

REPORT FOR:

Diversity and Distribution of Freshwater Gastropods from the Ozark Region of Arkansas

Principle Investigator:

Alan D. Christian, Ph.D., Department of Biological Sciences, Arkansas State University,
P.O. Box 599, State University, Arkansas 72467; achristian@astate.edu; Phone:
(870)972-3082; Fax: (870)972-2638

Co-Principle Investigator and Graduate Research Assistant:

David M. Hayes, Department of Environmental Science, P.O. Box 847, State University,
Arkansas 72467: david.hayes@smail.astate.edu

Submitted to:

William R. Posey II
Malacologist and Commercial Fisheries Biologist, AGFC
P.O. Box 6740
Perrytown, Arkansas 71801

September 2007

Executive Summary

Eighty-percent of freshwater gastropod species in Arkansas have a state ranking of SU (unknown conservation status), while in comparison, only 4% of Arkansas mussel species have a state ranking of SU. This is most likely a reflection of the freshwater gastropod fauna of Arkansas being a poorly surveyed group. The purpose of this study was to survey freshwater gastropods from the Ozark Mountain Region of Arkansas in an effort to fill data gaps on distribution and conservation status. We surveyed 171 sites within the Ozark Mountain region of Arkansas from June through August 2006. Freshwater gastropods were collected by visual/tactile searches in addition to dip nets. The majority of sampling was in lotic environments which is where the imperiled groups of gastropods occur (i.e. Pleuroceridae and Hydrobiidae). A total of 24 species was collected in the Ozark Mountain Region of Arkansas. Out of 171 sites surveyed, 48 did not yield gastropods and the maximum species richness at any site was 8. *Elimia* (= *Goniobasis*) *potosiensis* (Pleuroceridae) was the most common species, occurring at 88 sites and at most sites was the most abundant gastropod. The second most common species in the Ozarks was *Pleurocera acuta* (Pleuroceridae) occurring at 51 sites. *Elimia potosiensis* is widespread in the White River drainage, but only occurs in a few localities in the Arkansas River drainage. *Pleurocera acuta* appears to be absent from the Arkansas River drainage. The significance of this study is that it represents the single largest sampling of freshwater gastropods in Arkansas to date and will serve to fill in large data gaps of taxa distributions in Arkansas. This study also will play a large role in a future state-wide surveys of freshwater gastropods and provides the framework for establishing conservation status categories and subsequent management of this group.

Introduction

Eighty-percent of freshwater gastropod species in Arkansas have a state ranking of SU (unknown conservation status; NatureServe 2006), while in comparison, only 4% of Arkansas mussel species have a state ranking of SU (NatureServe, 2006). This is most likely a reflection of the freshwater gastropod fauna of Arkansas being a poorly surveyed group. Within the state, the gastropod fauna of various drainages has been surveyed (Gordon, 1980a; Gordon et al., 1995; Gordon, 1982; Gordon, 1985) as well as various counties and regions (Pilsbry, 1900; Sampson, 1882; Sampson, 1883b; Sampson, 1883a; Wheeler, 1918), however, no thorough state wide survey has been conducted. The most recent state list of freshwater gastropod species (Gordon, 1980b) is taxonomically outdated and did not include ranges for species within the state of Arkansas. General distributions and current species lists are necessary for proper conservation and management of this imperiled group.

Purpose/Objective

The purpose of this study was to survey freshwater gastropods from the Ozark Mountain Region of Arkansas in an effort to fill data gaps on distribution and conservation status.

Methods

We surveyed 171 sites within the Ozark Mountain region of Arkansas from June through August 2006. Freshwater gastropods were collected by visual/tactile searches in addition to dip nets. The majority of sampling was in lotic environments which is where the imperiled groups of gastropods occur (i.e. Pleuroceridae and Hydrobiidae). GPS

coordinates were taken at each site and recorded in decimal degrees in the datum NAD83. Specimens were preserved in 95% EtOH and deposited in the Arkansas State University Museum of Zoology. Identifications were made using Burch (1982) and Wu et al (1997). Dr. Fred Thompson at Florida Museum of Natural History (FLMNH) identified specimens of the family Hydrobiidae. Distribution maps were generated using GPS coordinates in the program DIVA-GIS v5.4 (Hijmans, 2007). Arkansas gastropod collections were examined at the National Museum of Natural History (NMNH) and Ohio State University Museum (OSUM).

Results and Discussion

A total of 24 species were collected in the Ozark Mountain Region of Arkansas (Table 1). Out of 171 sites surveyed, 48 yielded no gastropods (Fig. 1). The maximum species richness at any site was eight species (Fig. 2). *Elimia* (= *Goniobasis*) *potosiensis* (Lea 1841)(Pleuroceridae) was the most common species, occurring at 88 sites and was the most abundant gastropod at most sites (Fig. 3). The second most common species in the Ozarks was *Pleurocera acuta* Rafinesque 1831(Pleuroceridae) occurring at 51 sites (Fig. 4). *Elimia potosiensis* is widespread in the White River drainage, but only occurs in a few localities in the Arkansas River drainage. *Pleurocera acuta* appears to be absent from the Arkansas River drainage. In a published survey of the Strawberry River (Harp and Robinson, 2006), the authors incorrectly list *Elimia ovoidea* (Lea 1845)(type locality- Alexandria, LA) for *E. potosiensis*.

Two species historically occurring in the region were not found during this study: *Somatogyus crassilabris* Walker 1915(Hydrobiidae) and *Menetus sampsoni* ‘Ancey’

Sampson 1855 (Planorbidae). *Somatogyrus crassilabris* from the North Fork of the White River is thought to be extinct (Gordon, 1980b; Robinson and Allen, 1995). The taxonomic status of *Menetus sampsoni* is questionable and may be a junior synonym of *Menetus dilatatus* (Burch, 1982). *Menetus sampsoni* was reported from Frog Bayou (Gordon, 1985) and in other non-Ozark regions of Arkansas (FLMNH collections).

One of the most important finds of this survey was the re-discovery of *Leptoxis arkansensis* (Hinkley 1915)(Pleuroceridae) within Arkansas (Fig. 5). *Leptoxis arkansensis* is the only member of the genus occurring west of the Mississippi River. Within the state of Arkansas, *Leptoxis arkansensis* was thought to be endemic to the North Fork of the White River. Wu et al. (1997) surmised that Arkansas populations of *L. arkansensis* had been extirpated due to the construction of Norfork Lake. We found populations of *L. arkansensis* in Otter Creek, a small tributary of the North Fork of the White River, below the dam. Sylamore Creek, Stone Co., also has shown to support large populations of *L. arkansensis*. Three individuals were found in the White River, downstream of the Sylamore Creek confluence with the White River at Boswell Shoals Access. Hinkley (1915) also noted in the original description that, “a very few specimens were taken at Cotter, Arkansas.” Sampling at the White River, Cotter produced no specimens of *L. arkansensis*.

Within the Ozark Region, *Pleurocera alveare* Rafinesque 1831 appears to be restricted to the Spring and Black Systems, although it is known to occur in the Current River in MO (Wu et al., 1997) (Fig. 6) and holdings at NMNH have records for *P. alveare* from the White River at Cotter (not found during this study). Similar in distribution, *Pleurocera canaliculatum* (Say 1821) and *Lithasia verrucosa* (Rafinesque

1820) occur mainly within the Black River and lower Spring River, with *P. canaliculatum* (Fig. 6) ranging further north into the Eleven Point River and *L. verrucosa* (Fig 5) historically known to occur further south into the White River, near Bradford and Newport. All three of these species have wider geographic ranges east of the Mississippi River. Minton and Lydeard (2003) stated that based on DNA sequences, *L. verrucosa* from west of the Mississippi River may represent a separate species from *L. verrucosa* from east of the Mississippi River, but refrained from describing the species until further molecular analysis was completed. *Lithasia verrucosa* is the only member of the genus occurring in Arkansas. Records of *Lithasia armigera* (Say 1821), housed at FLMNH from the Black River at Black Rock were requested for loan and the specimens were determined to be *Lithasia verrucosa*. It is unlikely that *L. armigera* occurs within the State and the misidentified FLMNH specimens may have been the source for listing it as occurring in Arkansas by Neves et al. (1997).

The family Hydrobiidae is the most diverse group of freshwater gastropods in North America (Lydeard et al., 2004). Few hydrobiids were found during this survey (Fig. 7). It is very likely that due to the minute size of these species (less than 10mm), they are overlooked/missed during normal sampling efforts, although special effort was made to search for hydrobiid taxa given their high incidents of endemism and imperilment. Hydrobiids generally occur in large numbers (F.G. Thompson *pers comm.*) however, we did not locate any large hydrobiid populations in this study. Only small numbers of individuals were found at locations with hydrobiid species. *Marstonia ozarkensis* (Hinkley 1915), an S1, was found at one locality, although it historically occurred in the North Fork of the White River. Wu et al. (1997) reported that *M.*

ozarkensis has been “extirpated from all former habitats in Arkansas (pg. 20).” *Amnicola cora* (Hubricht 1979) , endemic to Foushee Cave, Independence Co., was not collected during this study despite occurring in the Ozark Region. Recent surveys have shown populations of *A. cora* are stable (Graening, 2003), therefore we deemed further collection as unnecessary.

Viviparus subpurpureus (Say 1829) (Viviparidae) is not typically an Ozarkian species, but rather is more characteristic of slow moving rivers in the delta region (Fig. 8). Up to three different species of the genus *Campeloma* (Viviparidae) have been recognized in the state, *C. descisum* (Say, 1817) *C. subsolidum* (Anthony 1860), and *C. crassulum* Rafinesque 1819, but each form is distinguished only by weak differences in shell shape and size. The size and shape of the shell could be influenced by a variety of environmental factors (e.g. (Ortmann, 1920) and thus the characters are not always useful in separating species. Widespread parthenogenesis in *Campeloma* further confounds species limits. Additionally, recent molecular work indicates that the number of currently recognized *Campeloma* species may be an overestimate (Johnson and Leefe, 1999). Until a revision of *Campeloma* is completed, we have listed all specimens in the genus under the oldest name, *Campeloma decisum* (Say 1817)(Fig. 9). *Campeloma decisum* is generally found in sandy or silty substrate in large rivers.

Three members of the family Lymnaidae were found in the Ozark Region of Arkansas: *Pseudosuccinea columnella* (Say 1817), *Fossaria obrussa* (Say 1825, and *Fossaria bulimoides* Lea 1841)(Fig. 9). Members of this family generally occur in lentic systems, but can occur in lotic systems as well. Gordon (1980b) included *Fossaria humilis* in his list of freshwater gastropods from Arkansas, however, Burch (1982) lists

this species as being an Atlantic Slope species. Wu et al. (1997) lists this species as occurring in Missouri as well. We have chosen to follow Burch (1982), pending a revision of the family.

The Planorbidae are generally characteristic of lentic environments, however, individuals can occur in slow moving rivers and in backwaters of faster moving systems. Four species of planorbids were observed during this study: *Planorbella trivolvis*(Say 1817), *Helisoma anceps*(Menke 1830), *Menetus dilatatus*(Gould 1841), and *Gyrulus parvus* (Say 1817)(Fig. 11 and 12). All four species are common and widespread in North America (Burch, 1982). *Planorbella trivolvis* is of particular interest in Arkansas because it is an intermediate host for *Bolbophorus* sp., a trematode which causes catfish mortality in aquaculture ponds (Levy et al., 2002), a major economic importance in other regions of Arkansas.

Species identification based on shell morphology is difficult in the family Physidae and confident identification of species can only be made via dissection and examination of penile morphology. Specimens of the family Physidae will be sent to professionals working on the group for more definitive identification. Gordon (1980) listed two species of Physidae as occurring in Arkansas, *Physa gyrina* (Say 1821) and *Physa virgata* (Gould 1855). *Physa virgata* has been shown to be conspecific with *P. acuta* (Draparnaud 1805) based on studies of reproductive isolation (Dillon et al., 2005). Recently, the taxonomy of the Physidae has undergone extensive revisions (Wethington and Lydeard, 2007). It is likely that the *Physa* species in Arkansas will be *P. gyrina*, *P. acuta*, *P. hendersoni* (Clench 1925) or *P. pomilla* Conrad 1834 based on literature records and recent synonymizations (Dillon et al., 2005; Wethington and Lydeard, 2007).

Wu et al. (1997) listed 12 species of Physidae as occurring in Missouri, many of which have been synonymized with *P. gyrina* or *P. acuta*. Four species listed in Wu et al. (1997) were not treated in the most recent taxonomic study nor were they listed in Burch (1981) or Turgeon et al. (1998), therefore the taxonomic status of these species is questionable. These species include *P. goodrichi* Clench 1926, *P. anatina* Lea 1864, *P. salina* Clench 1930, and *P. saffordii* Lea 1864. *Physa* specimens were collected at 48 sites within the Ozark Mountain Region and were the third most abundant gastropod in the region (Fig. 13). *Physa* occurs in a variety of habitats and is tolerant of a wide range of environmental conditions. Additionally, *Physa* is a pulmonate, which means it breathes via a lung modified from the mantle cavity, and can tolerate low oxygen levels. These factors give *Physa* the ability to colonize habitats where many other species would not be able to survive.

Recent research on Ancyliidae taxa has shown that the nominal taxa *Laevapex fuscus* (Adams 1841), *L. diaphanous* (Haldeman 1841), and *Ferrissia arkansaensis* (Walker 1925) are not morphologically or genetically distinct and have been synonymized under *L. fuscus* (Walther et al., 2006)(Fig. 13). Currently, molecular work is underway on the genus *Ferrissia*. Specimens from Benton Co., which is the type locality for the nominal species *Ferrissia walkeri* (Pilsbry & Ferris 1907), have been sent to Andrea Walther (University of Michigan), to determine if it represents a valid species. Pending those results, I have listed all *Ferrissia* as either *F. rivularis* (Say 1817) or *F. fragilis* (Tryon 1863)(Fig. 14).

One invasive species, *Melanoides tuberculata* (Müller 1774)(Thiaridae) was found on the Spring River, just downstream of Dam 3 near Hardy on Sept. 9, 2005. The

specimen was a single dead shell and several return visits have not produced any additional individuals. *M. tuberculata* is a parthenogenic snail from southeast Asia. It is common in the pet trade, so it is possible live/dead individuals were introduced by aquarium hobbyists. Given the close proximity of the specimen to the Arkansas Game and Fish Commission Spring River State Fish Hatchery monitoring should be in place to prevent the spread of this species to determine if viable populations persist. This species should not be confused with *Pleurocera acuta*, which is common and abundant, especially in the Spring River. Both snails are conical in shape, however, *M. tuberculata* possesses brown-red blotches on the shell while *P. acuta* is usually solid colored or may possess banding patterns. The 2 species also can be distinguished by the aperture edge, which is more angular in *P. acuta* compared to the more rounded aperture of *M. tuberculata* (Fig. 15). This species has invaded large portions of the western US, including Texas and Louisiana (NatureServe 2006).

Significance

This study represents the single largest sampling of freshwater gastropods in Arkansas to date and will serve to fill in large data gaps of taxa distributions in Arkansas. These data will provide valuable baseline data for conservation managers. This study will also play a large role in a future state-wide survey of freshwater gastropods and provides the framework for establishing conservation status categories and subsequent management of this group.

Acknowledgments

We would like to thank the AGFC for funding this study. We also would like to thank Robert Hershler (National Museum of Natural History) and Tom Watters (Ohio State University Mollusk Collection) for access to museum collections. Fred Thompson (Florida Museum of Natural History) and Andrea Walther (University Michigan) have assisted in identification of Hydrobiidae and Ancyliidae, respectively, and Mickey Matthews and John Harris have assisted in field collections.

Literature Cited

- BURCH, J. B. 1982. Freshwater snails (Mollusca: Gastropoda) of North America. EPA 600/3-82-026. Environmental Protection Agency, Cincinnati, OH.
- DILLON, R. T., J. D. ROBINSON, T. P. SMITH, and A. R. WETHINGTON. 2005. No reproductive isolation between freshwater pulmonate snails *Physa virgata* and *P. acuta*. *Southwestern Naturalist*. 50:415-422.
- GORDON, M. E. 1985. Mollusca of Frog Bayou, Arkansas. *The Nautilus*. 99:6-9.
- GORDON, M. E. 1980a. Freshwater Mollusca of the Elk River, White River above Beaver Reservoir, and Frog Bayou drainages of the southwestern Ozarks., p. 366. University of Arkansas, Fayetteville.
- . 1980b. Recent mollusca of Arkansas with annotations to systematics and zoogeography. *Proceedings of the Arkansas Academy of Science*. 34:58-62.
- . 1982. Mollusca of the White River, Arkansas and Missouri. *The Southwestern Naturalist*. 27:347-335.
- . 1985. Mollusca of Frog Bayou, Arkansas. *The Nautilus*. 99:6-9.
- GORDON, M. E., S. W. CHORDAS III, G. L. HARP, and A. V. BROWN. 1995. Aquatic Mollusca of the White River National Wildlife Refuge, Arkansas, U.S.A. *Walkerana*. 7:1-9.
- GRAENING, G. O. 2003. Subterranean biodiversity of Arkansas, Part 2: Status update of the Foushee Cavesnail, *Ammicola cora*, Hubricht, 1979 (Mollusca: Gastropoda: Hydrobiidae). *Journal of the Arkansas Academy of Science*. 57:195-196.
- HARP, G. L., and H. W. ROBINSON. 2006. Aquatic macroinvertebrates of the Strawberry River system in south-central Arkansas. *Journal of the Arkansas Academy of Science*. 60:46-61.
- HIJMANS, R. 2007. DIVA-GIS v5.4. Software distributed by the author at www.diva-gis.org.
- HINKLEY, A. A. 1915. New fresh-water shells from the Ozark Mountains. *Proceedings of the United States National Museum*. 49:587-589.
- JOHNSON, S. G., and W. R. LEEFE. 1999. Clonal diversity and polyphyletic origins of hybrid and spontaneous parthenogenetic *Campeloma* (Gastropoda: Viviparidae) from the south-eastern United States. *Journal of Evolutionary Biology*. 12.
- LEVY, M. G., J. R. FLOWERS, M. F. POORE, J. E. MULLEN, L. H. KHOO, L. M. POTE, I. PAPERNA, R. DZIKOWSKI, and R. W. LITAKER. 2002. Morphologic, pathologic, and genetic investigations of *Bolbophorus* species affecting cultured channel catfish in the Mississippi Delta. *Journal of Aquatic Animal Health*. 14:235-246.

- LYDEARD, C., R. H. COWIE, W. F. PONDER, A. E. BOGAN, P. BOUCHET, S. A. CLARK, K. S. CUMMINGS, T. J. FREST, O. GARGOMINY, D. G. HERBERT, R. HERSHLER, K. E. PEREZ, B. ROTH, M. SEDDON, E. E. STRONG, and F. G. THOMPSON. 2004. The global decline of non-marine mollusks. *Bioscience*. 54:321-330.
- MINTON, R. L., and C. LYDEARD. 2003. Phylogeny, taxonomy, genetics and global heritage ranks of an imperiled, freshwater snail genus *Lithasia* (Pleuroceridae). *Molecular Ecology*. 12:75-87.
- NATURESERVE. 2006. An online encyclopedea of life. Available at <http://www.natureserve.org/explorer> April 2006.
- NEVES, R. J., A. E. BOGAN, J. D. WILLIAMS, S. A. AHSLTEDT, and P. W. HARTFIELD. 1997. Status of aquatic molluscs in the Southeastern United States: a downward spiral of diversity. pp. 43-86. *In: Aquatic Fauna in Peril: the Southeastern Perspective*. Special Publication 1. G. W. Benz and D. E. Collins (eds.). Southeast Aquatic Research Institute, Lenz Design and Communications, Decatur, GA.
- ORTMANN, A. E. 1920. Correlation of shape station in fresh-water mussels. *Proceedings of the American Philosophical Society*. 59:268-312.
- PILSBRY, H. A. 1900. Notes on certain Mollusca of southwestern Arkansas. *Proceedings of the Academy of Natural Sciences, Philadelphia*. 52:499-459.
- ROBINSON, H. W., and R. T. ALLEN. 1995. *Only in Arkansas: A Study of the Endemic Plants and Animals of the State*. University of Arkansas Press, Fayetteville.
- SAMPSON, F. A. 1882. Shells of Eureka Springs, Arkansas. *Kansas City Review of Science and Industry*. 5:526-528.
- . 1883a. Notes on the distribution of shells, No. III. *Kansas City Review of Science and Industry*. 6:551-554.
- . 1883b. Notes on the distribution of shells.- No. IV. *Kansas City Review of Science and Industry*. 7:22-25.
- TURGEON, D. D., J. F. QUINN, A. E. BOGAN, E. V. COAN, F. G. HOCHBERG, W. G. LYONS, P. M. MIKKELSON, R. J. NEVES, C. F. E. ROPER, G. ROSENBERG, B. ROTH, A. SCHLETEMA, F. G. THOMPSON, M. VECCHIONE, and J. D. WILLIAMS. 1998. *Common and scientific names of aquatic invertebrates from the United States and Canada: Mollusks* (2nd edition). American Fisheries Society Special Publication 26.
- WALTHER, A. C., T. LEE, J. B. BURCH, and D. O FOIGHIL. 2006. *E Pluribus Unum: A phylogenetic and phylogeographic reassessment of Laevapex* (Pulmonata: Ancyliidae), a North American genus of freshwater limpets. *Molecular Phylogenetics and Evolution*. 40:501-516.
- WETHINGTON, A. R., and C. LYDEARD. 2007. A molecular phylogeny of Physidae (Gastropoda: Basommatophora) based on mitochondrial DNA sequences. *Journal of Molluscan Studies*. 73:241-257.
- WHEELER, H. E. 1918. The Mollusca of Clark County, Arkansas. *The Nautilus*. 31:109-123.
- WU, S.-K., R. D. OESCH, and M. E. GORDON. 1997. *Missouri Aquatic Snails*. Missouri Department of Conservation, Jefferson City, MO.

Table 1. List of gastropods, their state rank, Global Heritage Rank, and corresponding map page number collected in this survey of the Ozark Region of Arkansas.

| Scientific Name | Common Name | State Rank | Global Heritage Rank | Map Page # |
|--------------------------------------|-----------------------|------------|----------------------|------------|
| Viviparidae | | | | |
| 1. <i>Viviparus subpurpureus</i> | Olive Mysterysnail | SU | G5 | 27 |
| 2. <i>Cameloma decisum</i> | Pointed Cameloma | SU | G5 | 28 |
| Hydrobiidae | | | | |
| 3. <i>Cincinnatia integra</i> | Midland Siltsnail | SU | G5 | 26 |
| 4. <i>Marstonia ozarkensis</i> | Ozark Pyrg | S1 | G1 | 26 |
| 5. <i>Birgella subglobosus</i> | Globe Siltsnail | S1 | G4 | 26 |
| 6. <i>Somatogyrus crassilabris</i> * | Thick-lip Pebblesnail | SX | GX | |
| 7. <i>Ammicola cora</i> † | Foushee Cavesnail | S1 | G1G2 | |
| Pleuroceridae | | | | |
| 8. <i>Elimia potosiensis</i> | Pyramid Elimia | SU | G5 | 22 |
| 9. <i>Pleurocera acuta</i> | Pointed Hornsnail | SU | G5 | 23 |
| 10. <i>P. canaliculatum</i> | Silty Hornsnail | SU | G5 | 25 |
| 11. <i>P. alveare</i> | Rugged Hornsnail | SU | G3 | 25 |
| 12. <i>Lithasia verrucosa</i> | Varicose Rocksnaail | SU | G2G3 | 24 |
| 13. <i>Leptoxis arkansensis</i> | Arkansas Mudalia | S1? | G1 | 24 |
| Pomatiopsidae | | | | |
| 14. <i>Pomatiopsis lapidaria</i> | Slender Walker | SU | G5 | 26 |
| Lymnaidae | | | | |
| 15. <i>Fossaria obrussa</i> | Golden Fossaria | SU | G5 | 29 |
| 16. <i>Fossaria bulimoides</i> | Prarie Fossaria | SU | G5 | 29 |
| 17. <i>Pseudosuccinia columnella</i> | Mimic Lymnaea | SU | G5 | 29 |
| Planorbidae | | | | |
| 18. <i>Helisoma anceps</i> | Two-Ridge Rams-horn | SU | G5 | 30 |
| 19. <i>Planorbella trivolvis</i> | Marsh Rams-horn | SU | G5 | 30 |
| 20. <i>Menetus dilatatus</i> | Bugle Sprite | SU | G5 | 31 |
| 21. <i>Menetus sampsoni</i> * | N/A | SU | G3G4 | |
| 22. <i>Gyraulus parvus</i> | Ash Gyro | SU | G5 | 31 |
| Physidae | | | | |
| 23. <i>Physa sp.</i> | Physa species | SU | G5 | 32 |
| Ancylidae | | | | |
| 24. <i>Laevapex fuscus</i> | Dusky Ancylid | SU | G5 | 33 |
| 25. <i>Ferrissia rivularis</i> | Creeping Ancylid | SU | G5 | 33 |
| 26. <i>Ferrissia fragilis</i> | Fragile Ancylid | SU | G5 | 33 |

(*)Indicates historical records for the region but not found during this study..

(†)This species is endemic to one cave which was recently surveyed (Graening, 2003) and was thus not surveyed in this study.

Table 2. Locality data for all gastropod collection sites surveyed in the Ozark Mountain Region of Arkansas, 2006. Numbers in the species column correspond to numbers in Table 1 (0 = No gastropods found).

| Site # | Lat | Lon | County | Locality | Date | Species |
|--------|---------|----------|------------|---|----------|-------------------|
| 1 | 35.5226 | -94.0751 | Crawford | Little Mulberry Cr off Mulberry Rd | 7/6/2006 | 17, 18, 23 |
| 2 | 35.5262 | -94.2720 | Crawford | Frog Bayou @ Rudy, Hwy 282 Crossing | 7/6/2006 | 18, 23 |
| 3 | 35.4639 | -94.3892 | Crawford | Lee Creek, Rena Rd xing | 7/6/2006 | 0 |
| 4 | 35.5514 | -94.4296 | Crawford | Webber Cr @ Hwy 220 xing | 7/6/2006 | 0 |
| 5 | 35.5689 | -94.3453 | Crawford | West Cedar Cr. @ Hwy 162 Crossing | 7/6/2006 | 23 |
| 6 | 35.7022 | -94.3280 | Crawford | Lee Creek @ Hwy 220xing | 7/6/2006 | 0 |
| 7 | 35.7027 | -94.3280 | Crawford | Lee Creek @ Lee Creek Canoe Ramp | 7/6/2006 | 0 |
| 8 | 35.7136 | -94.3080 | Crawford | Lee Creek? @ Hwy 220xing | 7/6/2006 | 0 |
| 9 | 35.7822 | -94.2501 | Washington | Devil's Den State Park off Hwy 74 | 7/6/2006 | 0 |
| 10 | 35.7821 | -94.2501 | Washington | West Fork White River, HWY 71 Crossing, S. of Greendland | 7/6/2006 | 8, 23 |
| 11 | 35.8670 | -94.1185 | Washington | West Fork White River @ Brentwood Rest Area | 7/6/2006 | 0 |
| 12 | 35.9260 | -94.0528 | Washington | Middle Fork White River @ CR 43 | 7/6/2006 | 8 |
| 13 | 35.9510 | -94.0592 | Washington | Middle Fork White River, CR 32 & 45 bridge | 7/6/2006 | 8 |
| 14 | 36.1032 | -94.3450 | Washington | Illinois R., Hwy16xing before Weddington WMA | 7/7/2006 | 3, 8 |
| 15 | 36.1455 | -94.4962 | Benton | Illinois R., Hwy16xing north of Weddington WMA | 7/7/2006 | 8 |
| 17 | 36.1913 | -94.3873 | Benton | Osage Cr. South of Logan @ Gailey Hollow Rd crossing Osage Cr. @ Logan Cave Rd xing, upstream of Wildcat Cr. | 7/7/2006 | 8 |
| 18 | 36.1972 | -94.3377 | Benton | Confl. | 7/7/2006 | 8, 24 |
| 19 | 36.2048 | -94.2353 | Washington | Brush Cr., @ Elm Springs, Hwy 112xing | 7/7/2006 | 0 |
| 20 | 36.2438 | -94.2353 | Benton | Spring Cr, 112xing, Midway between Elm Sprs & Cave Sprs | 7/7/2006 | 8, 23 |
| 21 | 36.2613 | -94.2315 | Benton | Cave Springs Effluent @ Cave Spring | 7/7/2006 | 19, 21, 23 |
| 22 | 36.2543 | -94.2725 | Benton | Little Osage Cr @ Hwy 264 crossing | 7/7/2006 | 8 |
| 23 | 36.2420 | -94.4893 | Benton | Flint Creek off Hwy 59, S of Gentry | 7/7/2006 | 0 |
| 24 | 36.3652 | -94.5514 | Benton | Spavinaw Cr. @ Hwy 102 crossing | 7/7/2006 | 8, 23 |
| 25 | 36.3491 | -94.4483 | Benton | Wolf Cr., 59xing | 7/7/2006 | 8 |
| 26 | 36.3352 | -94.4338 | Benton | Small trib entering Crystal Lake | 7/7/2006 | 8, 20, 23, 25, 26 |
| 27 | 36.4209 | -94.1193 | Benton | White River/Beaver Lake Horseshoe Bend CG | 7/7/2006 | 0 |
| 28 | 36.4208 | -94.1193 | Benton | Little Sugar Cr, N of Little Flock, Hwy 94 xing | 7/8/2006 | 8 |

| | | | | | | |
|----|---------|----------|------------|--|-----------|--------------|
| 29 | 36.4235 | -93.8426 | Carrol | White R., tailwaters of Beaver Lake Exxon Gas Station fountain, @ 62 and 187 Junction, NW of | 7/8/2006 | 0 |
| 30 | 36.4319 | -93.7815 | Carrol | Eureka Springs | 7/8/2006 | 19 |
| 31 | 36.3946 | -93.6343 | Carrol | Kings R, Rt. 62 Access, W of Pleasant Valley | 7/8/2006 | 8 |
| 32 | 36.4274 | -93.6239 | Carrol | Kings R., Hwy 143 crossing | 7/8/2006 | 8, 9, 23 |
| 33 | 36.4626 | -93.5962 | Carrol | Kings River, AGFC Stoney Point Access | 7/8/2006 | 8, 9, 23 |
| 34 | 36.2709 | -93.6682 | Carrol | Unnamed trib to Kings River | 7/8/2006 | 8 |
| 35 | 36.2820 | -93.6644 | Carrol | Unnamed trib to Kings River. Nearly dry | 7/8/2006 | 8, 9 |
| 36 | 36.2821 | -93.6644 | Carrol | Kings River AGFC Access | 7/8/2006 | 8 |
| 37 | 36.1558 | -93.7336 | Madison | Withrow Spring @ Withrow Spring, Rt 23 across from pool War Eagle Cr, Rt 23 xing, AGFC Access, S of Withrow | 7/9/2006 | 23 |
| 38 | 36.1503 | -93.7404 | Madison | Springs | 7/9/2006 | 8, 20, 24 |
| 39 | 36.2195 | -94.0189 | Washington | War Eagle Campground | 7/9/2006 | 0 |
| 40 | 36.1593 | -93.9386 | Washington | Whitener Cr, 303xing N of Hindsville | 7/9/2006 | 0 |
| 41 | 36.2024 | -93.8567 | Madison | War Eagle Cr, 45xing | 7/9/2006 | 8, 9, 15, 23 |
| 42 | 36.1316 | -94.9477 | Washington | Brush Cr., @ Rt 45xing, West of Mayfield | 7/9/2006 | 8 |
| 43 | 36.1043 | -94.0076 | Washington | Richland Cr @ Hwy 45 crossing W of Goshen | 7/9/2006 | 23 |
| 44 | 36.1062 | -94.0122 | Washington | White R., Hwy 45xing AGFC Access W of Goshen | 7/9/2006 | 0 |
| 45 | 36.1210 | -93.6934 | Madison | War Eagle Cr, 412 xing E of Harmony | 7/9/2006 | 8 |
| 46 | 36.1438 | -93.5941 | Madison | Kings R, AGFC Marble Access | 7/9/2006 | 8, 9 |
| 47 | 36.1004 | -93.5442 | Madison | Kings R, @ Rt 21 crossing, N of Kingston | 7/9/2006 | 8, 24 |
| 48 | 36.0094 | -93.3737 | Newton | Clark Creek @ Lost Valley Campground (dry) | 7/9/2006 | 0 |
| 49 | 36.0413 | -93.7048 | Madison | War Eagle Cr. @ Rt 23 crossing | 7/10/2006 | 8, 26 |
| 50 | 35.8936 | -93.5828 | Madison | Mink Cr., Trib to Kings River @ CR3500 crossing | 7/10/2006 | 23 |
| 51 | 35.8204 | -93.6450 | Madison | White R @ Rt 16 crossing, Pettigrew | 7/10/2006 | 23 |
| 52 | 35.8192 | -93.7800 | Madison | White R @ Hwy 16/23xing at St. Paul | 7/10/2006 | 0 |
| 53 | 35.6820 | -93.7869 | Franklin | Mulberry R @ Redding CG | 7/10/2006 | 0 |
| 54 | 35.6787 | -93.6889 | Franklin | Mulberry R @ High Bank Canoe Launch, Hwy 215xing | 7/10/2006 | 0 |
| 55 | 35.6724 | -93.6679 | Johnson | Little Mulberry Cr., W of Yale | 7/10/2006 | 0 |
| 56 | 35.6746 | -93.6615 | Johnson | Mulberry R @ Wolf Pen CG, Ozark-St.Francis National Forest | 7/11/2006 | 23 |
| 57 | 35.6842 | -93.5990 | Johnson | Mulberry R @ Hwy 103xing, S of Hwy 215 | 7/11/2006 | 0 |
| 58 | 35.5496 | -93.5613 | Johnson | Middle Fork Horsehead Cr., N of Harmony @ Rt 103 crossing | 7/11/2006 | 20, 23 |
| 59 | 35.6780 | -93.2602 | Johnson | Haw Creek Falls Campground on Hwy 123 | 7/11/2006 | 0 |

| | | | | | | |
|----|---------|----------|---------------|--|-----------|------------------|
| 60 | 35.6756 | -93.2355 | Johnson | Big Piney Cr. Boat Launch at Hwy 123xing | 7/11/2006 | 0 |
| 61 | 35.6182 | -93.2937 | Johnson | Little Piney Cr., @ 123 xing | 7/11/2006 | 26 |
| 62 | 35.5135 | -93.3085 | Johnson | Little Piney Cr., @ 164 xing, E of Hagarville | 7/11/2006 | 0 |
| 63 | 35.5043 | -93.1837 | Pope | Big Piney Cr., ArkansasGFC Access @ 164 crossing | 7/11/2006 | 8, 23 |
| 64 | 35.5497 | -93.1617 | Pope | Big Piney R., @ Long Pool Campground | 7/11/2006 | 8 |
| 65 | 35.4659 | -93.0402 | Pope | Illinois Bayou, Broomfield Rd crossing | 7/11/2006 | 18 |
| 66 | 35.4999 | -93.0195 | Pope | North Fork Illinois Bayou, Granny Gap Road No. 1 xing @ Piney Cr. WMA | 7/11/2006 | 0 |
| 67 | 35.5258 | -92.9387 | Pope | Illinois Bayou, Bayou Bluff Campground on Hwy 27 | 7/12/2006 | 0 |
| 68 | 35.5284 | -92.9417 | Pope | Middle Fork Illinois Bayou, Rt 27 crossing, North of Bayou Bluff CG, OSFNF | 7/12/2006 | 20 |
| 69 | 36.3504 | -92.5908 | Van Buren | Archey Fork @ 65 crossing at Clinton | 7/12/2006 | 18, 26 |
| 70 | 36.3504 | -92.5909 | Baxter/Marion | White R., Downstream of Bull Shoals Lake, Bull Shoals State Park | 7/16/2006 | 23 |
| 71 | 36.2477 | -92.2435 | Baxter | Norfork Lake Dam tailwaters | 7/16/2006 | 0 |
| 72 | 36.2238 | -92.2519 | Baxter | Otter Cr., CR 64 (N.F. R. Rd.) | 7/16/2006 | 8, 13 |
| 73 | 36.2441 | -92.3448 | Baxter | Big Cr, 201 xing S of Mountain Home | 7/16/2006 | 8, 19, 23, 24 |
| 74 | 36.2138 | -92.3563 | Baxter | White R. @ AGFC Shipp's Ferry Access at CR 61 crossing | 7/16/2006 | 8 |
| 75 | 36.3081 | -92.5741 | Baxter | White R, Wildcat Shoals Access | 7/16/2006 | 8 |
| 76 | 36.2670 | -92.5434 | Baxter | White R, Cotter Access | 7/16/2006 | 8, 19, 23 |
| 77 | 36.2268 | -92.6818 | Marion | Shawnee Town Br., Yellville, center of town | 7/16/2006 | 23 |
| 78 | 36.2308 | -92.7087 | Marion | Crooked Cr, @ Kelley Access, W of Yellville | 7/16/2006 | 8, 9 |
| 79 | 36.2224 | -92.6793 | Marion | Crooked Cr, @ AGFC Kelley Access, Yellville | 7/16/2006 | 0 |
| 80 | 36.1240 | -92.5481 | Marion | Buffalo River @ Rush CG | 7/17/2006 | 0 |
| 81 | 36.1256 | -92.5522 | Marion | Small trib to Buffalo R., crossing road to Rush Campground | 7/17/2006 | 8, 23 |
| 82 | 36.2438 | -92.8002 | Marion | Crooked Cr, @ AGFC Snow Access | 7/17/2006 | 8, 18, 23, 24 |
| 83 | 36.2467 | -92.8352 | Marion | Crooked Cr., @ AGFC Pyatt Access | 7/17/2006 | 8 |
| 84 | 36.2315 | -93.0820 | Boone | Wilson Springs? @ Wilson Springs Road | 7/17/2006 | 0 |
| 85 | 36.4204 | -92.9351 | Boone | Sugar Loaf Creek, W of Lead Hill | 7/17/2006 | 8, 20, 23 |
| 86 | 36.4499 | -93.0754 | Boone | Bear Cr, Rt. 14 crossing, SW of Bellville | 7/17/2006 | 8, 9, 23 |
| 87 | 36.0611 | -93.1377 | Newton | Buffalo R., @ Pruitt | 7/17/2006 | 8, 9 |
| 88 | 36.0636 | -93.1597 | Newton | Buffalo R., Ozark Campground | 7/18/2006 | 8, 9 |
| 89 | 36.0100 | -93.1844 | Newton | Little Buffalo R @ Jasper | 7/18/2006 | 8, 9, 19, 23, 24 |

| | | | | | | |
|-----|---------|----------|-----------|---|-----------|--------------|
| 90 | 35.9463 | -93.0662 | Newton | Big Cr. @ Rt 123 Crossing, E of Vendor | 7/18/1960 | 8, 20, 26 |
| 91 | 35.9470 | -93.0667 | Newton | Left Fork of Big Creek | 7/18/2006 | 8, 23 |
| 92 | 35.9518 | -93.0575 | Newton | Big Creek, off Hwy 123 | 7/18/2006 | 8 |
| 93 | 35.9827 | -93.0410 | Newton | Buffalo R., @ Carver | 7/18/2006 | 8, 9 |
| 94 | 36.0290 | -92.8149 | Sercey | Mill Cr., @ St. Joe, Hwy 374xing | 7/18/2006 | 0 |
| 95 | 35.9698 | -92.8870 | Sercey | Buffalo R./Richland Cr confluence @ Woolum | 7/18/2006 | 0 |
| 96 | 35.9764 | -92.8983 | Sercey | Richland Cr upstream of confluence with Buffalo R. @ Woolum | 7/18/2006 | 8, 9, 10, 25 |
| 97 | 35.7882 | -92.5404 | Van Buren | Middle Fork Little Red R., Hwy 65xing, W of Rumley, S of Leslie | 7/19/2006 | 0 |
| 98 | 35.5855 | -92.4526 | Van Buren | South Fork Little Red R., Hwy 65xing @ Clinton | 7/19/2006 | 0 |
| 99 | 35.2994 | -92.4030 | Faulkner | North Cadron Creek @ Rt. 65 crossing | 7/19/2006 | 20, 25 |
| 100 | 35.4565 | -91.9486 | Cleburne | Little Red River @ AGFC Libby Shoals Access | 7/20/2006 | 23 |
| 101 | 35.4576 | -91.9253 | Cleburne | Little Red River @ AGFC Lobo Landing Boat Ramp Access | 7/20/2006 | 0 |
| 102 | 35.4376 | -91.8448 | Cleburne | Little Red River @ AGFC Panaburn Access | 7/20/2006 | 0 |
| 103 | 35.5409 | -91.7792 | Cleburne | Big Cr., Tyler Rd xing, Jim Kress WMA | 7/20/2006 | 24 |
| 104 | 35.7346 | -91.8388 | Stone | Unnamed trib to White River crossing Rt 14 (Wolf Bayou?) | 7/20/2006 | 18, 24 |
| 105 | 35.8157 | -91.8708 | Stone | White River, Martin Access AGFC | 7/20/2006 | 8, 9 |
| 106 | 35.8041 | -91.8846 | Stone | Elk Creek, Martin Access Road @ Rt 14 | 7/20/2006 | 8, 18, 24 |
| 107 | 35.8754 | -91.8544 | Stone | White River, Younger Access AGFC | 7/21/2006 | 2, 8, 9 |
| 108 | 35.9415 | -92.1142 | Stone | White R & Sylamore confluence @ Allison | 7/21/2006 | 2, 8, 9 |
| 109 | 36.0355 | -92.0587 | Stone | White River, Boswell Shoals Access AGFC | 7/21/2006 | 8, 13, 23 |
| 110 | 35.9568 | -92.1396 | Stone | North Sylamore Cr @ Blanchard Spr. Campground | 7/21/2006 | 8, 9, 13, 23 |
| 111 | 35.9568 | -92.1396 | Stone | Blanchard Springs @ Spring trailhead | 7/21/2006 | 8 |
| 112 | 35.9947 | -92.2127 | Stone | North Sylamore Cr @ Gunner Pool Campground OSFNF | 7/21/2006 | 8 |
| 113 | 35.9248 | -91.9472 | Izard | White River @ Guion Access | 7/26/2006 | 0 |
| 114 | 36.0926 | -91.7548 | Izard | Piney Fork ->Strawberry River @ 289xing | 7/26/2006 | 26 |
| 115 | 36.0916 | -91.9181 | Izard | Big Hurricane Cr., Hwy 9xing S of Bleview, N of Melbourne | 7/26/2006 | 0 |
| 116 | 36.2298 | -91.8821 | Izard | Strawberry R., @ Rt. 354 crossing | 7/26/2006 | 15, 23, 24 |
| 117 | 36.4220 | -92.1183 | Fulton | Bennetts River, Arkansas 87 xing | 7/26/2006 | 8, 9, 24 |
| 118 | 36.4689 | -92.1114 | Fulton | Little Cr ->Lake Norfolk | 7/26/2006 | 0 |
| 119 | 36.4635 | -92.1933 | Baxter | Bennetts Bayou, North Fork WMA, CR 46 xing | 7/27/2006 | 8, 9, 23 |
| 120 | 36.4494 | -92.2672 | Baxter | North Fork White R/Norfolk Lake, Red Bank Access off 102 | 7/26/2006 | 8, 9 |

| | | | | | | |
|-----|---------|----------|----------|---|-----------|----------------------------|
| 121 | 36.4067 | -92.2489 | Baxter | North Fork White R/Norfolk Lake, Howard Cove Boat Launch off 101 | 7/27/2006 | 8, 9 |
| 122 | 36.3832 | -91.9839 | Fulton | Big Creek, Hwy 223xing, S of Viola | 7/27/2006 | 0 |
| 123 | 36.3153 | -91.4908 | Sharp | Spring R., under US 62/412 | 7/27/2006 | 8, 9, 10, 15, 23, 24 |
| 124 | 36.3122 | -91.4730 | Sharp | Spring River @ Hardy, AGFC Bueford Beach Access | 7/27/2006 | 8, 9, 10, 24 |
| 125 | 36.2443 | -91.2686 | Lawrence | Brown's Cr, 412/63 xing, W of Ravenden | 7/27/2006 | 8, 9, 20, 23 |
| 126 | 36.2253 | -91.2507 | Lawrence | Spring River @ Ravenden AGFC Access | 7/27/2006 | 8, 9 |
| 127 | 36.2044 | -91.1725 | Lawrence | Spring River @ Imboden Access | 7/31/2006 | 9, 10, 11 |
| 128 | 36.2506 | -91.0864 | Randolph | Eleven Point R., W of Pocahontas, @ Hwy 62 AGFC Access Spring @ Ravenden Springs @ Upper Janes Cr RD | 7/31/2006 | 0 |
| 129 | 36.3175 | -91.2253 | Randolph | (Arkansas 90) | 7/31/2006 | 14, 23 |
| 130 | 36.3237 | -91.2414 | Randolph | Janes Cr, Upper Janes Cr RD (CR 433) | 7/31/2006 | 8, 9, 15, 24 |
| 131 | 36.3469 | -91.1136 | Randolph | Eleven Point River @ Eleven Point | 7/31/2006 | 2, 3, 9, 10, 17, 25 |
| 132 | 36.4220 | -91.1405 | Randolph | Eleven Point River @ Dalton, AGFC Kirpatrick Access | 7/31/2006 | 9 |
| 133 | 36.4172 | -91.1198 | Randolph | Upshaw Cr ->Eleven Point, Hwy 93xing W of Hamil Cattle Cr @ CR 349 xing (Cattle Cr. Rd), S. of Hankins/Mud Cr WMA | 7/31/2006 | 24 |
| 134 | 36.4101 | -90.9848 | Randolph | | 7/31/2006 | 8, 20, 23, 24, 25 |
| 135 | 36.4226 | -90.9751 | Randolph | Mud Cr @ Mud Cr WMA | 7/31/2006 | 2, 4, 8, 9, 15, 20, 23, 24 |
| 136 | 36.1054 | -91.0932 | Lawrence | Black R @ Black Rock Boat Ramp | 8/2/2006 | 1, 2, 9, 11, 12 |
| 137 | 36.0814 | -91.3274 | Lawrence | Cooper Cr, CR 160 xing, W of Smithville | 8/2/2006 | 5, 8, 9, 16, 23, 24 |
| 138 | 36.1030 | -91.3625 | Sharp | Unnamed Trib to Strawberry R, Strawberry R. Rd xing | 8/2/2006 | 0 |
| 139 | 36.1052 | -91.3869 | Sharp | Strawberry River @ AGFC Peebles Bluff Access | 8/2/2006 | 9, 16 |
| 140 | 36.1348 | -91.4050 | Sharp | Mill Creek (->Strawberry R.) @ Mill Creek Rd. crossing Small unnamed trib to Strawberry R, Crossing Strawberry R RD | 8/2/2006 | 8, 9, 23 |
| 141 | 36.1228 | -91.4146 | Sharp | | 8/2/2006 | 8, 21, 23 |
| 142 | 36.1369 | -91.4610 | Sharp | Hurricane Cr, 354xing | 8/2/2006 | 8, 14, 20, 23, 26 |
| 143 | 36.0531 | -91.3106 | Lawrence | Cooper Cr. @ Hwy 115 xing | 8/4/2006 | 2, 8, 9, 15, 24 |
| 144 | 36.0276 | -91.3259 | Lawrence | Strawberry R. @ Hwy 115xing | 8/4/2006 | 0 |
| 145 | 36.0243 | -91.3757 | Sharp | South Big Cr, trib to Strawberry, Hwy 115xing | 8/4/2006 | 8, 9 |
| 146 | 36.0118 | -91.3988 | Sharp | Mill Creek | 8/4/2006 | 8 |
| 147 | 36.0789 | -91.5437 | Sharp | Pond near Strawberry R, new horse farm | 8/4/2006 | 15, 17, 21 |
| 148 | 36.0841 | -91.5373 | Sharp | Strawberry R, Upstream of Barnes RD, TNC Property | 8/4/2006 | 2, 8, 9, 24 |

| | | | | | | |
|-----|---------|----------|--------------|---|-----------|----------------------|
| 149 | 36.0572 | -91.6089 | Sharp | Mill Creek Spring @ Evening Shade (public drinking water), Hwy 167 | 8/4/2006 | 8 |
| 150 | 36.4220 | -91.1405 | Sharp | Strawberry River @ Evening Shade Canoe access | 8/4/2006 | 8, 9, 15, 24 |
| 151 | 35.7584 | -91.7108 | Independence | White R, above Batesville | 8/5/2006 | 0 |
| 152 | 36.4452 | -91.5668 | Fulton | Myatt Cr? (maybe English Cr) Rt 289 crossing | 8/7/2006 | 8 |
| 153 | 36.4329 | -91.5283 | Fulton | Spring R @ AGFC Bayou Access | 8/7/2006 | 2, 8, 9 |
| 154 | 36.4958 | -91.5332 | Fulton | Mammoth Spring St. Park | 8/7/2006 | 8, 9, 15, 19, 20, 23 |
| 155 | 36.4446 | -91.6696 | Fulton | Myatt Cr? @ Hwy 9xing between Salem and Fryatt | 8/7/2006 | 0 |
| 156 | 36.3855 | -91.8096 | Fulton | South Fork Spring R, @ Salem AGFC Access | 8/7/2006 | 8, 9, 25 |
| 157 | 36.4398 | -91.8292 | Fulton | South Fork Spring R, 395xing | 8/7/2006 | 9, 24 |
| 158 | 36.4781 | -91.8469 | Fulton | South Fork Spring R, Red Bud Rd xing, W of State Line (City) | 8/7/2006 | 8, 9, 26 |
| 159 | 36.4604 | -91.8777 | Fulton | Pine Hill Cr.? At Sturkie Rd xing | 8/7/2006 | 8, 9, 15, 23, 24 |
| 160 | 35.7902 | -91.6429 | Independence | Poke Bayou, 69s xing N of Batesville | 8/8/2006 | 8, 9 |
| 161 | 35.6115 | -91.6072 | Independence | Salado Cr @ 167xing next to rest stop | 8/8/2006 | 15, 24 |
| 162 | 35.6328 | -92.0543 | Cleburne | Beech Fork ->Greers Ferry Lake @ 263xing | 8/8/2007 | 0 |
| 163 | 35.7969 | -92.3461 | Stone | Meadow Cr, W of Fox | 8/8/2006 | 19, 20, 23 |
| 164 | 35.8971 | -92.2667 | Stone | Big Spring @ Big Springs, Pony Peak Rd | 8/8/2006 | 0 |
| 165 | 35.7421 | -92.3338 | Stone | Middle Fork Little Red R., Red River Rd xing. S.W. of Fox | 8/9/2006 | 8, 9 |
| 166 | 35.6522 | -92.3195 | Van Buren | Middle Fork Little Red R., @ Shirley | 8/9/2006 | 18, 20, 23, 24 |
| 167 | 35.6477 | -92.3173 | Van Buren | Weaver Cr @ Hwy 16xing | 8/9/2006 | 0 |
| 168 | 35.7411 | -91.6958 | Independence | Inman Cr, W of Bryant @ Hwy 25xing | 8/9/2006 | 0 |
| 169 | 36.0078 | -91.2984 | Lawrence | Coopers Cr upstream of confluence with Strawberry River | 9/30/2006 | 2, 9 |
| 170 | 35.7606 | -91.6477 | Independence | White River, upstream of Lock and Dam 1, Batesville | 8/6/2006 | 2, 8, 9 |
| 171 | 36.1586 | -91.1301 | Lawrence | Spring River, midway between Imboden & Black Rock | 1/20/2006 | 8, 9, 11, 12, 25 |

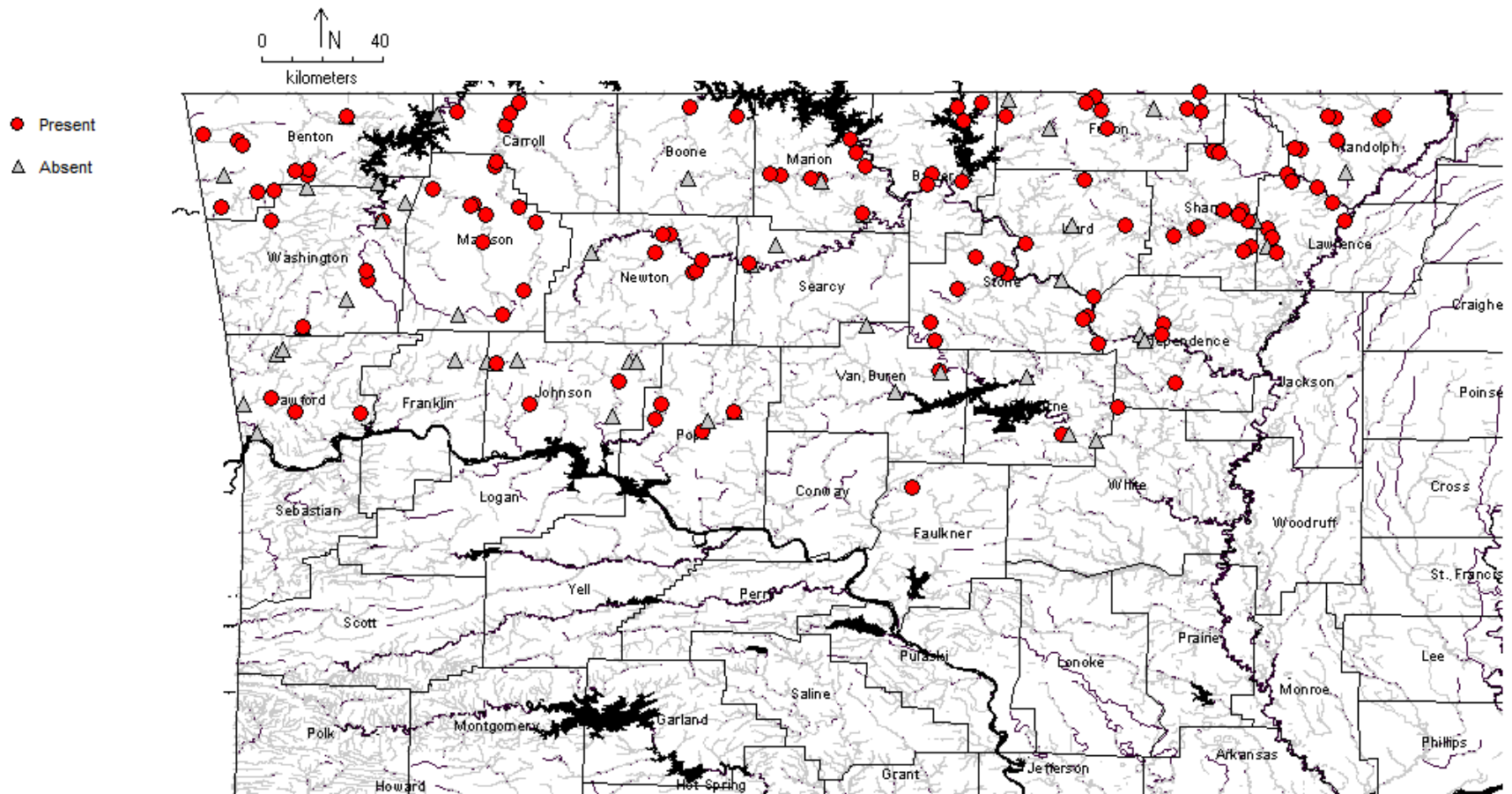


Figure 1. Sampling localities for freshwater gastropods in the Ozark Mountain Region of Arkansas, 2006. Red circles indicate sites where gastropods were present. Grey triangles indicate sites surveyed but no gastropods were found.

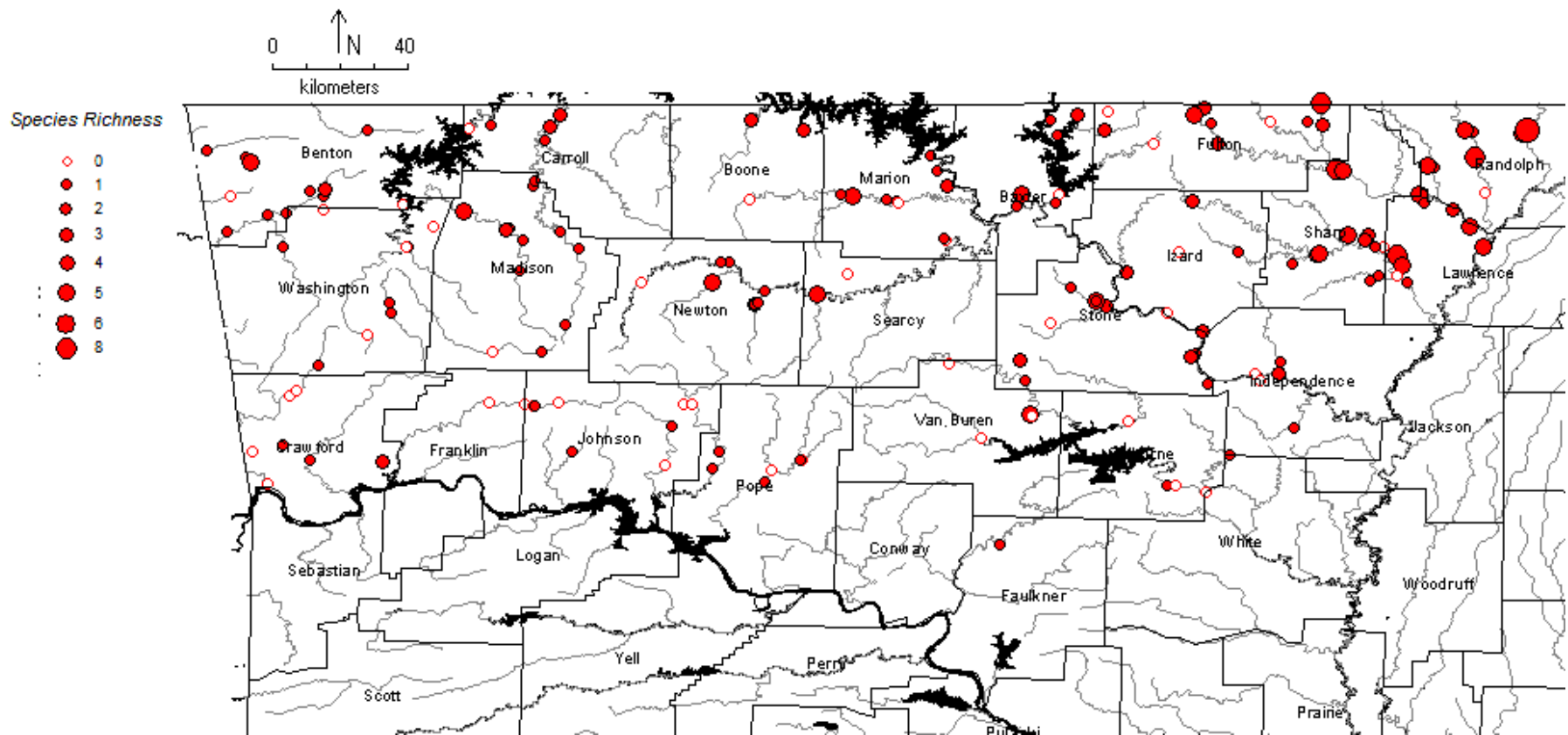


Figure 2. Species richness of freshwater gastropods in the Ozark Mountain Region of Arkansas, 2006. Open circles indicate no gastropods were found. Red circle size indicates number of species found at each locality.

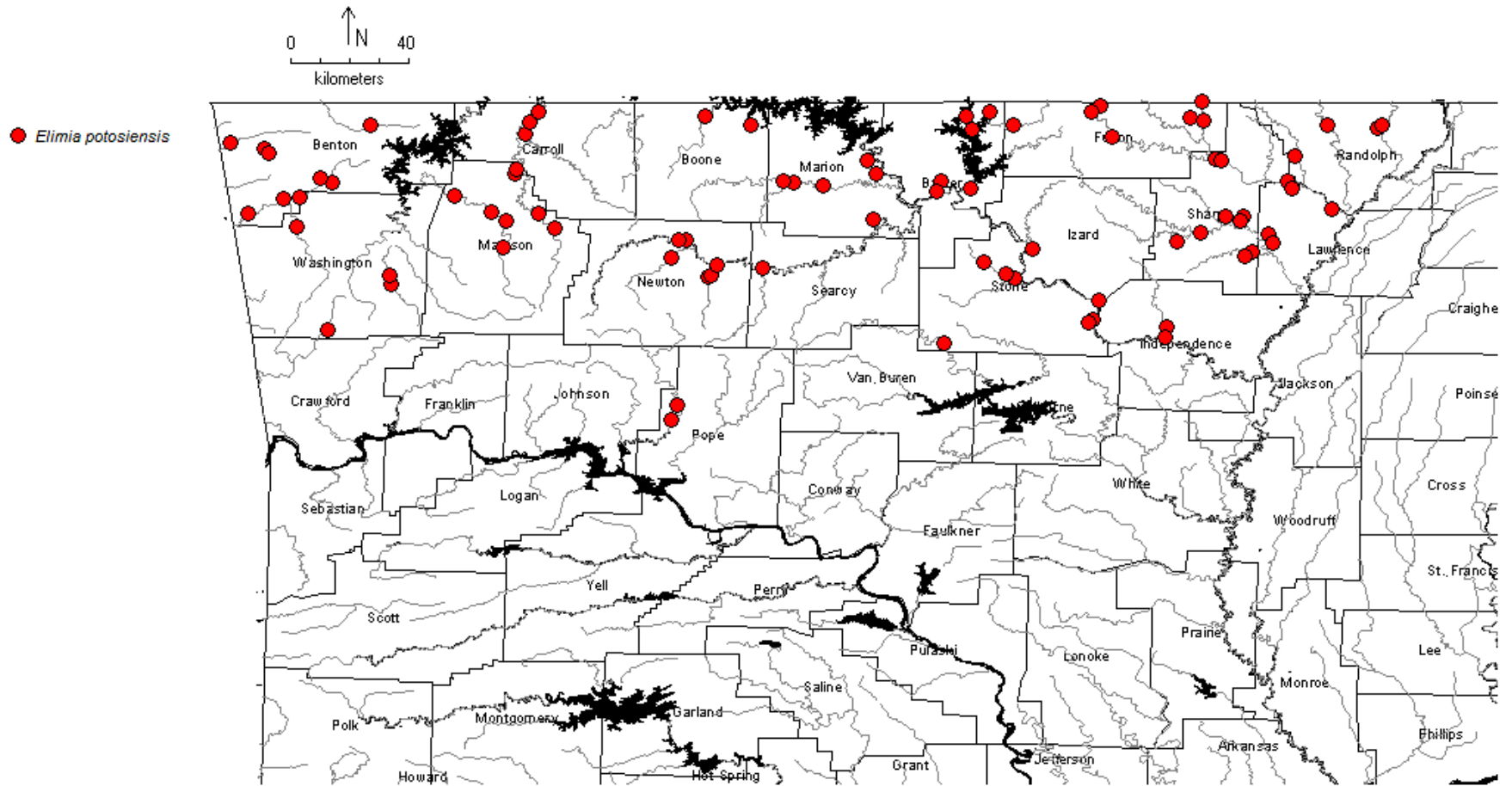


Figure 3. Distribution of *Elimia potosiensis* (Pleuroceridae) in the Ozark Mountain Region of Arkansas, 2006.

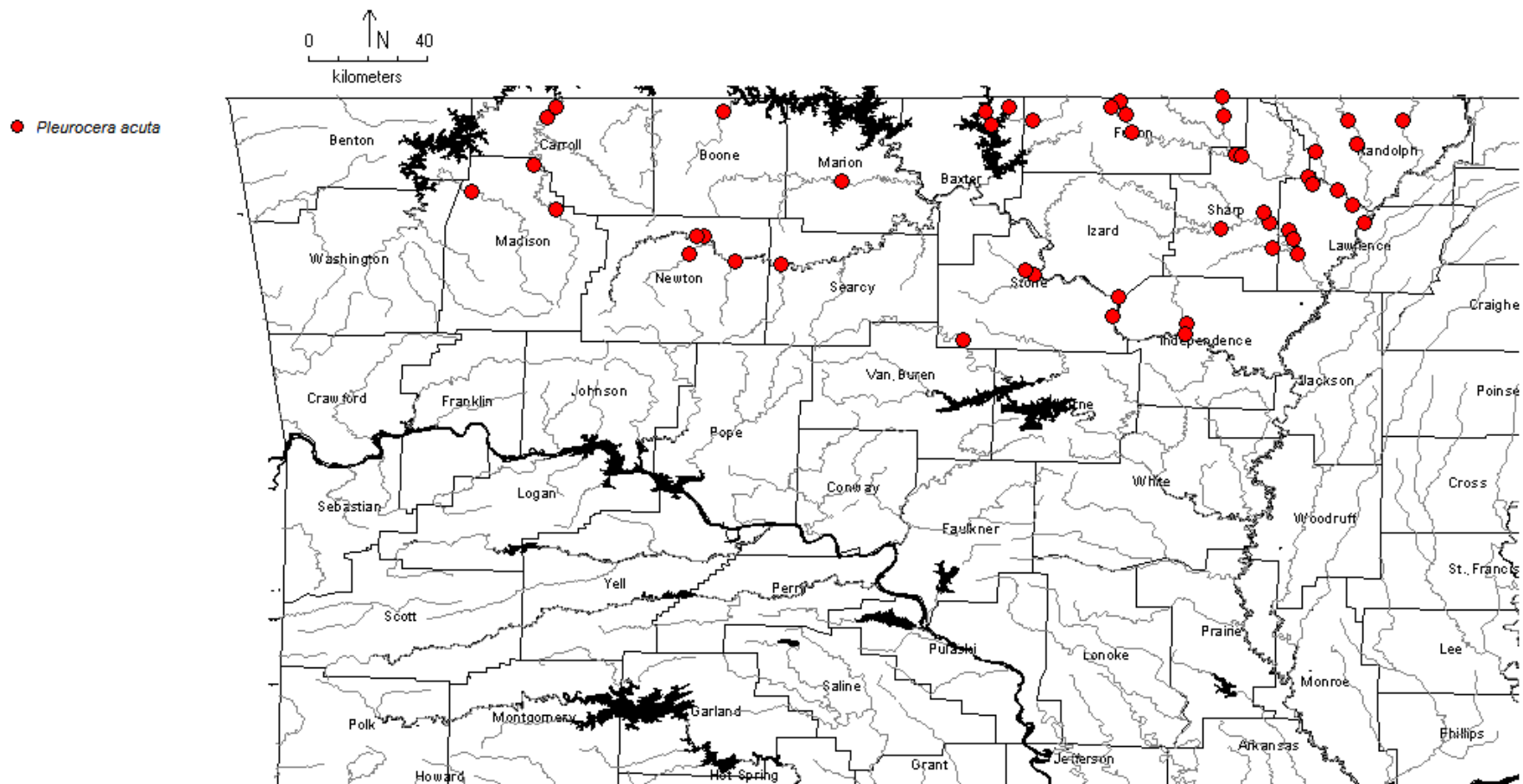


Figure 4. Distribution of *Pleurocera acuta* (Pleuroceridae) in the Ozark Mountain Region of Arkansas, 2006.

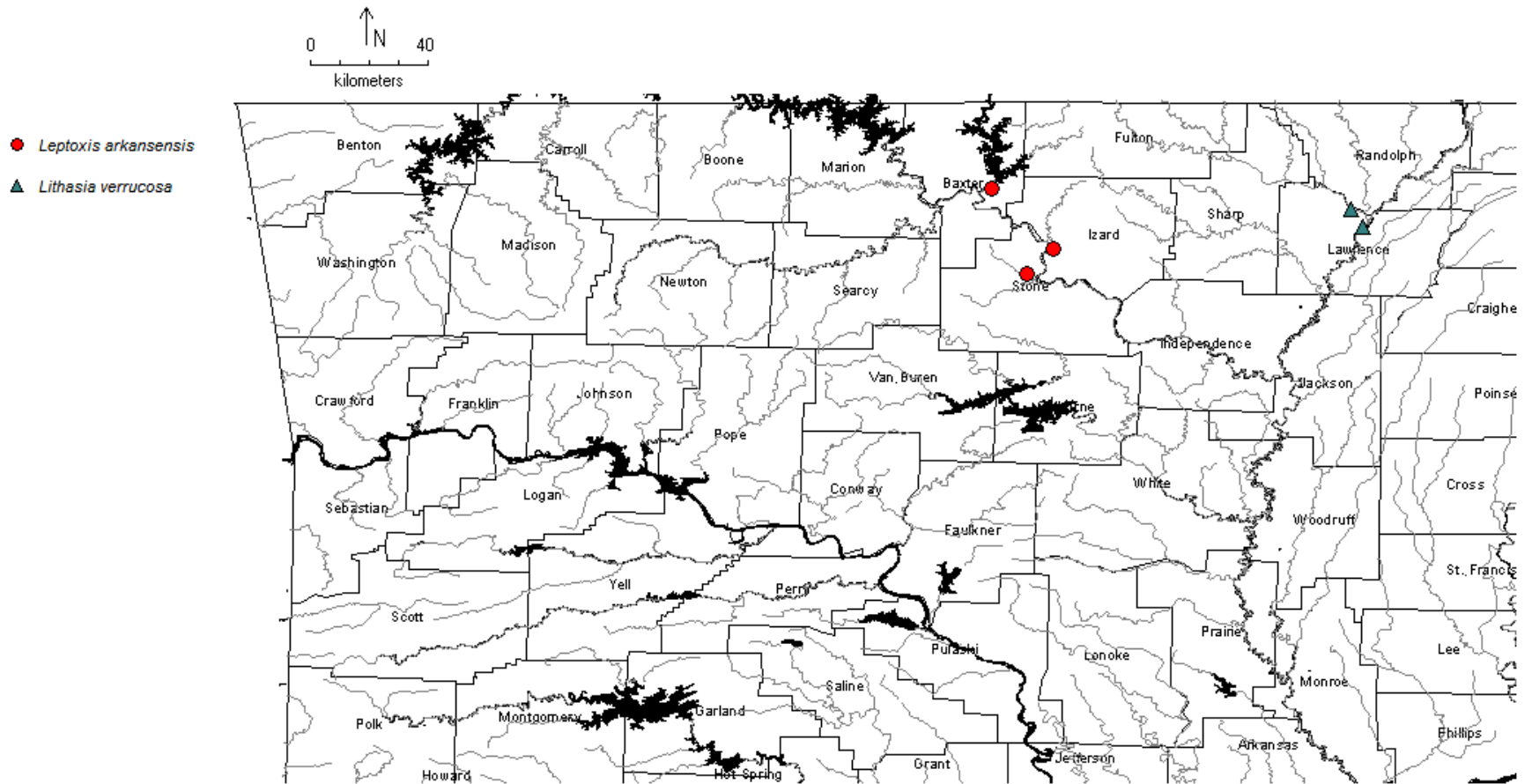


Figure 5. Distribution of *Leptoxis arkansensis* and *Lithasia verrucosa* (Pleuroceridae) in the Ozark Mountain Region of Arkansas, 2006.

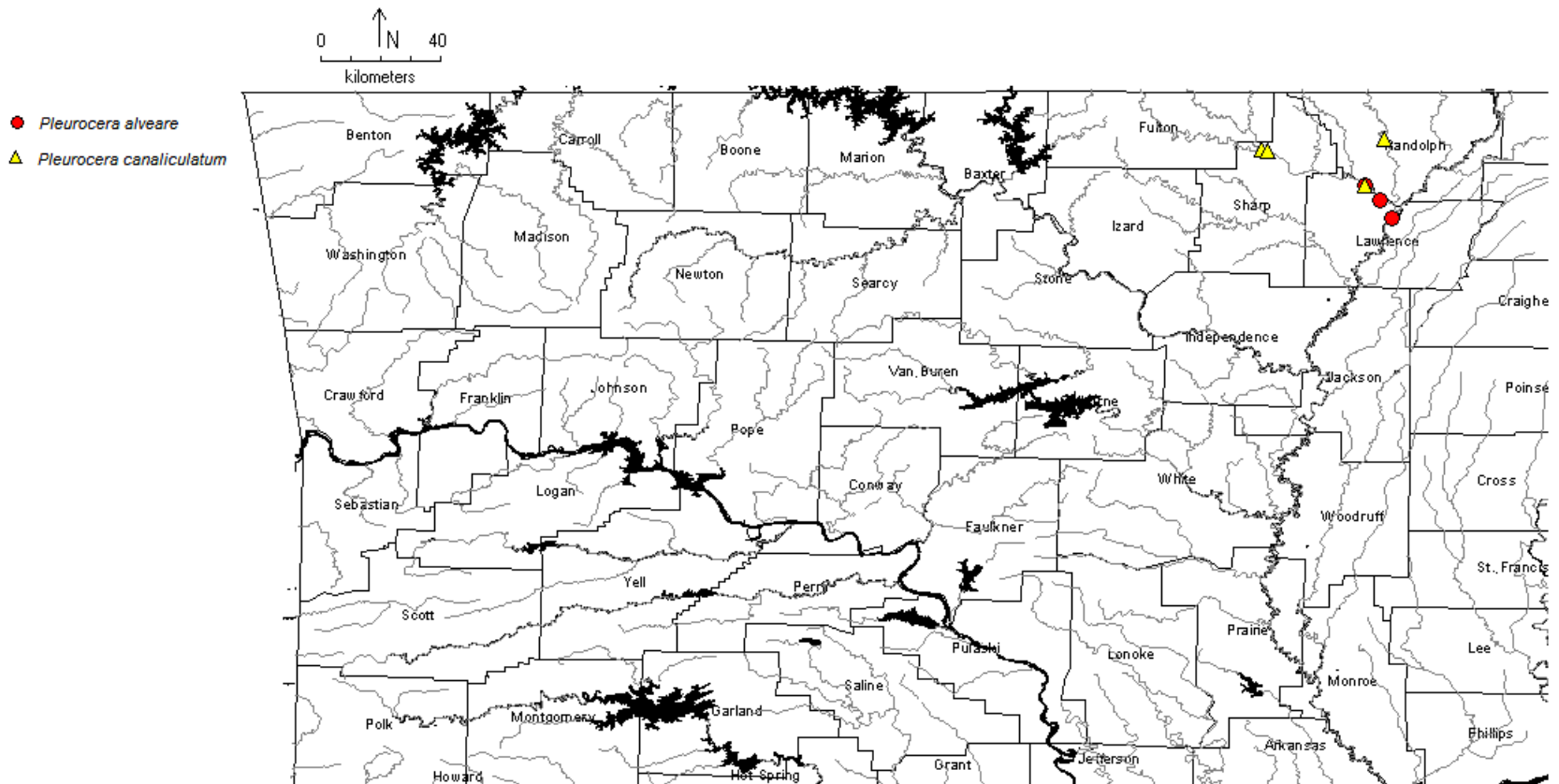


Figure 6. Distribution of *Pleurocera alveare* and *Pleurocera canaliculatum* (Pleuroceridae) in the Ozark Mountain Region of Arkansas, 2006.

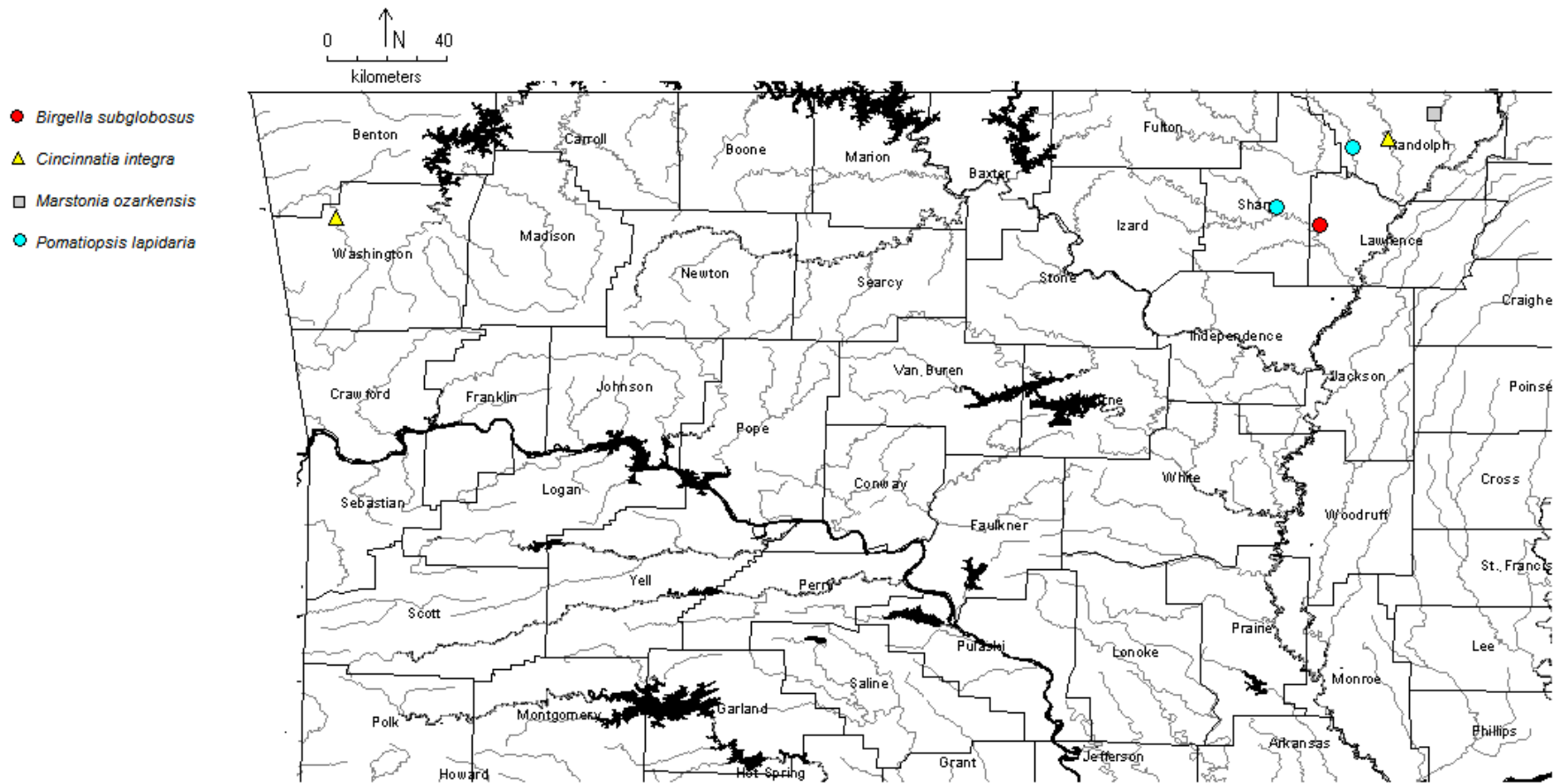


Figure 7. Distribution of Hydrobiidae and Pomatiopsidae in the Ozark Mountain Region of Arkansas, 2006.

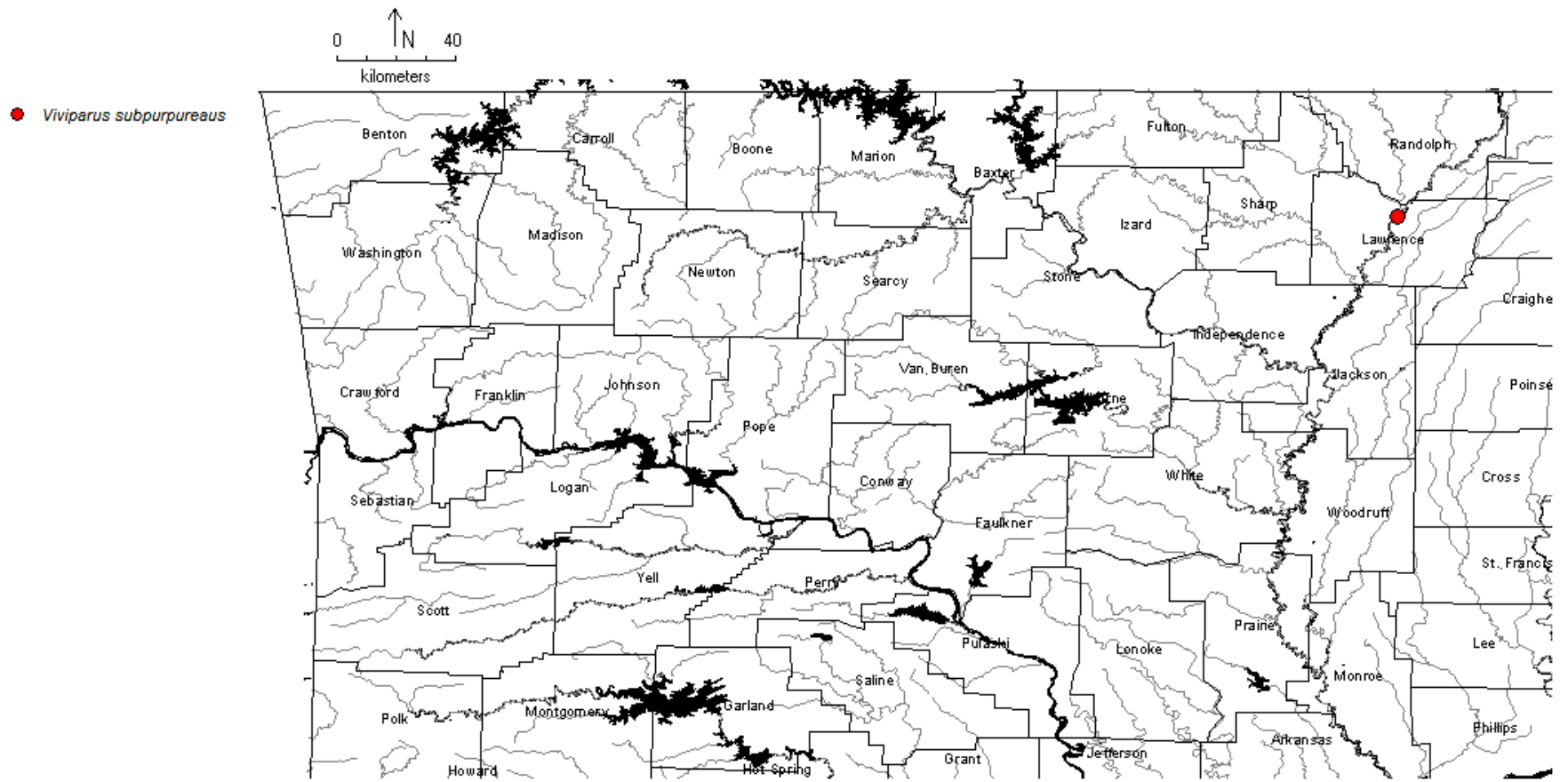


Figure 8. Distribution of *Viviparus subpurpureus* (Viviparidae) in the Ozark Mountain Region of Arkansas, 2006.

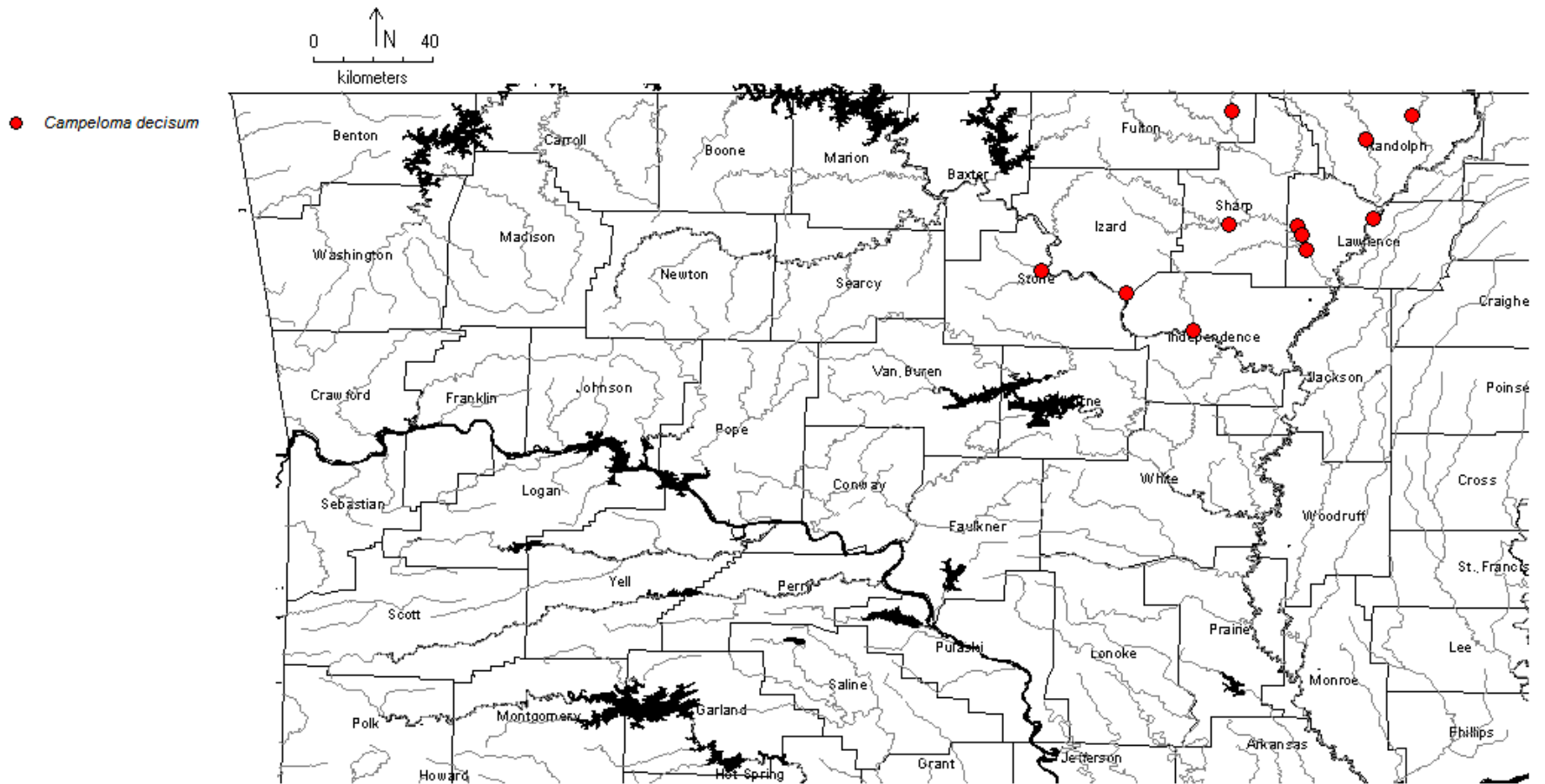


Figure 9. Distribution of *Campeloma decisum* (Viviparidae) in the Ozark Mountain Region of Arkansas, 2006.

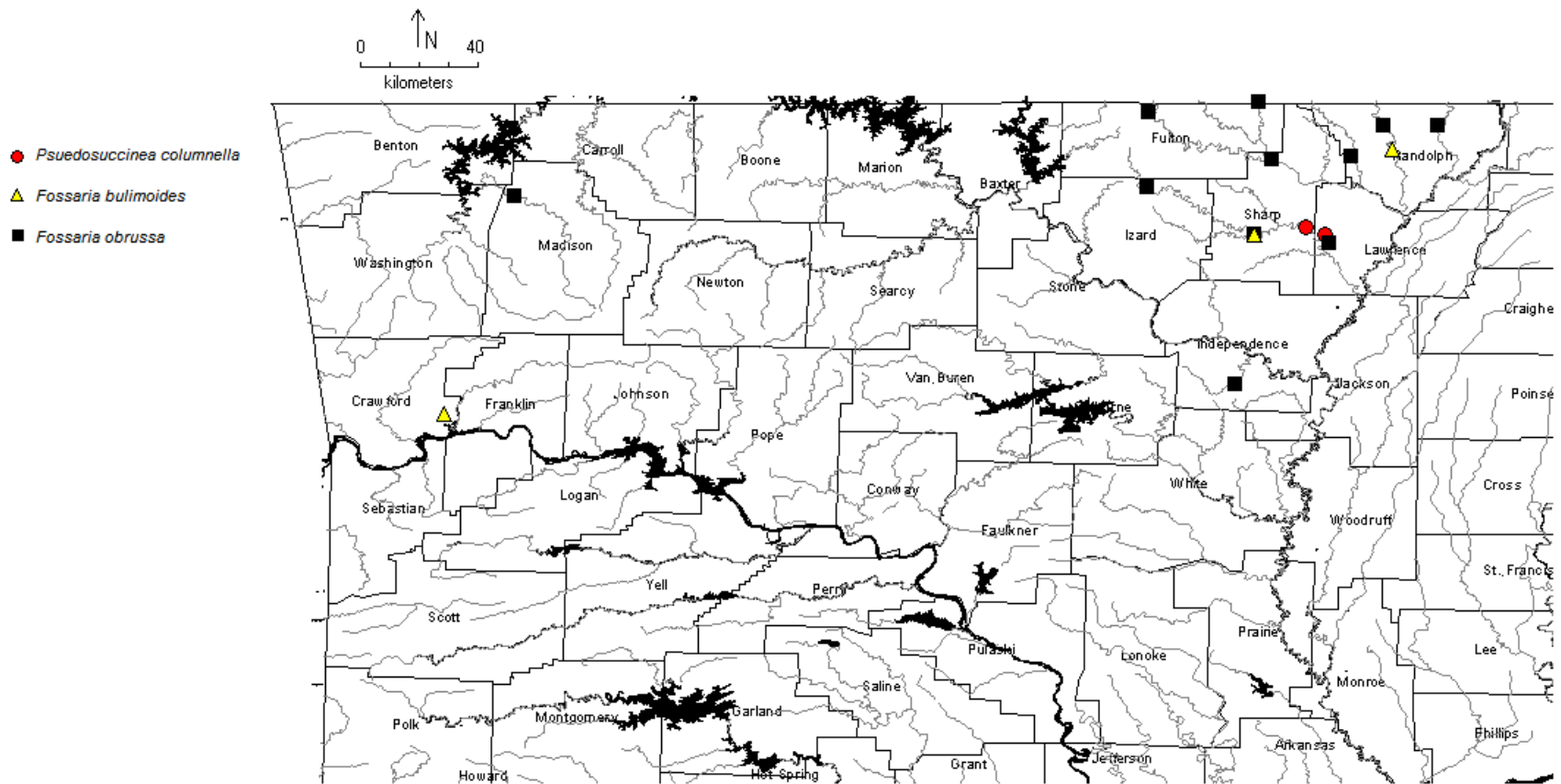


Figure 10. Distribution of Lymnaidae in the Ozark Mountain Region of Arkansas, 2006.

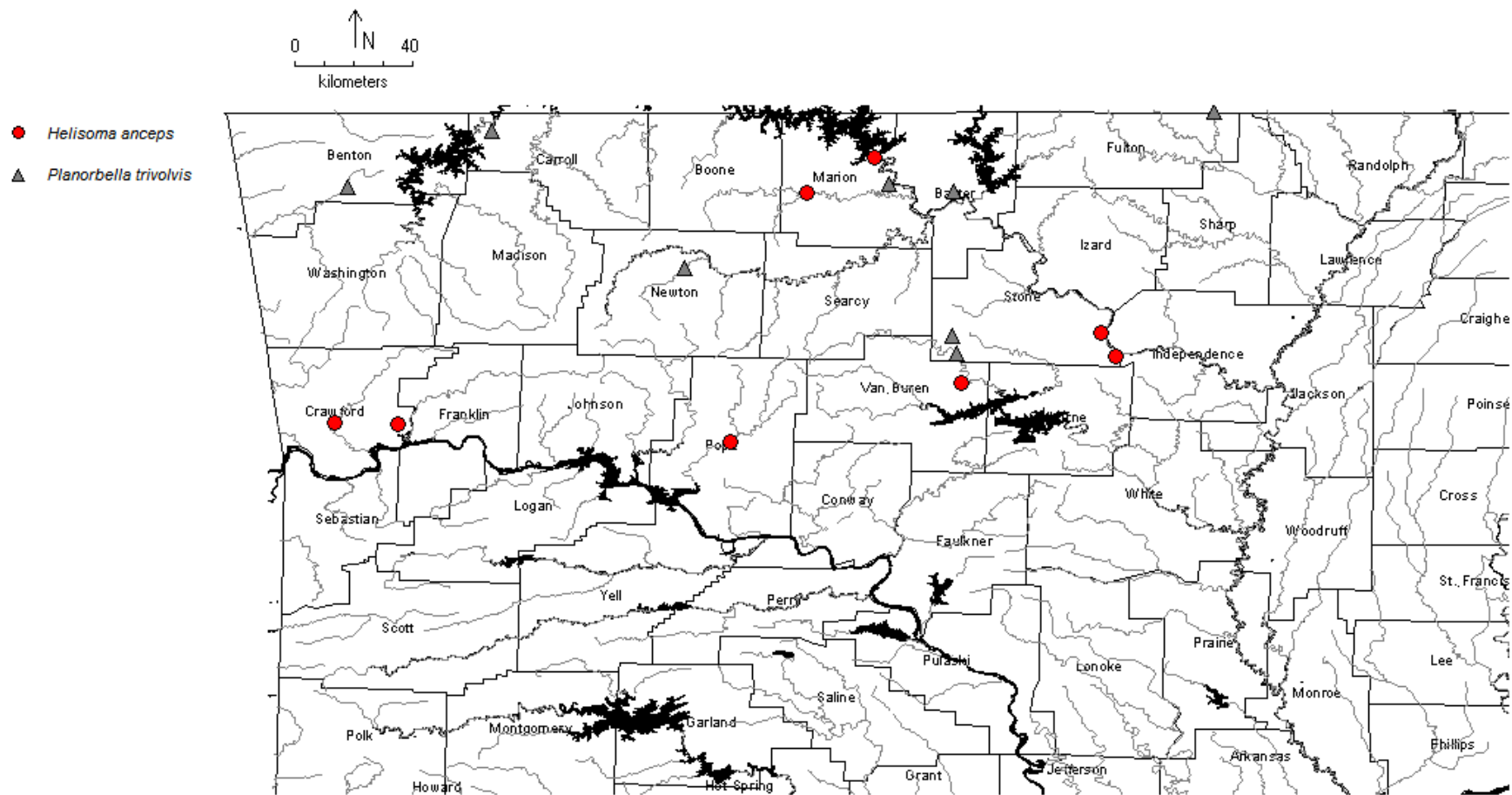


Figure 11. Distribution of *Helisoma anceps* and *Planorbella trivolvis* (Planorbidae) in the Ozark Mountain Region of Arkansas, 2006.

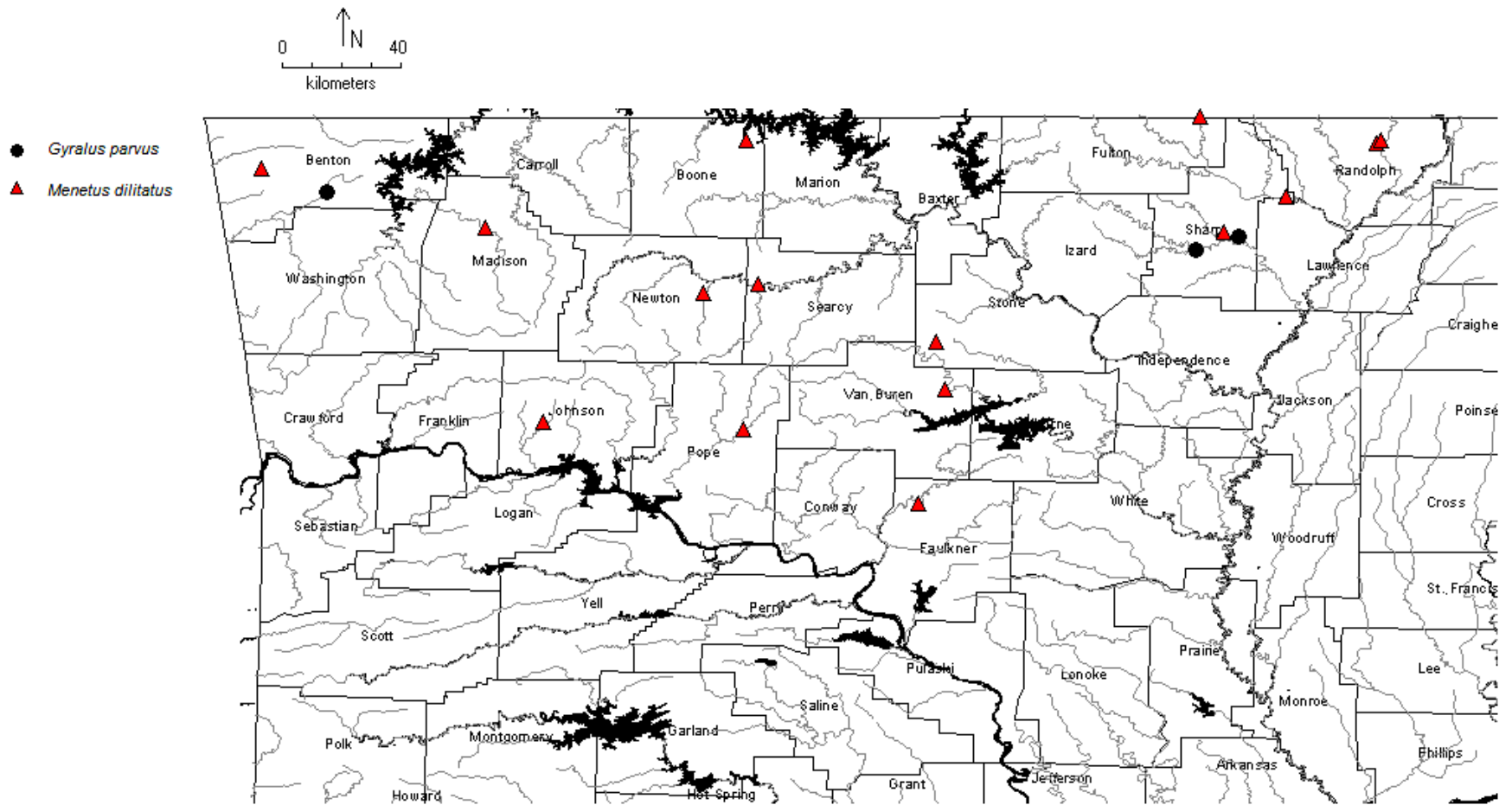


Figure 12. Distribution of *Gyrulus parvus* and *Menetus dilatatus* (Planorbidae) in the Ozark Mountain Region of Arkansas, 2006.

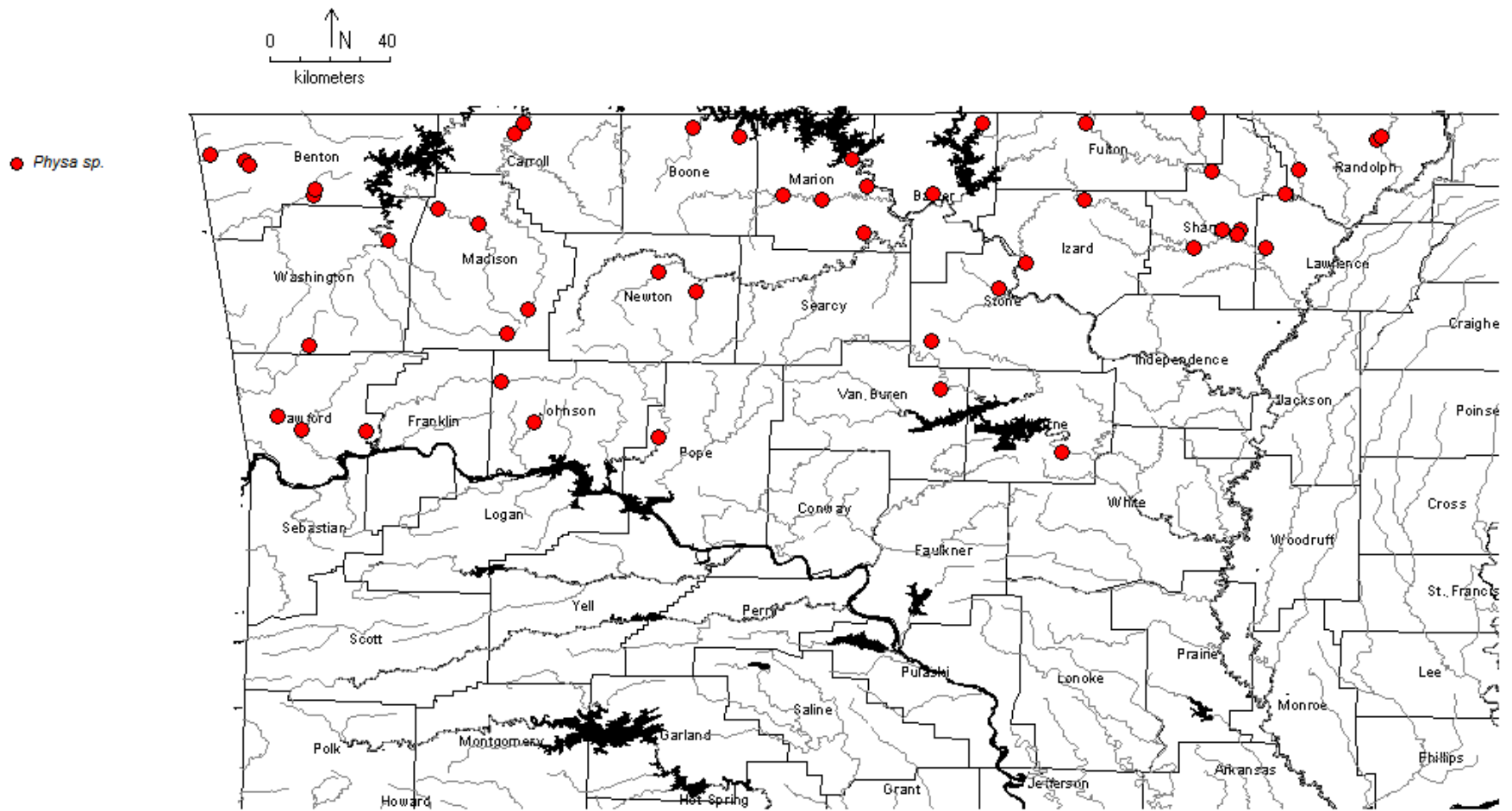


Figure 13. Distribution of *Physa sp.* (Physidae) in the Ozark Mountain Region of Arkansas, 2006

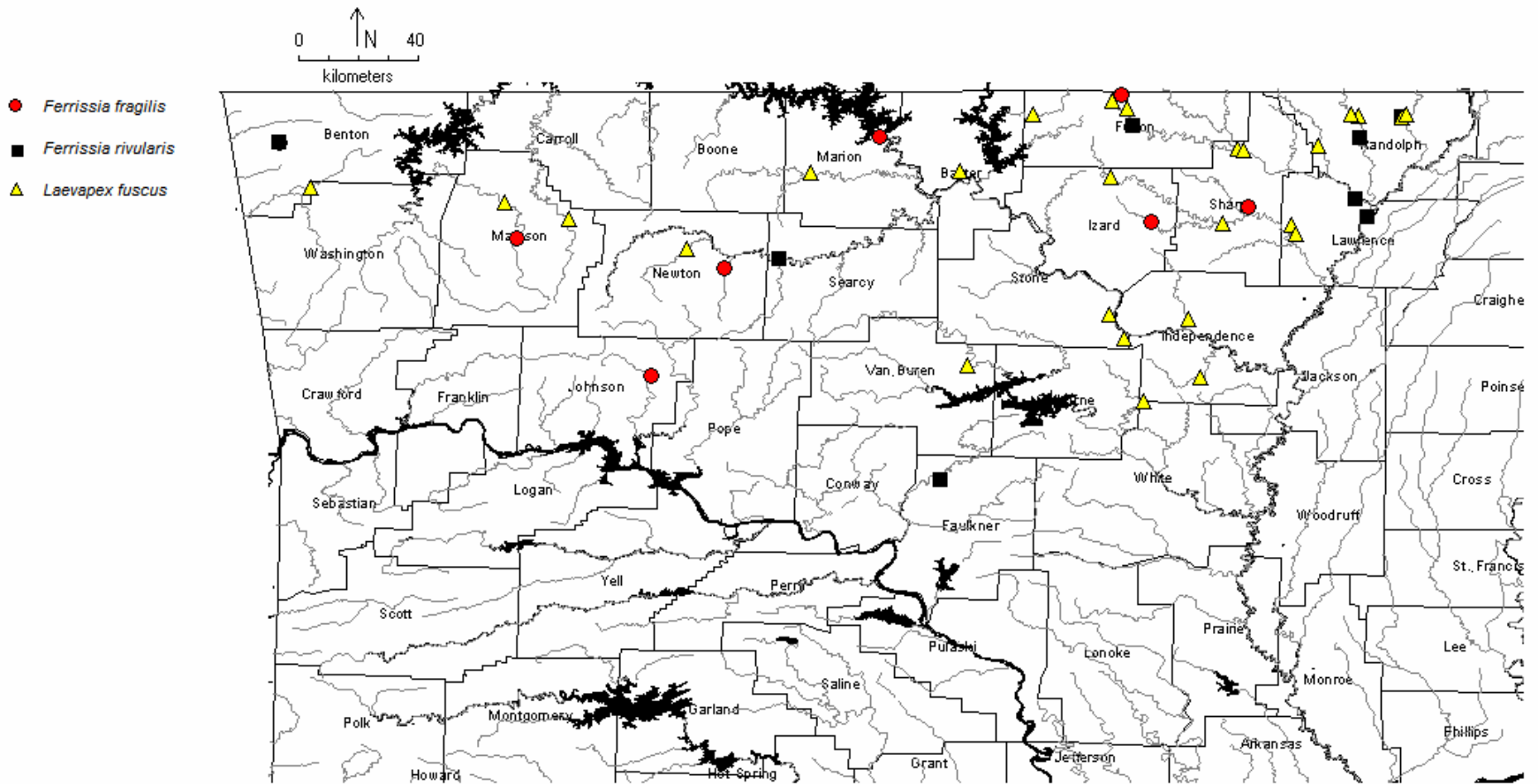


Figure 14. Distribution of Ancyliidae in the Ozark Mountain Region of Arkansas, 2006.



Figure 15. Shells of *Melanoides tuberculata* (Left) and *Pleurocera acuta* (Right). Both individuals were collected from the Spring River, Below Dam 3 near Hardy, Sharp Co., Arkansas on 9-9-05 by D.M. Hayes. Scale bar divided into millimeters.