name because it was a homonym of L. pallipes (Walker), 1875. *Paraleptophlebia memorialis* has been taken in Mexico only in Baja California (Lugo-Ortiz and McCafferty 1994). In New Mexico it is now known from all major drainage systems.

*Thraulodes brunneus*

Koss, 1966

PREVIOUS RECORDS.—Koss (1966): Grant Co (Silver City).

NEW COUNTY RECORDS.—PERC: Catron Co (Gila R).

REMARKS.—Thraulodes brunneus is known from Arizona and New Mexico, and throughout much of Mexico including Chihuahua (Allen and Murvosh 1987b). In the USA it has been taken only from the Gila River drainage system.

*Thraulodes gonzalesi*  
Traver and Edmunds, 1967


REMARKS.—Thraulodes salinus Kilgore and Allen was recently shown by Lugo-Ortiz and McCafferty (1995a) to be a junior synonym of *T. gonzalesi*. Therefore, in addition to the new New Mexico distribution, the species is known from Arizona (Kilgore and Allen 1973), Mexico (including Chihuahua), and Texas (Traver and Edmunds 1967). In New Mexico it has been taken only in the Gila River drainage system.

**Thraulodes speciosus**  
Traver, 1934


NEW COUNTY RECORDS.—BYU: Grant Co (Turkey Cr).

REMARKS.—Thraulodes arizonicus Kilgore and Allen was recently shown to be a junior synonym of *T. speciosus* by Lugo-Ortiz and McCafferty (1995a). This species has been known only from Arizona (Traver 1934) and northern Mexico (Allen and Murvosh 1987b, Lugo-Ortiz and McCafferty 1996a), including Chihuahua. Allen and Brusca (1978) may have seen material from New Mexico because they plotted the species in New Mexico on a range map but presented no substantiating data for it. In addition to the new county record cited above, we have seen this species in Catron County from the west fork of the Gila River and White Water Creek. In New Mexico the species is known only from the Gila River drainage system.

**Traverella albertana**  
(McDunnough), 1931

DESCRIPTION.—Adult: McDunnough (1931a) as *Thraulodes stenoptera* McDunnough; see also Traver and Edmunds (1967). Larva: Edmunds (1948).

PREVIOUS RECORDS.—Kilgore and Allen (1973) as *Traverella castanea*: Catron Co (San Francisco R); Grant Co (Gila R).

NEW COUNTY RECORDS.—NMHU: Santa Fe Co (Rio Grande).

REMARKS.—Traverella castanea Kilgore and Allen was recently shown to be a junior synonym of *T. albertana* by Lugo-Ortiz and McCafferty (1995a). This western species, therefore, is known from Alberta and Saskatchewan south to Chihuahua (see Allen 1973, Allen and Murvosh 1987b, Lugo-Ortiz and McCafferty 1995a, 1996a). Although it is known from the surrounding areas of Arizona, Chihuahua, and Colorado, it is not known from Texas. In New Mexico it has been taken only in the Gila River, upper Rio Grande, and San Francisco River drainage systems.

**Oligoneuriidae**

**Homoeoneuria alleni**  
Pescador and Peters, 1980


REMARKS.—This species was originally described from New Mexico by Pescador and Peters (1980), and those authors also reported it from Chihuahua and Utah. It has since been found in Colorado by Durfee and Kondratieff (1994). In New Mexico it is known only from the lower Rio Grande.

**Lachlania dencyannae**  
Koss, 1970


PREVIOUS RECORDS.—Koss and Edmunds (1970): Grant Co (Gila R).

REMARKS.—This is the only species of North American mayflies known exclusively from
New Mexico and therefore endemic to the state and the Gila River drainage system. It may eventually be found in the Gila River drainage system area of eastern Arizona. We consider this species rare and endangered (see Species of Special Concern below). The ending of the specific epithet of this species has been emended to conform to rules of nomenclature because it was based on a modern female name (Deney Anne) latinized by the original author and thus should have further been given the appropriate genitive ending.

*Lachlania saskatchewanensis* Ide, 1941

**DESCRIPTION.**—Adult: Ide (1941); see also Edmunds (1951) as *L. powelli* Edmunds. Larva: Edmunds (1951) as *L. powelli*.


**REMARKS.**—McCafferty (1996) recently showed *S. powelli* Edmunds from Utah (Edmunds 1951) and Mexico (Lugo-Ortiz and McCafferty 1994) to be a junior synonym of *L. saskatchewanensis*. Thus, *L. saskatchewanensis* occurs from Saskatchewan to Guerrero in Mexico. It is known from the adjacent state of Colorado (McCafferty et al. 1993) but is not reported from Arizona, Chihuahua, or Texas. In New Mexico it has been taken only in the San Juan River drainage system.

*Siphlonurus occidentalis* (Eaton), 1885

**DESCRIPTION.**—Adult: Eaton (1885) as *Siphlonurus occidentalis* Eaton. Larva: Clemens (1915).


**NEW COUNTY RECORDS.**—BYU: Grant Co (Gila R, Turkey Cr). NMHU: Otero Co (Agua Chiquita); Taos Co (Rio Hondo). PERC: Grant Co (Buck Cr, Cherry Cr, Little Cr, Sapillo Cr); San Miguel Co (Pecos R); Taos Co (Rio Grande).

**REMARKS.**—McCafferty et al. (1993) indicated that *S. occidentalis* was the most common species of *Siphlonurus* in western North America. It is known from all USA states adjoining New Mexico except Texas, and was reported from Mexico in adjacent Chihuahua (Lugo-Ortiz and McCafferty 1994) and as far south as Hidalgo (Lugo-Ortiz and McCafferty 1996a). In New Mexico it has been taken in all major drainage systems except the Canadian River drainage system.

**FAUNISTICS**

**Regional Affinities**

We have categorized New Mexico mayflies by their general regional geographic affinities and present this data in Table 1. Western species are those that have a considerable north–south distribution pattern in western North America. Only those New Mexico mayflies found north of Colorado and Utah and not in Texas (unless restricted to west Texas) are considered in the western species category. Two subcategories of such western mayflies are informative with respect to faunistics. These subcategories segregate those species in which New Mexico is the southern limit of their ranges, and those that occur further south than New Mexico and Arizona. Southwestern species are the 2nd main distributional category for New Mexico mayflies. These species occur no further north than Colorado or Utah, and no further east than Oklahoma or Texas. Widespread species are the 3rd main distributional category. These are New Mexico species that are western but also occur in at least 1 other large region of the continent, i.e., central, northeastern, or southeastern. Mexican species constitute a 4th category. New Mexico species placed in this category are distributed mainly through Mexico and occur no further north than Arizona, New Mexico, or Texas. Southern species constitute a 5th category. New Mexico species placed in this category are distributed in the southern USA further east than Texas, and range no further north than New Mexico in the West. Eastern species constitute a 6th category. These species occur in the central and northeastern USA in addition to New Mexico.

Table 1 shows that the largest component of the New Mexico mayfly fauna is made up of species generally well represented in the West. Most of these western species are restricted to the USA and Canada, with New Mexico, or New Mexico and Arizona, representing their southern range limit. Moreover, many of these latter species (e.g., *Drunella grandis*, *Epeorus*...
Table 1. Major geographic affinities of the New Mexico mayfly species. See text for detailed definitions of the distributional categories.

<table>
<thead>
<tr>
<th>Southern limits at NM</th>
<th>Western species</th>
<th>Southern limits south of NM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ameletus sparsatus</td>
<td><em>Ephemera infrequens</em></td>
<td>Acentrella insignificans</td>
</tr>
<tr>
<td><em>Ameletus albrighti</em></td>
<td>Heptagenia elegans</td>
<td>Baetis magnus</td>
</tr>
<tr>
<td><em>Ameletus marginata</em></td>
<td>Heptagenia solitaria</td>
<td>Caenis bojesensis</td>
</tr>
<tr>
<td><em>Baetis bicaudatus</em></td>
<td>Leucrocuta petersi</td>
<td>Callibaetis pictus</td>
</tr>
<tr>
<td><em>Cinygmula par</em></td>
<td>Nixe cridrelli</td>
<td>Camelobaetidius warreni</td>
</tr>
<tr>
<td><em>Drunella coloradensis</em></td>
<td>Nixe simplicoides</td>
<td>Lachlania saskatchewanensis</td>
</tr>
<tr>
<td><em>Drunella doddsi</em></td>
<td><em>Paraleptophlebia heteronea</em></td>
<td>Paraleptophlebia memorialis</td>
</tr>
<tr>
<td><em>Drunella grandis</em></td>
<td>Procloeon conturbatum</td>
<td>Rhithrogena mornisoni</td>
</tr>
<tr>
<td><em>Epeorus albertae</em></td>
<td><em>Rhithrogena robusta</em></td>
<td>Serrataella micheneri</td>
</tr>
<tr>
<td><em>Epeorus deceptivus</em></td>
<td><em>Serrataella tibialis</em></td>
<td>Siphlonurus occidentalis</td>
</tr>
<tr>
<td><em>Epeorus longimanus</em></td>
<td><em>Timpanoega hecuba</em></td>
<td>Traverella albiterana</td>
</tr>
<tr>
<td><em>Ephemerella inermis</em></td>
<td><em>Ephemerella altana</em></td>
<td>Neochoroterpes oklahona</td>
</tr>
<tr>
<td>Ameletus doddsianus</td>
<td>Ephemerella alama</td>
<td>Rhithrogena hageni</td>
</tr>
<tr>
<td>Ameletus faustus</td>
<td>Ephemerella mollitia</td>
<td>Rhithrogena platula</td>
</tr>
<tr>
<td>Baetis adonis</td>
<td>Homoepentorix aleni</td>
<td><em>Rhithrogena vitta</em></td>
</tr>
<tr>
<td>Baetis caelestis</td>
<td>Isonychita intermedi</td>
<td>Thraulodes gonzalei</td>
</tr>
<tr>
<td>Baetis notos</td>
<td><em>Labiohaeitctis apache</em></td>
<td>Tricorythodes condylus</td>
</tr>
<tr>
<td>Baetodes edmundsi</td>
<td><em>Lachlania dencyannae</em></td>
<td>Tricorythodes corporulentis</td>
</tr>
<tr>
<td>Camelobaetidius masseri</td>
<td>Neochoroterpes kosi</td>
<td>Tricorythodes dimorophus</td>
</tr>
<tr>
<td>Choroterpes inornata</td>
<td>Neochoroterpes namita</td>
<td>Tricorythodes explicatus</td>
</tr>
<tr>
<td><em>Cloeodes macroleuellus</em></td>
<td>Widespread species</td>
<td>Isonychita sicca</td>
</tr>
<tr>
<td><em>Acentrella insignificans</em></td>
<td>Baetis flavitarca</td>
<td>Paraleptophlebia debilis</td>
</tr>
<tr>
<td><em>Baetis magnus</em></td>
<td><em>Ephemerella simulans</em></td>
<td>Rhithrogena undulata</td>
</tr>
<tr>
<td><em>Camelobaetidius warreni</em></td>
<td><em>Fallceon quilleri</em></td>
<td>Tricorythodes minutus</td>
</tr>
<tr>
<td><em>Callibaetis jerrugineus</em></td>
<td><em>Caenis latipennis</em></td>
<td>Ephemerella simulans</td>
</tr>
<tr>
<td><em>Callibaetis marginata</em></td>
<td><em>Caenis bajasen</em>s</td>
<td>Isonychita sicca</td>
</tr>
<tr>
<td><em>Callibaetis minimus</em></td>
<td><em>Callibaetis montanus</em></td>
<td>Paraleptophlebia debilis</td>
</tr>
<tr>
<td><em>Callibaetis serrata</em></td>
<td>Thraulodes bruneus</td>
<td>Rhithrogena undulata</td>
</tr>
<tr>
<td><em>Callibaetis unicolour</em></td>
<td>Thraulodes speciosus</td>
<td>Tricorythodes minutus</td>
</tr>
<tr>
<td>Leptophlebia bradleyi</td>
<td>Southern species</td>
<td>Traverella albiterana</td>
</tr>
<tr>
<td>Labiohaeitctis propinquis</td>
<td>Eastern species</td>
<td>Traverella albiterana</td>
</tr>
</tbody>
</table>

Species restricted to mountain streams.

Species restricted only to the greater Colorado River drainage system.

Longimanus are restricted to mountain streams, and some have their southern range limit in the Rocky Mountain Province of northern New Mexico (e.g., Serrataella tibialis). None of the western species whose ranges extend into Mexico are restricted exclusively to mountain streams.

The more geographically restricted, southwestern species in New Mexico make up almost as large a component as the western species in New Mexico. None of these species are restricted to mountain streams except *Cloeodes macroleuellus*, but that species is not found at high altitudes. The southwestern species *Labiohaeitctis apache* and *Lachlania dencyannae* are restricted to the greater Colorado River drainage system.

Thirteen species in New Mexico are considered widespread. Some of these are relatively ubiquitous (e.g., *Baetis tricaudatus*, *Callibaetis ferrugineus*, Tricorythodes minutus). *Ephemerella simulans* has its southwestern range limit represented in New Mexico. On the other hand, *Caenis latipennis* and *Fallceon quilleri* are widely distributed in much of the USA but also occur through Mexico and Central America. *Acentrella turbida* is widespread but generally found in cool, well-oxygenated water and thus, in New Mexico, is found in mountain streams.
Four species represent an essentially Mexican fauna in New Mexico. Of these, all but *Callibaetis montanus* are restricted in distribution in New Mexico to the Gila River drainage system. Although *C. montanus* has invaded other drainage systems in the state besides the Gila, it is restricted to lower lying areas (San Juan River and southernmost area of the Rio Grande drainage system). *Baetodes deficiens* is notable because its presence in Sapillo Creek (Gila River drainage system) is its only known occurrence in the USA.

Two species show atypical distribution patterns by their presence in New Mexico. *Leptophlebia bradleyi* is a southern species that reaches its westernmost limits in extreme southeastern New Mexico. *Labiaheuctis propinquus* is a mainly central USA species that has its southwestern range limit in northeastern and south central New Mexico. We regard its distribution in New Mexico as anomalous since it does not fit any predictable pattern. However, the species may prove to be more widespread in North America than now thought and therefore fall into the widespread category.

We have documented the occurrence of a total of 12 families, 37 genera, and 81 species of mayflies in the state of New Mexico. By comparison with broadly adjoining states, 9 families, 28 genera, and 66 species have been recorded for Arizona (see Lugo-Ortiz and McCafferty 1995a, Zloty 1996); 5 families, 14 genera, and 27 species have been recorded for Chihuahua (see Lugo-Ortiz and McCafferty 1995d, 1996a, McCafferty and Lugo-Ortiz 1996); 14 families, 44 genera, and 100 species for Colorado (see McCafferty et al. 1993, Durfee and Kondratieff 1994); and 11 families, 34 genera, and 92 species for Texas (see Lugo-Ortiz and McCafferty 1995b). The low number of taxa for the Mexican state of Chihuahua is due to the more restricted availability of freshwater habitats in that primarily desert area and also the fact that collecting efforts have not been on a par with those in the other states mentioned. On the other hand, the relatively high mayfly taxa number in Colorado is due to the diverse topography and array of freshwater habitats available in that state as well as the fact that Colorado has been one of the better worked North American regions with respect to sampling of aquatic macroinvertebrates.

A more informative comparison of the New Mexico mayfly fauna with that of other regions can be made with a comparative index that takes into account the degree of similarity and difference in the faunas of any 2 regions. We have used Sorensen's coefficient of similarity (SC) to compare New Mexico more thoroughly with each of its broadly adjoining states [SC = 2a/(2a + b + c), where a = number of species in common between New Mexico and a comparative state, b = the number of species in New Mexico, and c = the number of species in the comparative state]. The results of such calculations, taking into consideration any recent taxonomic revisions such as Zloty (1996), are as follows: for New Mexico and Arizona, there are 52 species in common and SC = 0.41; for New Mexico and Chihuahua, 18 species in common and SC = 0.35; for New Mexico and Colorado, 48 species in common and SC = 0.35; and for New Mexico and Texas, 22 species in common and SC = 0.20.

To a large extent, Arizona mirrors the aquatic environment of New Mexico. The shared mayfly fauna of the 2 states is mainly southwestern but also contains many of the western mountain species (Table 1). This accounts for the high coefficient of similarity for these 2 states. Eighteen of the 27 species thus far known from Chihuahua occur in New Mexico, and this is the main reason for considerable similarity between these states. With respect to relationships with Colorado, just as with Arizona, over half of the New Mexico species are found in Colorado also. However, less than half of the Colorado species are found in New Mexico; this is because of a considerable number of more boreal transcontinental species that occur in Colorado (McCafferty et al. 1993) but not New Mexico. The large number of shared mountain species (all those mountain-restricted species shown under the Western [southern limits New Mexico] categories of Table 1) is offset by the fact that many of the southwestern species in New Mexico do not reach Colorado, thus giving a basically intermediate coefficient of similarity between the 2 states. The low coefficient of similarity between New Mexico and Texas is explained by the fact that only one of the basically eastern and southeastern species of east and central Texas (see Lugo-Ortiz and McCafferty 1995b) reaches New Mexico, and in the same respect, western mountain species of New Mexico do not reach Texas. The vast majority of the 22 species shared by New Mexico and Texas are southwestern or
Mexican species, but some are widespread. *Acentrella insignisicans* represents a rare case of a species distributed mainly in the Northwest, but which has also penetrated west Texas, evidently via the Canadian and Pecos River drainage systems.

**Drainage System Relationships**

In Table 2 we have sorted the New Mexico mayfly species by major drainage system. Species richness is greatest in the Gila system (49 species), followed closely by the Rio Grande (46 species), then Pecos (39 species), Canadian (29 species), and finally San Juan (25 species). The Gila, although not large compared with some other drainages, does have a unique complex of both western mountain species and species that could be considered lowland species, many of which are southwestern or Mexican. The species richness of the Rio Grande and Pecos systems is in large part due to the western mountain species present in headwaters and mountain tributaries, and the range of habitats represented over their relatively long courses, including large, low-lying rivers. The Canadian and San Juan systems are somewhat restricted both in area and in habitats, both primarily with low-lying courses with considerable silting, particularly the San Juan. A number of species collected from the San Juan River prior to 1961 may no longer be present there (see Species of Special Concern below).

If intrastate comparisons of the drainage-system mayfly faunas are made by calculating Sorensen’s coefficients (see formulation above), it becomes apparent that the greatest similarity of any 2 systems is that shown by the Gila and Rio Grande systems (Fig. 2), which also happen to be the richest systems. The Pecos system is also relatively similar to both the Gila and Rio Grande (Fig. 2). The least similarity is shown between the Gila and Canadian systems, probably due to the distance between them, compounded by the fact that one is a western drainage and the other an eastern drainage, and by their overall dissimilarity in habitat availability. The Canadian system has only 14 species in common with the San Juan system and another 14 in common with the Gila system. Factoring in the faunal size of the systems in question, however, shows that the Canadian and San Juan systems have a greater similarity than the Canadian and Gila systems (Fig. 2). By summing all intra-drainage coefficients for each of the drainage systems, we can see that the Rio Grande system fauna is most representative of the entire New Mexico fauna, whereas the San Juan and Canadian system faunas are least representative of the state.

Eighteen New Mexico mayfly species are known exclusively from western drainages in the state (San Juan, Zuni, San Francisco, Gila), and 23 species are known exclusively from eastern drainages (essentially all drainages east of the continental divide: Dry Cimarron, Canadian, Rio Grande, Pecos; see Table 2, Fig. 1). The genera to which these exclusive drainage system species belong can be considered with respect to their recent biogeographic origins (Edmunds et al. 1976, McCafferty et al. 1992). Twelve of the 18 species confined to the western drainage systems are species that are members of genera that have recent Neotropical biogeographic origins (*Baetodes, Camelobaetidius, Leptohyphes, Tricorythodes, Thraulodes, Lachlania*). On the other hand, nearly all species (22 of 23) that are found exclusively in eastern drainages in New Mexico belong to genera that have boreal Nearctic biogeographic origins (*Ameletus, Baetis, Labiohaetis, Caenis, Attenella, Drunella, Ephemerella, Serratella, Timponoga, Ephemera, Hexagenia, Cinygmula, Epeorus, Rhithrogena, Isomychia, Neochoroterpes, Leptophlebia, Paraleptophlebia, Homoeoneurta*). This comparison suggests that the greater Colorado drainage system has been a major northern dispersal corridor for mayflies during its 3.5-million-year existence. It also suggests that the greater Rio Grande drainage system has not been amenable to northern dispersal of austral taxa, but has been primarily colonized from the north. However, mountain species found exclusively in the eastern drainage systems (there are 9 of these) evidently have been limited to the northern part of the state by topography. The 38 species of New Mexico mayflies that occur in both eastern and western drainage systems in the state belong to a mix of Nearctic and Neotropical genera and demonstrate that none of the drainage systems in New Mexico should be considered one-way corridors.

**Species of Special Concern**

Recent studies of the mayflies of the Southwest indicate that only 1 endemic species occurs in New Mexico. It is *Lachlania decyannae*, a
Table 2. Drainage system distributions of New Mexico mayfly species.

<table>
<thead>
<tr>
<th>Species</th>
<th>San Juan (including Zuni)</th>
<th>Gila (including San Francisco)</th>
<th>Canadian (including Dry Cimarron)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acentrella insignificans</td>
<td>Ephemerella mollita</td>
<td>Paraleptophlebia debilis</td>
<td>Nixe simplicioides</td>
</tr>
<tr>
<td>Anetropus allrighti</td>
<td>Heptagenia elegantula</td>
<td>Paraleptophlebia memorialis</td>
<td>Paraleptophlebia debilis</td>
</tr>
<tr>
<td>Baetis flavistrixa</td>
<td>Heptagenia solitaria</td>
<td>Ephilo nephrus</td>
<td>Paraleptophlebia debilis</td>
</tr>
<tr>
<td>Baetis tricaudatus</td>
<td>Labiobaetis apache</td>
<td>Lachlania dendycanae</td>
<td>Paraleptophlebia heteroneu</td>
</tr>
<tr>
<td>Callibaetis ferrugineus</td>
<td>Lachlania saskatchewanensis</td>
<td>Rhithrogena morrisoni</td>
<td>Paraleptophlebia memorialis</td>
</tr>
<tr>
<td>Callibaetis montanus</td>
<td>Leptophyes apache</td>
<td>Rhithrogena robusta</td>
<td>Rhithrogena morrisoni</td>
</tr>
<tr>
<td>Callibaetis pictus</td>
<td>Nixe criddlei</td>
<td>Rhithrogena undulata</td>
<td>Rhithrogena morrisoni</td>
</tr>
<tr>
<td>Camelobaetidius warreni</td>
<td>Nixe simplicioides</td>
<td>Siphlonurus occidentalis</td>
<td>Paraleptophlebia memorialis</td>
</tr>
<tr>
<td>Ephemera inermis</td>
<td></td>
<td>Tricorythodes explicatus</td>
<td>Tricorythodes minutus</td>
</tr>
<tr>
<td>Acentrella insignificans</td>
<td>Drunella doddsi</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ametropus aulrighti</td>
<td>Ephemerella altana</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baetis flavistrixa</td>
<td>Ephemerella inermis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baetis magnus</td>
<td>Heptagenia solitaria</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baetis tricaudatus</td>
<td>Falccon quilleri</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baetodes deficiens</td>
<td>Lachlania dendycanae</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baetodes edmundsi</td>
<td>Isomychta intermedia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Causis bjoennianis</td>
<td>Leptophyes apache</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Callibaetis ferrugineus</td>
<td>Leucrocrita petesi</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Callibaetis montanus</td>
<td>Neochoroterpes kossi</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Callibaetis pictus</td>
<td>Nixe criddlei</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Camelobaetidius masseri</td>
<td>Nixe simplicioides</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Camelobaetidius warreni</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Choroterpes inornata</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cloeodes macrolellumus</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

notably distinct and unique mayfly with a restrictive habitat (Koss and Edmunds 1970). Most other species once thought to be endemic to New Mexico have eventually been found in Arizona, often in the same drainage system (middle or lower Colorado River drainage system). Lachlania dendycanae deserves special attention for other reasons, beside its being endemic. It is limited in distribution to the Gila River drainage system. Camelobaetidius musseri, Cloeodes macrolellumus, Rhithrogena viila, Tricorythodes condylus, T. corpulentus, Neochoroterpes kossi, Thraulodes brunneus, T. gonzalezii, and T. speciosus are additional New Mexico species that are found only in the Gila River drainage system. This drainage system can therefore be viewed as a refuge in New Mexico for certain southwestern species. In addition, Lachlania is a highly unusual group of mayflies with rapid flight habits and associated wing morphology unique among the Ephemeroptera (see Edmunds et al. 1976) and a molting process unique among all insects (see Edmunds and McCafferty 1988). Given the highly restricted range and remarkable nature of this mayfly species, we recommend that L. dendycanae be given special consideration as a rare and endangered species, both at the state and federal levels. Because of the degradation of the Gila River, especially in Arizona (see e.g., McNamee 1994), and impending degradation in New Mexico, we suggest...
that the other Gila River drainage system mayfly species, mentioned above, minimally be considered at risk.

We consider the following mayfly species rare or, in some cases, possibly recently extirpated in New Mexico. *Amelotus albrighti* is a sand-dwelling mayfly with very specific habitat requirements (see Clifford and Barton 1979) that has been taken only in the San Juan River in New Mexico and the Green River system in the region where Colorado, Wyoming, and Utah meet (Allen and Edmunds 1976). Although such sand-dwelling species can be difficult to sample (McCafferty 1991), *A. albrighti* has not been taken in New Mexico since 1935. Sublette et al. (1990) discussed the changes to the San Juan River related to a recent host of large-scale irrigation facilities in the San Juan Basin and construction of the Navajo Dam. *Callibaetis fluctuans* is a common species elsewhere, but in New Mexico it has been taken only from a single sample from Castle Creek in Eddy County (lower Pecos River drainage system). It may have only recently invaded the state, and we expect that it may become more widespread if it is relatively vagile as is typical of other species in the genus (McCafferty et al. 1992). *Procloeon conturbatum* is known in New Mexico only from adult males taken at the San Juan River. *Leptophlebia bradleyi* is known only from a single sample from Eddy County, which apparently is the westernmost record of this southern USA species. *Neochoroterpes nanita* is known from only 1 sample from the Canadian River in San Miguel County. Otherwise, it is known only from central and east central Texas (Henry 1993, Lugo-Ortiz and McCafferty 1995b). *Rhithrogena hageni* is known only from an isolated fringe population in the Red River in Taos County, upper Rio Grande drainage system. Although also rare in Arizona, it is relatively common in Colorado. *Hexagenia bilineata* is a large, common, and well-known species in eastern and central areas.

<table>
<thead>
<tr>
<th>Table 2. Continued.</th>
<th>Rio Grande</th>
<th>Pecos</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acentrella insignificans</td>
<td>Epeorus decepcticus</td>
<td>Leptophlebia bradleyi</td>
</tr>
<tr>
<td>Acentrella turbida</td>
<td>Epeorus longimanus</td>
<td>Neochoroterpes oklahoma</td>
</tr>
<tr>
<td>Ameletus doddsianus</td>
<td>Epeorus marginatus</td>
<td>Nixe criddlei</td>
</tr>
<tr>
<td>Ameletus falkus</td>
<td>Ephemerula simulans</td>
<td>Nixe simplicicoides</td>
</tr>
<tr>
<td>AtteneUus margarita</td>
<td>Ephemera allana</td>
<td>Paraleptophlebia debilis</td>
</tr>
<tr>
<td>Baetis bicadenatus</td>
<td>Ephemera inermis</td>
<td>Paraleptophlebia membranalis</td>
</tr>
<tr>
<td>Baetis magnus</td>
<td>Ephemera infrequens</td>
<td>Rhithrogena hageni</td>
</tr>
<tr>
<td>Baetis tricipedatus</td>
<td>#</td>
<td>Rhithrogena hageni magnotini</td>
</tr>
<tr>
<td>Callibaetis ferrugineus</td>
<td>#</td>
<td>Rhithrogena plana</td>
</tr>
<tr>
<td>Callibaetis montanus</td>
<td>#</td>
<td>Rhithrogena robusta</td>
</tr>
<tr>
<td>Callibaetis pictus</td>
<td>#</td>
<td>Rhithrogena undulata</td>
</tr>
<tr>
<td>Choroterpes inornatus</td>
<td>#</td>
<td>Serratella micheneri</td>
</tr>
<tr>
<td>Drunella coloradensis</td>
<td>#</td>
<td>Siphlonurus occidentalis</td>
</tr>
<tr>
<td>Drunella dohodsi</td>
<td>#</td>
<td>Timpanogeta hecuba</td>
</tr>
<tr>
<td>Drunella grandis</td>
<td>#</td>
<td>Tricorythodes dimorphus</td>
</tr>
<tr>
<td>Epeorus albertae</td>
<td>#</td>
<td>Tricorythodes explicatus</td>
</tr>
<tr>
<td>Acentrella insignificans</td>
<td>Callibaetis pictus</td>
<td>Tricorythodes minutus</td>
</tr>
<tr>
<td>Acentrella turbida</td>
<td>Choroterpes inornatus</td>
<td></td>
</tr>
<tr>
<td>Ameletus falkus</td>
<td>Ciugumala par</td>
<td></td>
</tr>
<tr>
<td>Ameletus sparsatus</td>
<td>Drunella coloradensis</td>
<td></td>
</tr>
<tr>
<td>AtteneUus margarita</td>
<td>Drunella dododsi</td>
<td></td>
</tr>
<tr>
<td>Baetis adonis</td>
<td>Drunella grandis</td>
<td></td>
</tr>
<tr>
<td>Baetis bicadenatus</td>
<td>Epeorus decepcticus</td>
<td></td>
</tr>
<tr>
<td>Baetis caelestis</td>
<td>Epeorus longimanus</td>
<td></td>
</tr>
<tr>
<td>Baetis magnus</td>
<td>Ephemera allana</td>
<td></td>
</tr>
<tr>
<td>Baetis tricipedatus</td>
<td>Ephemera inermis</td>
<td></td>
</tr>
<tr>
<td>Caenis latipennis</td>
<td>Falloce quilleri</td>
<td></td>
</tr>
<tr>
<td>Callibaetis ferrugineus</td>
<td>Hexagenia bilineata</td>
<td></td>
</tr>
<tr>
<td>Callibaetis fluctuans</td>
<td>Labiobaetis propinquus</td>
<td></td>
</tr>
</tbody>
</table>

that the other Gila River drainage system mayfly species, mentioned above, minimally be considered at risk.

We consider the following mayfly species rare or, in some cases, possibly recently extirpated in New Mexico. *Amelotus albrighti* is a sand-dwelling mayfly with very specific habitat requirements (see Clifford and Barton 1979) that has been taken only in the San Juan River in New Mexico and the Green River system in the region where Colorado, Wyoming, and Utah meet (Allen and Edmunds 1976). Although such sand-dwelling species can be difficult to sample (McCafferty 1991), *A. albrighti* has not been taken in New Mexico since 1935. Sublette et al. (1990) discussed the changes to the San Juan River related to a recent host of large-scale irrigation facilities in the San Juan Basin and construction of the Navajo Dam. *Callibaetis fluctuans* is a common species elsewhere, but in New Mexico it has been taken only from a single sample from Castle Creek in Eddy County (lower Pecos River drainage system). It may have only recently invaded the state, and we expect that it may become more widespread if it is relatively vagile as is typical of other species in the genus (McCafferty et al. 1992). *Procloeon conturbatum* is known in New Mexico only from adult males taken at the San Juan River. *Leptophlebia bradleyi* is known only from a single sample from Eddy County, which apparently is the westernmost record of this southern USA species. *Neochoroterpes nanita* is known from only 1 sample from the Canadian River in San Miguel County. Otherwise, it is known only from central and east central Texas (Henry 1993, Lugo-Ortiz and McCafferty 1995b). *Rhithrogena hageni* is known only from an isolated fringe population in the Red River in Taos County, upper Rio Grande drainage system. Although also rare in Arizona, it is relatively common in Colorado. *Hexagenia bilineata* is a large, common, and well-known species in eastern and central areas.
of North America. In New Mexico, however, its distribution is disjunct, the population is unusual (see Species Accounts above), and the single habitat where it is found is a one-of-a-kind area in the state. It consists of a 1-km-long, 2-m-deep pool with fine, calcareous sediments. It is located just upstream from Harkey crossing on the Black River (Eddy County). We doubt there is another habitat with this type of burrowing substrate (required by Hexagenia mayflies) in New Mexico. The road crossing mentioned above acts as a partial dam across the limestone basin, and any alteration of the crossing or roadwork would seriously affect the depositional nature and sediment trapping feature of the extensive pool.

_Homoeoneuria alleni_ is known somewhat north and south of New Mexico. In New Mexico it has been taken only once from the lower Rio Grande in Dona Ana County. However, we expect that this sand-dwelling species is difficult to collect in larger rivers. Likewise, _Lachlania saskatchewanensis_, known only from the San Juan River drainage system in New Mexico, is also difficult to sample and in reality may not be rare.

_Baetis adonis, Ephemerella mollitita, and Leucrocuta petersi_ are apparently rare North American species. _Baetis adonis_ is known only from the San Gabriel Mountains of southern California and the upper Pecos River in the foothills of the Sangre de Cristo Mountains in San Miguel County, New Mexico. _Ephemerella mollitita_ is also known only from California and New Mexico. Although it has not been reported from the San Juan River since 1935 and this singular New Mexico record was questioned by Allen and Edmunds (1965), the fact that the species is also known in California from the San Gabriel Mountains (as is _B. adonis_ above) would possibly add credence to the New Mexico report. If it was taken from New Mexico, it may now be extirpated there due to alteration of habitats in the San Juan River that have occurred in the last half of this century. It is possible that _Leucrocuta petersi_ presently occurs only in New Mexico. Outside of New Mexico the species has been known only from the Green River of northeastern Utah and southwestern Wyoming. However, the species may now be extirpated in these latter states because the construction of Flaming Gorge Dam has had some detrimental effects on mayflies of that area (Edmunds personal communication), and _L. petersi_ has not been found there subsequent to the collections of the type material (1945, 1962; Allen 1966). The species apparently is common in the Gila River drainage system in New Mexico, and it has also been taken in a sample from the Canadian River drainage system in another part of the state.

**ACKNOWLEDGMENTS**

We thank Dick Baumann (Provo, Utah), George Edmunds (Salt Lake City, Utah), and Boris Kondratieff (Fort Collins, Colorado) for the loan and donation of collections of New Mexico mayflies. We also thank Arwin Provostha (West Lafayette, Indiana) for the artwork. To all those who have collected mayflies in New Mexico beginning in the 1960s and whose names appear in the New Records sections of this paper, we offer our sincere gratitude for making this study possible. We also thank S.L. Joseph and A.R. Alexander, who collected new county records, but whose names did not appear in the text. The research was supported in part by a grant from the American Philosophical Society. Additional financial support for some collections since 1991 was provided in part by Grant F-59-R through the Federal Aid in Sport Fish Restoration Program administered by the New Mexico Department of Game and Fish and the U.S. Fish and Wildlife Service for development of an index of biotic integrity (IBI) for surface waters of New Mexico. The study has been assigned Purdue Agricultural Research Program Journal Number 15347.

<table>
<thead>
<tr>
<th>G</th>
<th>C</th>
<th>R</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>15[.29]</td>
<td>13[.33]</td>
<td>16[.31]</td>
</tr>
<tr>
<td>C</td>
<td>17[.31]</td>
<td>15[.31]</td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>25[.37]</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Fig. 2. Matrix of New Mexico species shared by, and Sorensen's coefficients of similarity [in brackets] between, major drainage systems in New Mexico. S = San Juan + Zuni, G = Gila + San Francisco, C = Canadian + Dry Cimarron, R = Rio Grande, P = Pecos.
LITERATURE CITED


1888–89. A revisional monograph of recent Ephemero­


1935. Post embryonic development of Ephemero­


Society. 1927.1110 Hocky Mountain species of the mayfly


Peters, W.L., AND C.F. Edmunds, Jr. 1961. The mayflies (Ephemeroptera) of the Navajo Reservoir Basin, New


