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Herpetofaunal Changes in McDonough County, Illinois

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ABSTRACT

Herpetological changes and present status are described for McDonough County, Illinois, located on the flat uplands between the Mississippi and Illinois rivers. This primarily agricultural county was formerly mostly prairie and is poorly represented in large museum collections. The status of 55 species is reported. Four salamanders and ten frogs are native to the county, of which *Hemidactylium scutatum* and *Rana utricularia* are noteworthy. One introduction (*Rana clamitans*) is noted here, and two were reported previously. Five native turtles, one lizard, and 15 snakes remain. Noteworthy reptiles include *Carphophis, Diadophis* (two races), *Virginia valeriae, Thamnophis radix, Nerodia erythrogaster* and *Agkistrodon contortrix*. Ten of the present 35 native herptiles were not shown for McDonough County by Smith (1961), and 12 species that he did indicate appear to be absent now. The difficulties of reptile survival and conservation are discussed. Local amphibian environmental factors are also noted, and recommendations are made for preserving herptile fauna.

INTRODUCTION

Massive human habitat destruction is generally realized, but is still shocking when pictured (Curtis, 1956). Biodiversity loss from cumulative gradual environmental degradation also proceeds unnoticed. Larger animals leave early from human predation or because the ecosystems will no longer support them (Hoffmeister, 1989), but even smaller vertebrates like herptiles fade away. In a classic paper on the effect of urbanization in the midwest (Indianapolis area) Minton (1968) describes herptile losses as breeding places and other resources disappear.

This paper details a similar process for McDonough County, in west-central Illinois, where environmental alteration has mainly been through agriculture. There is only one large (central) area of growing urbanization (Macomb). Public semi-protected areas include one state park (Argyle Lake) with surrounding Department of Natural Resources land, one city park (Spring Lake), and some property owned by Western Illinois University. There are no county, state, or federal nature preserves, game preserves, or conservation areas except Ferster Wood (30 acres). Possibilities for preserving even large samples of prairie, woodland, and wetland ecosystems are limited because of Illinois habitat transformations (illustrated by Graber and Graber, 1963). However, sample populations of plants or smaller animals can be maintained or even increased by private action, thus

reducing species losses, if not population decreases. Some habitat is preserved on steeper slopes near waterways, and some modified habitat exists along streams, railroads, highways, and even fence rows and "odd corners". Habitat can be improved or created (Thurow 1994a, 1994b, 1997, and articles by others in the Natural Areas Journal or Restoration and Management Notes).

McDonough County is square, 24 miles (38.6 km) per side (Fig. 1). It lies in the Prairie Peninsula of Transeau (1935), and is centrally located on the relatively flat upland between the Mississippi and Illinois rivers. The county is crossed by the LaMoine River and its east fork, and a soil map shows where the forest and prairie once occurred (Bushue, et al., 1970). Additional maps are given by Presley (1994). The forest is now fragmented (Hoffmeister, 1989, Presley, 1994), and the prairie largely converted to crop fields. Figure 1 is based on 1963 aerial photographs. A newer source (Department of Natural Resources, 1996) lists 71.5% cropland, 14.3% grassland, 10.4% forest/woodland, and 3.7% wetland and other for McDonough County. The county is covered by Illinoian glacial till and loess, but there are scattered rock outcrops. The average (1951-1996) annual temperature is 51.8° F and the average precipitation is 37.4 inches (personal communication from Dr. D. Wise, Western Illinois University Climatic Station).

MATERIALS AND METHODS

Literature records, personal communications from local people, and 30 years of field work were used for information. I believe county-wide observations over a longer period give more meaningful abundance indicators than generalizations from limited quantitative sampling. In other words, the number of locations does not necessarily indicate the number of animals.

Museum collections were not surveyed extensively, except for the Western Illinois University (WIU) collection and my collection (GRT). Other parts of Illinois had more herptile collecting (Smith, 1961), and there are few McDonough County specimens in larger collections. Curators informed me that there are none at the Chicago Academy of Science, the Field Museum of Natural History, Eastern Illinois University, Illinois State University, Northern Illinois University, or Southern Illinois University at Edwardsville. I examined Knox College specimens, and found none from McDonough County. In early 1997 the Illinois Natural History Survey (INHS) had 25 McDonough County specimens (11 species). Specific population localities are mainly omitted in the present paper, for their protection. The herptile species are described under three categories: 1) those which are widespread in the county, though in diminishing numbers; 2) those which are uncommon to rare, or with restricted distributions; and 3) those which are very rare or extirpated, or whose survival is unknown. The latter two categories include three new species translocated into McDonough County. The current status is discussed for 55 herptiles indicated to be in the general area (Conant and Collins, 1991, whose nomenclature I follow). I have seen all 55 entities alive as well as preserved, except possibly *Tropidoclonion*. I have identified living specimens from McDonough County for all 35 native herptiles presently judged to be extant, except *Sternotherus* and *Nerodia erythrogaster*.

RESULTS (Species Accounts)

Widespread Species - Amphibians

1) *Ambystoma texanum* - is common in less disturbed areas near water. Adults do not require high quality woodlands, have been found in pasture, yard, and garden burrows, and can breed in small temporary ponds like roadside ditches.

2) *Bufo americanus* - was once abundant, but declined after the 1988-1989 drought (see Owen and Chiras, 1990, p. 129, about the drought). This toad is recovering, as evidenced by more sightings and more choruses. It can utilize small impoundments and even backyard artificial pools. Tadpoles survive with large predatory fish by occupying very shallow pond margins, or spaces surrounded by aquatic vegetation.

3) *Acris crepitans* - was once the most abundant frog in the county, but declined even more after the 1988 drought, perhaps because it breeds later in the season. *Acris* is also recovering, and can again be found along stream and pond margins through most of the county in 1996 and 1997, though not in its former abundance. I examined some waters on my farm every year since 1970. Older specimens include WIU 88-94 and 306-317. More recent specimens include WIU 643 and INHS 12751, 12760, and 12766.

4) *Hyla versicolor* - can be heard calling in most areas with trees. It also declined after the 1988 drought, and is recovering, with large choruses and many eggs in 1997.

5) *Pseudacris crucifer* - calls abundantly at a few areas, and sporadically in others. It is more numerous along the wooded bluffs of the LaMoine River, particularly downstream and west of Macomb. On my farm away from the river and northeast of Macomb, *P. crucifer* was quite rare. Local calling did increase some in 1994-1997, either from immigration following forest maturation or from augmentation with some local frogs and tadpoles.

6) *Pseudacris triseriata* - is probably the most abundant frog in the county at present, based on the number of choruses, though it is secretive and not often seen away from the breeding ponds. This frog can breed in roadside ditches, tire ruts, and other small temporary waters near grassy areas.

7) *Rana blairi* - is widespread and relatively common in its remaining habitat. It can breed in smaller and more temporary waters than the bullfrog, and may be found in damp grass some distance from water.

8) *Rana catesbeiana* - is common in ponds and along streams and rivers. It can breed in nearly any mostly permanent pond above a certain size, such as the Bardolph municipal sewage lagoon and a WIU campus golf course pond. Bullfrogs disperse well, and can temporarily occupy puddles or backyard artificial pools.

Widespread Species - Reptiles

9) *Chelydra serpentina* - is a turtle found throughout the county. I have seen it in many streams and ponds, and crossing roads.

10) *Chrysemys picta* - is the most common and widespread turtle in the county. I have seen it more often and at more sites than other turtles. It is found in streams and ponds of about any size, and a hatchling crawled through my backyard over 50 m from a temporary stream.

11) *Trachemys scripta* - is larger and less common than *Chrysemys*, and is not found in the smaller ponds and streams except as juveniles. Some pet store and biological supply house specimens probably were released in Macomb, in addition to the native population.

12) *Thamnophis sirtalis* - is the most common and most widespread snake, based on sightings and road kills, and is the last to disappear in disturbed habitat.

The next five snakes are listed in order of decreasing approximate abundance, based on my sightings over the years.

13) *Storeria dekayi* - is found under cover in grasslands and forest. It is secretive, and not seen often except in much visited population sites. In 1997 they were frequently encountered on my farm.

14) *Nerodia sipedon* - is found near or in water. It can be locally abundant near a food source, such as below dams. When pollution reduced the number of small fish in my farm stream, the number of *N. sipedon* decreased also.

15) *Lampropeltis calligaster* - is a semi-fossorial form that mostly lives in or near grasslands. Highway right-of-ways are important connecting habitat, even though mowing machines and traffic cause fatalities.

16) *Coluber constrictor* - was once fairly common in woods and fields, but it is now declining and mostly found where people go less often. In 25 years I have seen it decrease from fairly common to uncommon on my farm and the immediate neighborhood. Only one was encountered there in 1996 and none in 1997.

17) *Elaphe obsoleta* - is declining because of deforestation and persecution. This semi-arboreal form still occurs with some frequency on wooded banks and bluffs along the LaMoine River and its tributaries, particularly in the southwest quarter of the county. *Elaphe* travels well and occasionally is encountered far from the river, near a barn with rodents, or after flooding. On my farm upriver to the northeast there was one visitor in the 1970s, and a shed skin was left in the attic of my house around 1995.

Uncommon to Rare Species, or Those with Restricted Distribution - Amphibians

18) *Ambystoma tigrinum* - is an increasingly rare salamander (WIU 59), because it requires larger breeding ponds with more food resources. Such ponds are disappearing or becoming unsuitable, mainly because of stocking with predatory fish and disruption by livestock (mostly cattle). The latter increase siltation and pollution, and decrease shore vegetation. The tiger salamander is now extirpated from several ponds where it was formerly reported, or where I had seined larvae. The one pond with reliable sightings is silting in from tractor raised dust.

19) *Necturus maculosus* - has occasionally been taken from the LaMoine River by fishermen over the years, (WIU 248, 617), and presumably breeds in selected riffle and tributary areas. The most recent report was in 1994, a little downstream and outside the county border. So some *Necturus* remain in the river, although silt and pollution have increased.

20) *Bufo woodhousei fowleri* (or *B. fowleri* by Sullivan et al., 1996) - is now rare in the county. It occupies sand areas along major rivers and streams. It is still numerous along the Mississippi and Illinois rivers, less so along the upper Spoon River in adjacent Fulton County, and still less along the upper LaMoine River in McDonough County. I encountered very few individuals from 1966-1996. There is a 1963 (WIU 83) record from Lake Argyle, a 1953 INHS specimen (7179) from the same general area, and a 1967 specimen from downstream (WIU 109). Human disturbance (habitat fragmentation and river siltation) has contributed to decline. I heard one *B. w. fowleri* call from a recently failed (empty) impoundment near my farm in 1983. Since then there have been no calls or sightings in the neighborhood. This species could decline to extirpation in the county.

21) *Hyla chrysoscelis* - is less abundant and widespread than *H. versicolor*. The calls of these two are not always easy to distinguish, particularly if they are not both calling at once. It appears that *H. chrysoscelis* may be uncommon to rare in the county. If *H. chrysoscelis* is totally green when calling (Vogt, 1981) then I have seen both this form and *H. versicolor* on my house.

22) *Rana sylvatica* - was introduced to the county (Thurow, 1994a). This frog is flourishing, although only found on three adjacent farms.

23) *Rana utricularia* (also called *R. sphenocephala*) - has recently been found just south of the county (Thurow and Sliwinski, 1991), and I found a few more recently (1993 on) from the south margin of the county (GRT 3250) and later on my farm northeast of Macomb (GRT 3251). They co-exist with *R. blairi*, and I found them together under rocks along the LaMoine River bank. In 1996 INHS collectors took two specimens northeast of Macomb (INHS 12757-8), one south (INHS 12765), and one to the southeast (INHS 12762). Extensive sampling between 1966-1990 by myself and WIU students previously revealed only *R. blairi*. Possibly *R. utricularia* was missed earlier, but it appears to be expanding its range northward. From my experience in Pike County, *R. blairi* is found more by upland ponds and streams, and *R. utricularia* is more often in river bottoms.

Uncommon to Rare Species, or Those with Restricted Distribution - Reptiles

24) *Apalone spinifera* - a few specimens have been seen or taken from the LaMoine River (I identified some of the latter), and Don Moll trapped specimens from various parts of the river in the early 1970s (personal communication). This species is seen less often than the above three turtles, but may not be rare in the river. I saw one in southwest McDonough County (near Colmar) in 1997. This turtle is common in some Pike County streams and Mississippi River lowland ditches, and in the backwaters along the lower Spoon River in Fulton County.

25) *Sternotherus odoratus* - is a widespread and tolerant species that should occur in McDonough County, but there are no WIU specimens. This species is more difficult to see basking, and is rarly encountered even where I know they occur, as in Pike County. However, Don Moll trapped this form along the LaMoine River, in the early 1970s (personal communication).

26) *Eumeces fasciatus* - is restricted to a few places along the south margin of the county. I identified and released three individuals, and saw others through 1993. This lizard was once more widespread in the south half of the county, as estimated by Smith (1961). Recent strip mining and logging make the lizard's position more rare and precarious.

27) *Carphophis vermis* - is a snake which has spread east to McDonough County from the Mississippi bluffs. It can usually be found for a short period in April. The best of my two known relict populations (WIU 513) was extirpated by overgrazing and erosion. Fortunately I later found two other *Carphophis* colonies in south McDonough County. The snake was once more widespread locally, as evidenced by the discontinuous relict colonies.

28) *Diadophis punctatus* - is a small snake which has mainly spread along the rocky bluffs of the Mississippi and Illinois rivers in west-central Illinois. The race *D. punctatus arnyi* has spread east from the Mississippi to the west margin of McDonough County. One colony followed the bluffs along the west fork of the LaMoine River. A second was introduced accidentally, hauled in among fill rock in railway cars when the first Colmar railroad bridges were built in 1856 and 1879. More may have been added when a later bridge was built nearby in 1955. Railroad personnel confirmed the bridge dates, and the rock fill is the only suitable *Diadophis* habitat in the area. The fill rock and snakes probably came from an old Marblehead quarry I found near the railroad, in Adams County.

In 1997 I found one *D. punctatus edwardsii* in south-central McDonough County. So the species also came from the Illinois River bluffs to the southeast. Recent records (Thurow and Sliwinski, 1991) place *Diadophis* in the tributaries of McKee Creek (Brown Co.), the LaMoine River (Schuyler Co.), and the Spoon River (Fulton Co.). I have since found it further up the Spoon River (near Seville), and further up the LaMoine River (south McDonough Co.). I also saw seven 1997 specimens in the Sugar Creek drainage (an Illinois River tributary between the LaMoine and Spoon rivers) just south of southeast McDonough County. In the 1980s a student reported seeing *Diadophis* from southeast McDonough County but I thought he might have seen *Storeria occipitomaculata*.

I confirmed the two west county locations in 1997, and rechecked the subspecies. The western race has spread to southwest McDonough County near Colmar, and the northern race from the east has spread up the LaMoine through Schuyler County. The stream tributary with the south *D. punctatus edwardsii* joins the river only nine km from the Colmar railroad bridge. Surviving habitat and specimens are scarce. I have not confirmed obvious gene flow between the races, but one animal from west McDonough County (WIU 661) and one seen near Colmar in 1997 did indicate possible intergradation.

29) *Heterodon platyrhinos* - is characteristically a solitary and uncommon species. Twenty five years ago groups of late summer hatchlings could be found in Macomb, but now the snake is increasingly rare. It is particularly killed because of its poison-mimic bluff behavior, and the population was further depressed because of a food (*Bufo*) decline after the 1988 drought. Specimens include WIU 649 and INHS 7180, 12701. Photographs exist of normal and albino individuals from a farm in Fulton County.

30) *Storeria occipitomaculata* - is an uncommon to rare snake throughout Illinois (Smith, 1961). I found a few individuals south, west, and southwest of Macomb, usually on wooded slopes (WIU 351, 654). While rarely seen, the snake has been found repeatedly in a few locations, usually in late March or September.

31) *Thamnophis proximus* - is usually found near water, and was always more uncommon than *T. sirtalis*. *T. proximus* was found at scattered county sites, including Macomb and the WIU campus (WIU 504, 14144-5). The snake is rare today because of habitat loss. A few colonies probably survive, but only a few single animals have been seen in more recent years.

32) *Virginia valeriae* - is a secretive form that has been found at several localities in the south half of the county, near the LaMoine and its tributaries (WIU 350, 422). The snake occurs just north of the east fork of the river in a few places, including Macomb. Though generally rare, I saw 14 specimens in two hours at one locality. Another was seen nearby in 1997.

Very Rare or Extirpated Species, or Those of Unknown Status - Amphibians

33) *Eurycea cirrigera* - is a salamander that was introduced as an experimental range extension (Thurow, 1997). It currently is known to survive in only three small colonies in McDonough County, but should persist for many years.

34) *Hemidactylium scutatum* - is a state-threatened salamander (Illinois Endangered Species Protection Board, 1994) with one known relict colony in the county (Frankland, 1980, INHS 10616). Most of the breeding stream and surrounding high quality hard maple forest was protected by an earlier landowner. However, the area was logged around 1992, and again after 1994. Repeated attempts to buy the land or interest land preservation organizations were unsuccessful. The heavy machinery caused erosion which damaged the breeding stream by siltation. Careful searching in 1993 revealed no larvae where there had been many earlier, five larvae and some recovery in 1994, and poorer conditions and no larvae in 1997. Some adults probably survive, but with no breeding and continued habitat destruction the colony will probably be extirpated in a few years.

35) *Rana clamitans* - was missing from the county after a 30 year search. *Rana clamitans* has been reported for surrounding counties (Smith, 1961, and Thurow and Sliwinski, 1991), in adjacent McKee Creek and Spoon River and Mississippi drainages. I released 58 frogs (from Pike, Brown, and Hancock counties) and about 500 tadpoles from Hancock County into two adjacent sites near the LaMoine River from 1986-1993. In 1996 I saw two *R. clamitans* (GRT 3253) in a stream less than two km upriver, which

hints that the translocations may succeed. I had seen none there in my previous annual visits from 1987-1995.

36) *Rana pipiens* - is mostly found north of McDonough County, as mapped by Redmer (1996). It has also been seen in Mercer County, and other parts of Knox and Rock Island counties (Thurow and Sliwinski, 1991). Repeated efforts to find the northern leopard frog around McDonough County have failed. However, I did collect and/or identify about five specimens on my farm from 1990-1994 (Thurow and Sliwinski, 1991, GRT 3254). None were seen since, and I have not yet been able to confirm occurrence along the north border of the county. Possibly some tadpoles were inadvertantly brought in with a sample of pondweeds from Lake Bracken in Knox County south of Galesburg, or from a WIU campus pond where others have released "surplus" biological supply house frogs. *R. pipiens* should not be considered part of the McDonough County fauna without further confirmation.

Very Rare or Extirpated Species, or Those of Unknown Status - Reptiles

37) *Apalone muticus* - is not known from the county. I saw two that students brought in from Iowa, and Don Moll found them by the Mississippi River in Hancock County (personal communication). The species is said to prefer clear rivers with sandy bottoms (Minton, 1972, Parmalee, 1955, and Smith 1961), and the turbid LaMoine is probably not suitable today.

38) *Graptemys geographica* - was once present in the county. A small creek passed through Macomb and the WIU campus. Near 1900 there was so much seepage from glacial deposits that people dammed the stream to form Holmes Lake, (or Lake George), now empty. Clear calcareous water supported many *Sagittaria* plants which still were present along the creek in the 1960s, presumably with many aquatic snails. I collected two *G. geographica* then (WIU 76), and locals spoke of more turtles in earlier years. Homes were built throughout the stream drainage, which is largely dry today, and the *Sagittaria*, snails, and map turtles are all gone. The quality of many other county streams also declined, and this turtle is probably extirpated county-wide. Don Moll trapped the LaMoine River in the 1970s but no *Graptemys* were caught (personal communication).

39) *Graptemys pseudogeographica* - may never have occurred in the county, and no specimens or reports are known to me.

40 and 41) *Terrepene carolina* and *T. ornata* - do not occur naturally although both of their known ranges are nearby (Smith, 1961, and Thurow and Sliwinski, 1991). These two forms and *T. c. triunguis* have been found repeatedly in Macomb (one noted by Smith, 1961, possibly INHS 3495), but are presumably pet releases or escapes.

42) *Ophisaurus attenuatus* - is a lizard that may once have occurred in the county in relict hill prairies. I know of no specimens, although a few old WIU specimens with no data could possibly have come from this area. Today the "glass snake" is probably absent.

43) *Agkistrodon contortrix* - was present in past years according to local reports from south McDonough County near Fandon and Industry. Some old WIU specimens with no

data may be from the county. Today copperheads occur in small relict colonies just south of the county line (live specimens displayed by Michael Romano and Robert Sliwinski of WIU). These snakes are very rare but not yet extirpated in McDonough County, because one live juvenile from southwest of Macomb was donated to Michael Romano in the fall of 1997.

44) *Clonophis kirtlandii* - is a state-threatened snake (Illinois Endangered Species Protection Board, 1994) which was reported from southwest McDonough County (Clark, 1962), and one older WIU specimen (14138) is from Argyle Lake. After wet prairies were plowed and drained, this species was probably extirpated. I searched for it, but only found one in southwest Adams County in 1985 (WIU 14140).

45) *Crotalus horridus* - is a state-threatened species (ibid., 1994) which formerly lived near Industry (personal report from a citizen who grew up there), Walnut Grove (a secondhand report), and near "rattlesnake den hollow" north of Colmar between 1896 and 1914 (Selters, 1982). Some old WIU specimens with no data could be from the county. But no recent specimens have been found, and no recent reports from nearer than Pike, Scott, and possibly Brown counties to the south. Consequently the species is thought to be extirpated from McDonough County.

46) *Elaphe vulpina* - has been reported from surrounding Hancock, Adams, Warren, and Fulton counties (Thurow and Sliwinski, 1991), and from isolated records to the south (Smith, 1961). Road kills on Illinois Highway 67 extend south towards McDonough County (WIU 347), and there was one unconfirmed secondhand report from Good Hope. The range may be expanding south and may reach this county if it has not already.

47) *Lampropeltis getula* - is almost certainly absent now. However, a 74 year old man who grew up in southeast McDonough County gave me a good description of specimens from his youth, saying they were rare then. Smith (1961) does not show it quite to McDonough County, listing it as "probably occurring sporadically" in western Illinois, and cites an old Peoria record (Garman 1892). One was taken from southwest Pike County by a high school teacher in the 1970s, and another man described them as formerly present in Pike County in the 1950s. In more recent years one was taken from the vacinity of Camp Point in east Adams County, and was supposedly deposited at the Jacksonville High School. It was described as the only one encountered in 40 years.

48) *Lampropeltis triangulum* - is a species which was once widespread in Illinois but is now quite rare outside of captivity. It occurs in Pike County; one (early 1970s) record exists from the Mississippi bluffs in Hancock County (WIU 537); Quincy College had one from Adams Co.; and I found one more recently in Warren County, to the north. This snake is probably extirpated in McDonough County.

49) *Nerodia erythrogaster* - occurs in the Illinois River above and below the mouth of the LaMoine River (Smith, 1961), and I saw nearer Illinois River specimens in Pike and Schuyler counties. Dr. Robert Henry and Mrs. Alice Henry, both experienced field biologists, described a close-up pond edge sighting from a boat on their McDonough County property by the LaMoine in 1997. This rare snake is hard to approach closely, and from a

distance is difficult to distinguish from other *Nerodia*. It is tentatively listed here with the county herpetofauna, pending confirmation of a population.

50) *Opheodrys vernalis* - is not known from the county, is presumably absent and has declined markedly in Illinois. *Opheodrys* may never have occupied McDonough County as implied by Smith (1961), but did occur in Galesburg 32 km north of the border. A man showed me where a hibernating aggregation had emerged from his cracked cement porch in 1985, and another citizen reported *Opheodrys* from the same area in earlier years. None were found in 1986, nor from a reported Fulton County locality.

51) *Pituophis melanoleucus* - is not known from the county, though a 1965 WIU specimen (259) was taken 6 km south in Schuyler County. Smith (1961) shows it from surrounding counties, and I saw one in Fulton County to the east in 1992. One report came from southeast McDonough County, for 40 years ago. This large snake is much persecuted and declining in Illinois, and is probably gone from McDonough County. It may never have been abundant, since it prefers sandy soil in Illinois (Schmidt and Davis, 1941, Smith 1961).

52) *Regina grahamii* - may have occupied McDonough County in the past, as it was once widespread along the rivers. No county records are known and it is presumed absent. Riverside habitat (with *Cephalanthus occidentalis* shrubs) like that of a previous sighting in Schuyler County was searched.

53) *Sistrurus catenatus* - is a state-endangered species (Illinois Endangered Species Protection Board, 1994) which still may be present, but would be very rare. There are still scattered reports from Warren, Knox, and other nearby counties and one from McDonough County by a graduate student in 1983, but WIU specimens are from only Warren County. Some old WIU specimens with no data might be from McDonough County and the snake might survive, but it is excluded here until confirmed.

54) *Thamnophis radix* - is a prairie upland snake, near the margin of its range, and does not persist well in McDonough County hayfields like *Storeria dekayi*. Warren County to the north has *T. radix* (Thurow and Sliwinski, 1991), and I found it in Galesburg (Knox County) in 1993. I thought it was extirpated in McDonough County, but found one road kill in 1989 (GRT 3255) and one in 1993 (GRT 3256), both in north McDonough County. It is very rare and could disappear.

55) *Tropidoclonion lineatum* - could possibly have occurred in McDonough County in the past, judging from the present disjunct range (Conant and Collins, 1991, and Smith, 1961). However, no records are known from the county.

DISCUSSION

This study suggests that 14 native amphibians and 21 native reptiles survive in McDonough County in 1998. Maps of the last major publication on Illinois herptile distribution (Smith, 1961) omitted the amphibians *Hemidactylium* and *Rana utricularia* (*R. pipiens sphenocephala*), and the more recently distinguished *R. blairi* and *Hyla chrysoscelis*. Smith's maps also implied that six of the reptiles were not in McDonough

County: *Carphophis, Diadophis, Thamnophis proximus, Virginia valeriae, Storeria occipitomaculata*, and *Nerodia* (*Natrix*) *erythrogaster*. Smith also shows *Lampropeltis getula* and *Clonophis* (*Natrix*) *kirtlandii* as being absent, although both probably once were present.

Smith's (1961) maps also indicated the probable presence of 12 native herptiles in McDonough County which I do not list here: *Rana clamitans* (though it has subsequently been introduced), *Rana pipiens* (the northern leopard frog), *Graptemys pseudogeographica* and *G. geographica* and *Ophisaurus attenuatus* (though he does not indicate these three by specific shading), *Apalone mutica, Opheodrys vernalis, Pituophis melanoleucus, Lampropeltis triangulum, Regina* (*Natrix*) *grahamii, Sistrurus catenatus*, and *Crotalus horridus*. A few additional species might still be found in McDonough County, such as *Rana pipiens, Clonophis kirtlandii, Elaphe vulpina*, and *Sistrurus catenatus*.

Eight of the 14 McDonough County amphibians are widespread (57%), five have restricted numbers or distribution (36%), and one (*Hemidactylium*) is on the verge of extirpation. Nine of the 21 reptiles (43%) are widespread in the county, nine are restricted, and three (14%) are very rare.

Four native salamanders and 10 frogs now live in McDonough County, of which *Hemidactylium scutatum* (rare) and *Rana utricularia* (found more recently) are noteworthy. No amphibian extirpations are known to have taken place in historical times. Their ranges and environmental change (Pielou, 1991) indicate that *Rana clamitans* and *R. sylvatica* probably once occurred and later disappeared, but they have been introduced again. Still more salamanders have been successfully translocated (but not all reported here), so the amphibian biodiversity of the county has not decreased yet, although many population sizes have.

Reptile biodiversity on the other hand has suffered greatly. Five turtles remain. But one and possibly two or more have been extirpated. One of two probable former lizards barely remains. Only 15 snakes remain, and nine of these show notable decline. At least five more probably existed in recent times. Six reptile survivors are less expected and therefore more noteworthy: the snakes *Carphophis, Diadophis* (both prairie and northern races), *Virginia valeriae, Thamnophis radix, Nerodia erythrogaster,* and *Agkistrodon contortrix*.

In recent years much attention has been given to a worldwide decline in amphibian biodiversity (Blaustein, 1994; McCoy, 1994; Phillips, 1994; Pechman and Wilbur, 1994; Travis, 1994; and many others), but comparable attention has not been given to reptiles. Reptiles are higher on the food chain and require populations of food animals supplied by relatively healthy ecosystems. Reptiles cannot exist on soil microarthropods, or algae or zooplankton, like many salamanders and frog larvae. Furthermore, reptiles are generally larger and more active, and require larger areas for self-sustaining breeding populations. The same amount of habitat fragmentation, selective lumbering or other disruption can be critical for a reptile population, but more tolerable by smaller amphibians during subsequent habitat recovery. Reptile augmentation or restocking is more difficult for these reasons. Reptiles are often more widely scattered, and it is more difficult to find the criti-

cal minimum number of donors to establish a population, particularly from the local area. Unfortunately, snakes, the most numerous reptile group in many areas, are more deliberately persecuted by humans than other herptile groups.

In many counties of the eastern U.S., reptile biodiversity is declining, and not just in counties that are becoming more metropolitan (as in Minton, 1968). This is also occurring in agricultural counties, like McDonough, where most of the original habitat has been replaced by crops.

Amphibians also have other problems in McDonough County besides habitat loss and degradation. Farmers and others use fertilizers, and pesticides. After the spring rains and runoff from fields, the mutagenicity of the waters increases (Ma, et al. 1985). My field notes record oily films on some ponds in some years, and some probable disappearance of amphibian larvae other than by predation or metamorphosis. The effects of acid rain are not extreme, probably because of the buffering effect of calcareous glacial deposits, and the addition of ground limestone for agriculture. I have not yet seen obvious intersexes or teratogenic abnormal development. In general, the amphibians appear to breed successfully. One or more pathogens in McDonough County sometimes cause a disease resembling "red leg", although most amphibians are unaffected. Erythema, edema or blister-like lesions, and necrosis sometimes occur. Around 1990 I found a dead *Rana blairi* with this condition in Wigwam Hollow Creek west of Macomb. In 1993 some *R. sylvatica* tadpoles showed this condition in an overcrowded puddle near lower Miller Creek northeast of Macomb. Unlike most of their siblings, they failed to metamorphose. In 1997 some salamander larvae briefly showed this condition in a crowded streamside impoundment (pictured by Thurow, 1994b) further up Miller Creek, and some mortalities resulted. Tadpoles, frogs, and other herptiles were apparently not affected.

Studies concerning long term herptile population changes are beginning to appear. Lanoo et al. (1994) noted changes among nine amphibians in Dickinson County, Iowa. Two had not been found from 1920, and two others were not present in 1920. McAlpine (1997) found evidence suggesting less change among 16 amphibians in New Brunswick, Canada.

Private citizens could slow herptile species losses by: 1) supporting natural land acquisition and protection organizations, and 2) by refraining from killing reptiles and educating others to do likewise. Since reptile populations often need larger areas of habitat (perhaps 32 ha or more), it may be practical for people to pool their efforts in raising money to purchase land or agreeing to protect bordering adjacent habitat areas. Although one small "odd corner" is usually insufficient, it can sometimes be helpful if contiguous with a watercourse or railroad, or even a road or fence row. Conservation easements can be used to protect habitat beyond the present owner's lifetime.

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Figure 1. McDonough County. Dark areas represent forests in 1963. Light areas are primarily agriculture.