

## AMPHIBIAN CWCS SPECIES (25 SPECIES)

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Common name	Scientific name
<a href="#">Allegheny Mountain Dusky Salamander</a>	<i>Desmognathus ochrophaeus</i>
<a href="#">Barking Treefrog</a>	<i>Hyla gratiosa</i>
<a href="#">Bird-voiced Treefrog</a>	<i>Hyla avivoca</i>
<a href="#">Black Mountain Salamander</a>	<i>Desmognathus welteri</i>
<a href="#">Cumberland Plateau Salamander</a>	<i>Plethodon kentucki</i>
<a href="#">Eastern Hellbender</a>	<i>Cryptobranchus alleganiensis alleganiensis</i>
<a href="#">Eastern Spadefoot</a>	<i>Scaphiopus holbrookii</i>
<a href="#">Four-toed Salamander</a>	<i>Hemidactylium scutatum</i>
<a href="#">Gray Treefrog</a>	<i>Hyla versicolor</i>
<a href="#">Green Salamander</a>	<i>Aneides aeneus</i>
<a href="#">Green Treefrog</a>	<i>Hyla cinerea</i>
<a href="#">Mole Salamander</a>	<i>Ambystoma talpoideum</i>
<a href="#">Northern Crawfish Frog</a>	<i>Rana areolata circulosa</i>
<a href="#">Northern Dusky Salamander</a>	<i>Desmognathus fuscus</i>
<a href="#">Northern Leopard Frog</a>	<i>Rana pipiens</i>
<a href="#">Redback Salamander</a>	<i>Plethodon cinereus</i>
<a href="#">Southern Leopard Frog</a>	<i>Rana sphenoccephala</i>
<a href="#">Southern Zigzag Salamander</a>	<i>Plethodon ventralis</i>
<a href="#">Spotted Dusky Salamander</a>	<i>Desmognathus conanti</i>
<a href="#">Streamside Salamander</a>	<i>Ambystoma barbouri</i>

[Three-lined Salamander](#)

*Eurycea guttolineata*

[Three-toed Amphiuma](#)

*Amphiuma tridactylum*

[Wehrle's Salamander](#)

*Plethodon wehrlei*

[Western Lesser Siren](#)

*Siren intermedia nettingi*

[Wood Frog](#)

*Rana sylvatica*

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## CLASS AMPHIBIA

**Allegheny Mountain Dusky Salamander**

*Desmognathus ochrophaeus*

<b>Federal Status</b>	<b>Heritage Status</b>	<b>GRank</b>	<b>SRank</b>	<b>GRank (Simplified)</b>	<b>SRank (Simplified)</b>
N	N	G5	S4	G5	S4

**G-Trend** Unknown

**G-Trend** Upland areas - primarily mountainous regions - from New York southward into

**Comment** Tennessee (Conant and Collins 1991). Occurs more or less continuously in suitable habitat throughout the Cumberland Mountains in extreme southeastern Kentucky; scattered populations occur elsewhere in eastern Kentucky; known from a total of about 16 counties (J.R. MacGregor Herpetology Maps 2004).

**S-Trend** Unknown

**S-Trend** Unknown rangewide; unknown but possibly declining in Kentucky due to the

**Comment** recent increase in mountaintop removal surface mining in the Cumberlands. In addition there seems to be an ongoing general *Desmognathus* decline in northeastern Kentucky for which additional investigation and documentation is

needed. The mountain dusky salamander is known historically from single sites in Carter County and McCreary County and has not been seen at either of these locations despite much searching over the past 20 years. This species is not tracked by Kentucky State Nature Preserves Commission.

**Habitat /** Somewhat of a habitat specialist in Kentucky; the best habitat includes moist

**Life History** banks, streamheads, seeps, wet spots, and cool moist forests at the highest elevations on Black Mountain and other high peaks in the Cumberlands.

Elsewhere in eastern Kentucky the mountain dusky salamander is found in cool mucky seeps and wet areas near waterfalls, or in close association with dripping rock faces and wet crevices along shaded sandstone or shale cliffs (including coal mine entrances).

**Key** Generally GOOD in the Cumberland Mountains, but only FAIR elsewhere in

**Habitat** eastern Kentucky; populations seem to be declining in the northeast. The Daniel Boone National Forest cliffline management policy will help maintain habitat for populations that inhabit public lands in the Cliff Section of the Cumberland Plateau.

Following Key Habitats (good):

1. Harlan County - Black Mountain
2. Leslie County - Daniel Boone National Forest

**Guilds** caves, rock shelters, and clifflines, Cumberland highland forest, running water, upland forest.

## **CLASS AMPHIBIA**

**Allegheny Mountain Dusky Salamander**

*Desmognathus ochrophaeus*

**Statewide** [AlleghenyMountainDuskySalamander.pdf](#)

**Map**

### **Conservation Issues**

Terrestrial habitat degradation

- 3K Surface mining. Surface mining and mountaintop removal.
- 3M Timber harvest. Logging (without cliffline buffers) and drying of forest floor/leaf litter.
- 3R Habitat and/or Population Fragmentation. Due to Surface Mining.
- 3U Loss, lack and degradation of special and unique microhabitats

**CLASS AMPHIBIA**

**Barking Treefrog** *Hyla gratiosa*

<b>Federal Status</b>	<b>Heritage Status</b>	<b>GRank</b>	<b>SRank</b>	<b>GRank (Simplified)</b>	<b>SRank (Simplified)</b>
N	S	G5	S3	G5	S3

**G-Trend** Stable

**G-Trend** The barking treefrog is widespread in southeastern U.S. (Conant and Collins

**Comment** 1991). An isolated population at the northwestern edge of the range occurs in the Western Pennyroyal Karst Plain (Woods et al. 2002) of Kentucky and Tennessee including portions of 8 western Kentucky counties (Redmond and Scott 1996, Kentucky State Nature Preserve Commission 2004, J.R. MacGregor Herpetology Maps 2004).

**S-Trend** Stable

**S-Trend** Rangewide populations are apparently stable. In our area, Kentucky State

**Comment** Nature Preserves Commission monitoring data shows recent records (1984-2004) for all 8 known Kentucky counties. Barking treefrogs breed rather sporadically in seasonal and permanent ponds that are located primarily in open agricultural habitats, and several years may pass in a given area between breeding events. It is quite difficult to track population trends accurately within individual colonies.

**Habitat /** Adult barking treefrogs are generally found only in agricultural areas in

**Life History** Kentucky; most observations are for calling males or tadpoles at breeding

ponds. A few adults can sometimes be found crossing wet roadways on rainy evenings. It is likely that most adults burrow into the soil and remain underground for much of the year, but this remains to be demonstrated. Radiotracking studies are needed to determine the habitat requirements of the adults.

**Key** Habitat condition overall is probably GOOD within its limited range in

**Habitat** Kentucky; the amount of cropland and pasture in this area seems to be relatively stable with little or no imminent threat from development or urban expansion.

Following Key Habitats (good):

1. Caldwell County
2. Caldwell County
3. Logan County

**Guilds** grassland/agricultural, standing water.

**Statewide** [BarkingTreefrog.pdf](#)

**Map**

# CLASS AMPHIBIA

## Barking Treefrog

*Hyla gratiosa*

## Conservation Issues

### Biological/ consumptive uses

- 5F Low population densities
- 5H Isolated populations (low gene flow)
- 5K Lack of suitable habitat for spawning, nesting, or breeding

### Miscellaneous Mortality Factors

- 6G Stochastic events (droughts, unusual weather, pine beetle damage, flooding etc.). Premature dry-up of breeding pools.

### Terrestrial habitat degradation

- 3A Row-crop agriculture (conversion to, annual reuse of fields, etc). Habitat loss (agriculture - breeding sites filled/graded).
- 3F Urban/residential development. Fragmentation by highways/urbanization (NatureServe 2004).
- 3P Pollution/toxicity (e.g., heavy metals, pesticides, herbicides, acid rain). Contamination by pesticides/herbicides.
- 3R Habitat and/or Population Fragmentation. Fragmentation by highways/urbanization (NatureServe 2004).
- 3U Loss, lack and degradation of special and unique microhabitats

**CLASS AMPHIBIA**

**Bird-voiced Treefrog** *Hyla avivoca*

Federal Status	Heritage Status	GRank	SRank	GRank (Simplified)	SRank (Simplified)
N	S	G5	S3	G5	S3

**G-Trend** Unknown

**G-Trend** The bird-voiced treefrog is widespread in southeastern U.S., extending

**Comment** northward along the Mississippi and lower Ohio River lowlands into western Kentucky (Conant and Collins 1991). This species occurs in about 15 counties in the Jackson Purchase and Western Coal Field in western Kentucky (Kentucky State Nature Preserve Commission 2004, Kentucky Herpetology Database 2004, J.R. MacGregor herpetology Maps 2004).

**S-Trend** Decreasing

**S-Trend** The rangewide population trend is unknown but is probably stable. The bird-

**Comment** voiced treefrog is uncommon to rare in Kentucky and may be declining; some populations (e.g., those in Ballard County) have vanished since the 1960's. Comprehensive survey work is needed in the state. There are recent (1984-2004) records from 14 counties (Kentucky State Nature Preserve Commission 2004; J.R. MacGregor data).

**Habitat /** Adults are largely arboreal and occur in and near cypress swamps, various

**Life History** swampy woodlands with some standing water, and bottomland hardwood forests. Calling males often perch above standing water in buttonbush or



tangled vines. Tadpoles develop in warm shallow waters with emergent vegetation (J.R. MacGregor).

**Key** Habitat condition overall is FAIR.

**Habitat**

Following Key Habitats (good):

1. Hickman County
2. Hickman County
3. Caldwell County and Hopkins County

**Guilds** Emergent and shrub-dominated wetlands, forested wetland.

**Statewide** [Bird-voicedTreefrog.pdf](#)

**Map**

## **CLASS AMPHIBIA**

### **Bird-voiced Treefrog**

*Hyla avivoca*

### **Conservation Issues**

#### Terrestrial habitat degradation

- 3A Row-crop agriculture (conversion to, annual reuse of fields, etc).  
loss/conversion of bottomland hardwoods
- 3F Urban/residential development. fragmentation by highways/urbanization  
(NatureServe 2004)
- 3K Surface mining
- 3R Habitat and/or Population Fragmentation. wetland fragmentation  
(mining/agriculture), fragmentation by highways/urbanization (NatureServe  
2004)
- 3U Loss, lack and degradation of special and unique microhabitats

**CLASS AMPHIBIA**

**Black Mountain Salamander**

*Desmognathus welteri*

<b>Federal Status</b>	<b>Heritage Status</b>	<b>GRank</b>	<b>SRank</b>	<b>GRank (Simplified)</b>	<b>SRank (Simplified)</b>
N	N	G4	S4	G4	S4

**G-Trend** Unknown

**G-Trend** Nearly endemic to eastern Kentucky, extending into adjacent portions of West

**Comment** Virginia, Virginia, and Tennessee (Conant and Collins 1991). Historically known from 29 counties in eastern Kentucky, primarily in the Cumberland, Kentucky, and Licking River drainages; rare and local in the Little Sandy and Big Sandy systems and apparently ranges no further north than Rowan, Elliott, Floyd, and Pike counties (J.R. MacGregor Herpetology Maps 2004).

**S-Trend** Decreasing

**S-Trend** The Black Mountain salamander has been documented since 1984 in at least 20

**Comment** counties in eastern Kentucky. Numbers are declining at numerous sites in northeastern Kentucky in the Morehead/Laurel Creek Gorge area in Rowan and Elliott counties and possibly in the Big South Fork area (McCreary County) as well. However, the species is regularly encountered in suitable habitat in Red River Gorge and nearby, in the Cave Hollow area (Lee County), and on Black Mountain (Harlan County). This species is not tracked by Kentucky State Nature Preserves Commission.

**Habitat /** The Black Mountain salamander is more of a habitat specialist than most

**Life History** Kentucky *Desmognathus*; it is largely a resident of clear high-gradient mountain streams and is most common in rocky headwater creeks in cool moist forested ravines on Black Mountain and other high peaks in the Cumberlands.

Elsewhere in eastern Kentucky the Black Mountain salamander is primarily found in shaded spring-fed streams. This species is intolerant of silt; it is often associated with small waterfalls and wet entrances to caves and abandoned coal mines.

**Key** Habitat condition is generally GOOD in the Cumberland Mountains, but only

**Habitat** FAIR elsewhere in eastern Kentucky; populations seem to be declining in the northeast. The Daniel Boone National Forest cliffline management policy and buffer strips to maintain forest cover along stream corridors will help maintain habitat for populations that inhabit public lands in the Cliff Section of the Cumberland Plateau.

Following Key Habitats (good):

1. Powell County
2. Lee County
3. Harlan County - Black Mountain

## **CLASS AMPHIBIA**

### **Black Mountain Salamander**

*Desmognathus welteri*

4. Letcher County

**Guilds** Cumberland highland forest, running water, upland forest.

**Statewide** [BlackMountainSalamander.pdf](#)

**Map**

### **Conservation Issues**

Miscellaneous Mortality Factors

6G Stochastic events (droughts, unusual weather, pine beetle damage, flooding etc.). Unexplained population declines.

Terrestrial habitat degradation

3K Surface mining. Surface mining and mountaintop removal.

3M Timber harvest

3R Habitat and/or Population Fragmentation. Due to surface mining

3U Loss, lack and degradation of special and unique microhabitats

**CLASS AMPHIBIA**

**Cumberland Plateau Salamander**

*Plethodon kentucki*

<b>Federal Status</b>	<b>Heritage Status</b>	<b>GRank</b>	<b>SRank</b>	<b>GRank (Simplified)</b>	<b>SRank (Simplified)</b>
N	N	G4	S4	G4	S4

**G-Trend** Decreasing

**G-Trend** Nearly endemic to eastern Kentucky, extending into adjacent portions of West

**Comment** Virginia, Virginia, and Tennessee (Conant and Collins 1991). The Cumberland Plateau salamander has been found in 31 counties and occurs nearly throughout eastern Kentucky (J.R. MacGregor Herpetology Maps 2004).

**S-Trend** Decreasing

**S-Trend** Population trends seem to be variable in Kentucky. This salamander appears to

**Comment** be doing well at several sites in southeastern Kentucky including Garrett (Floyd County), Black Mountain (Harlan County), Pine Mountain above Bledsoe (Harlan County), Limestone Cave (Whitley County), Pine Mountain Wildlife Management Area (Letcher County), and Cumberland Gap National Historical Park (Bell County) (all data from J.R. MacGregor 2000-2004 except Cumberland Gap information from Third Rock 2003). In some sections of northeastern Kentucky, however, it has all but disappeared from many locations for no apparent reason (J.R. MacGregor 2000-2004 data for Carter, Elliott, and Rowan Co). The Cumberland Plateau salamander has also declined rather dramatically at several locations near Huntington, West Virginia where it

was formerly abundant (R. Highton, pers. comm. 2002). Recent (1984-2004) records exist for 24 Kentucky counties (J.R. MacGregor data). This species is not tracked by Kentucky State Nature Preserves Commission.

**Habitat /** The Cumberland Plateau salamander is completely terrestrial. Adults and

**Life History** juveniles live in wooded areas; females deposit small clusters of eggs in summer-

fall in underground retreats. As with other species of Plethodon, all larval development takes place within the egg and thus there is no free-living aquatic larval stage. Populations are highest on ridges and steep slopes with mature forest cover, numerous shaded rock outcrops, abundant leaf litter and/or woody debris on the surface, and (often) rocky or gravelly soils (J.R. MacGregor).

This species is somewhat of a habitat specialist; it seems dependent to a large degree upon rock crevices; many good populations occur in/along/near shaded clifflines, outcrops, caves, rock shelters, and the entrances of abandoned coal mines. It also occurs in and under decaying logs, under loose bark on dead trees, within split trees/logs, in old sawdust piles, in cavities and crevices in living trees, and in burrows on steep hillsides.

## **CLASS    AMPHIBIA**

### **Cumberland Plateau Salamander**

*Plethodon kentucki*

**Key**            Habitat condition is generally GOOD in many areas in southeastern Kentucky, but perhaps only FAIR in an overall view if one considers the unexplained population declines that have taken place in some areas. Habitat condition is generally good on most public lands; Daniel Boone National Forest cliffline and cave management policies will probably ensure that forest cover is maintained in some of the best habitat in the Cliff Section and Rugged Eastern Area of the Cumberland Plateau.

Following Key Habitats (good):

1. Harlan County - Black Mountain
2. Harlan County - Pine Mountain
3. Harlan County - Daniel Boone National Forest
4. Floyd County
5. Whitley County - Pine Mountain
6. Letcher County

**Guilds**        caves, rock shelters, and clifflines, Cumberland highland forest, upland forest.

**Statewide**    [CumberlandPlateauSalamander.pdf](#)

**Map**

### **Conservation Issues**



## Miscellaneous Mortality Factors

- 6G Stochastic events (droughts, unusual weather, pine beetle damage, flooding etc.). Unexplained population declines.

## Terrestrial habitat degradation

- 3K Surface mining. Loss of habitat from surface mining and mountaintop removal
- 3M Timber harvest. Logging (without cliffline buffers and causing the drying of forest floor leaf litter. Loss of CWD in lowland woods.
- 3R Habitat and/or Population Fragmentation. Surface mining causing habitat fragmentation.
- 3U Loss, lack and degradation of special and unique microhabitats

**CLASS AMPHIBIA**

**Eastern Hellbender**

*Cryptobranchus alleganiensis alleganiensis*

<b>Federal</b>	<b>Heritage</b>	<b>GRank</b>	<b>SRank</b>	<b>GRank</b>	<b>SRank</b>
<b>Status</b>	<b>Status</b>			<b>(Simplified)</b>	<b>(Simplified)</b>
N	S	G3G4	S3	G3	S3
		T3T4			

**G-Trend** Decreasing

**G-Trend** Primarily throughout most of the Ohio River drainage (including Tennessee and

**Comment** Cumberland systems) from southern New York to northern Alabama and southern Illinois; isolated populations in Missouri and Arkansas (Conant and Collins 1991). Recorded from about 60 counties statewide; occurs in all major river systems in Kentucky except for those located to the west of the Tennessee River (Kentucky Herpetology Database 2004, Kentucky State Nature Preserves Commission Database 2004, J.R. MacGregor Herpetology Maps 2004).

**S-Trend** Decreasing

**S-Trend** Apparently declining rangewide; Kentucky status is unknown but the

**Comment** hellbender is probably declining in at least some areas. Recent (1984-2004) records are available from at least 25 counties in the Licking, Kentucky/Red, Cumberland, and Green/Barren River drainages; no comprehensive field surveys have been conducted for hellbenders in Kentucky.

**Habitat /** Occurs in rivers and large streams; known from the major river systems in

**Life History** Kentucky including the Ohio, Licking, Kentucky, Green, Barren, Cumberland.

No systematic surveys have been done here. Apparently requires reasonably good water quality; much literature points to the idea that hellbenders do best in cool, high quality streams with available large flat rocks or rock ledges available to serve as diurnal retreats.

**Key** Habitat condition is generally FAIR to POOR.

**Habitat**

Following Key Habitats (good):

1. Rowan County
2. Pulaski County
3. Allen County

**Guilds** running water.

**Statewide** [EasternHellbender.pdf](#)

**Map**

# **CLASS AMPHIBIA**

**Eastern Hellbender**

*Cryptobranchus alleganiensis alleganiensis*

## **Conservation Issues**

### Aquatic habitat degradation

- 2B Gravel/sand removal or quarrying (e.g., mineral excavation). Gravel dredging.
- 2C Construction/Operation of impoundments (migration barrier).  
Construction of dams/reservoirs.
- 2D Woody debris removal
- 2F Riparian zone removal (Agriculture/development). Loss/conversion of riparian forest and channelization/riparian wetland loss.

### Biological/ consumptive uses

- 5J Incidental mortality due to commercial fishing/musseling (mortality and overharvest). Fishing/troutlines/limb lines

### Miscellaneous Mortality Factors

- 6G Stochastic events (droughts, unusual weather, pine beetle damage, flooding etc.). Unexplained population declines.

### Point and non-point source pollution

- 4B Waste water discharge (e.g., sewage treatment). Degradation or pollution of streams/rivers.
- 4C Toxic chemical spills
- 4K Industrial waste discharge/runoff. Degradation or pollution of

Siltation and increased turbidity

- 1A Coal mining
- 1B Agriculture. Stream sedimentation also from mining/coal washing.
- 1C Road construction
- 1D Urbanization/Development General Construction

Terrestrial habitat degradation

- 3K Surface mining. Surface mining/mountaintop removal.
- 3R Habitat and/or Population Fragmentation

**CLASS Amphibia**

**Eastern Spadefoot**

*Scaphiopus holbrookii*

Federal Status	Heritage Status	GRank	SRank	GRank (Simplified)	SRank (Simplified)
N	N	G5	S4	G5	S4

**G-Trend** Unknown

**G-Trend** Data from across the range indicates that the overall population trend is thought

**Comment** to be stable to decreasing but populations are very difficult to monitor due to the irregular and unpredictable breeding habits of this species.

The Eastern Spadefoot is a wide-ranging species known from about 24 states in the eastern, midwestern, and southeastern U.S. and is listed by state heritage programs in about half of these (Conant and Collins 1991; U.S. Geological Survey/National Amphibian Atlas accessed 3/15/2010; NatureServe accessed 3/11/2010). Still, relatively little hard information is available on the distribution

and abundance of this highly fossorial animal. Adults call only during brief, irregular breeding episodes during periods of heavy rain but otherwise spend much of their time underground (Lannoo 2005). State Conservation Statuses (NatureServe, accessed 3/11/2010) are as follows: S1 in Connecticut, Ohio, Pennsylvania, Rhode Island, and West Virginia; S2 in Arkansas, Indiana, Massachusetts, and Missouri; S2/S3 in New York, S3 in Illinois; S4 in Delaware,

Kentucky, Louisiana, Maryland, and Virginia; and S5 or unranked in Alabama, Florida, Georgia, Mississippi, New Jersey, North Carolina, South Carolina, and Tennessee.

Eastern Spadefoots are believed to have been extirpated from portions of their original range due to habitat destruction (McCoy 1982; Klemens 1993).

**S-Trend** Unknown

**S-Trend** The Eastern Spadefoot has been added to the Kentucky State Wildlife Action Plan

**Comment** for three reasons: (1) its overall distribution and abundance are poorly known in comparison with other native anurans; (2) most of the documented breeding sites are temporary pools that in recent years have usually gone dry before the tadpoles have transformed into froglets; and (3) complete larval die-offs from disease have been observed at 2 different breeding ponds that have been monitored regularly by the state herpetologist.

Eastern Spadefoots have been documented from at least 37 Kentucky counties ranging from Greenup, Lawrence, and Floyd in eastern Kentucky westward to Carlisle County at the base of the loess bluffs bordering the Mississippi River. Some of these records date back into the 1930's, and many are based on single specimens. No records are available from the Bluegrass Region or Western Coal Field but this species does occur at least sparingly in all other sections of Kentucky. Within the past 10 years breeding

sites have been found in Rowan, Powell, Rockcastle, Laurel, McCreary, Meade, Hart, and Edmonson counties. Massive tadpole die-offs have been noted at breeding ponds in Rockcastle and Edmonson counties during this time, indicating that diseases such as Ranavirus may be impacting this species in Kentucky. Several breeding sites that were monitored in Edmonson County from 2004-2009 have gone dry before the tadpoles could complete their development – this is not unusual for a species that often uses temporary pools for reproduction but in combination with disease it may contribute to the extirpation of local populations over time (JRM unpublished data).

**Habitat /** Eastern Spadefoots occur in both open and forested habitats in uplands or  
**Life** bottomlands that have friable sandy to loamy soils. Breeding takes place largely  
**History** in temporary pools – even in low sections of flooded fields – and occasionally in permanent ponds (Hansen 1958, Pearson 1955, Lannoo 2005). At least 2 of the breeding ponds that are being monitored at Mammoth Cave National Park are old  
constructed farm ponds that were likely present when land for the park was purchased in the 1930's (JRM personal observation). Eggs are attached to submerged or floating vegetation; hatching and larval development periods vary with temperature but tend to be relatively rapid in comparison with other anurans.

In Kentucky, metamorphs have appeared as early as 30 days after the eggs



were laid (JRM personal observation). The Eastern Spadefoot can breed at just about any time from March-October in Kentucky but most breeding takes place from May-July (JRM personal observation). Breeding activity is primarily initiated by heavy rains, and populations at some locations breed very infrequently. One Powell County breeding site was used only twice in seven years. A breeding pond in Edmonson County, on the other hand, was used 4 times in a single year but went dry each time before the tadpoles were able to transform (JRM personal observation).

- Key** Laurel County (breeding site in a natural vernal pool along KY 192 NE of Baldrock); Edmonson County (Mammoth Cave National Park (several breeding sites continue to be regularly used and likely produce numerous young during some years).
- Habitat**
- Guilds** Emergent and shrub-dominated wetlands, grassland/agricultural, standing water, upland forest.

**Statewide** [Eastern Spadefoot.pdf](#)

**Map**

**CLASS**     **AMPHIBIA**

**Four-toed Salamander**

*Hemidactylium scutatum*

<b>Federal</b>	<b>Heritage</b>	<b>GRank</b>	<b>SRank</b>	<b>GRank</b>	<b>SRank</b>
<b>Status</b>	<b>Status</b>			<b>(Simplified)</b>	<b>(Simplified)</b>

N	N	G5	S4	G5	S4
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**G-Trend** Unknown

**G-Trend** Widespread in forested sections of the eastern U.S. from southern Canada to

**Comment** Florida, Alabama, Mississippi, Louisiana, Arkansas, and Oklahoma; the range is largely discontinuous and many populations are isolated (Conant and Collins 1991). Recorded from 44 Kentucky counties; most commonly found in eastern Kentucky but also known from Jefferson-Bullitt (Caperton Swamp and Bernheim Forest), Edmonson-Hart (Mammoth Cave area), Caldwell-Christian (Dripping Springs Escarpment and Dawson Springs Seep Swamp), and Calloway (Blood River bottoms) counties (J.R. MacGregor Herpetology Maps 2004).

**S-Trend** Stable

**S-Trend** Four-toed salamander populations seem to be more or less stable here in

**Comment** Kentucky; new locations are still being discovered at a regular rate and post-1984 records exist for at least 35 counties. The Jefferson County colony at Caperton Swamp seems to have disappeared during the construction of I-71 (Burt L. Monroe, Jr., now deceased, pers. comm. to J.R. MacGregor ca 1972), and the colony in the Blood River area of Calloway County has never been relocated since its original discovery. This species is not tracked by Kentucky State Nature Preserves Commission.

**Habitat /** Adult four-toed salamanders live primarily in upland forests; good populations

**Life History** also occur in wet woodlands along floodplains and terraces border some large streams and rivers. Egg clusters are laid in late winter and early spring and are usually attended by females; nests are located near the edges of ponds, woodland pools, seeps, or sluggish boggy headwater streams in which the larval development takes place after hatching. Most nests are hidden in mosses, but some are also found in clumps of grasses or sedges, in and under chunks of decaying wood, or in leaf litter. Most Kentucky sites are in areas with acid soils. Natural vernal ponds on broad flat sandstone ridges and wet areas located along old mine benches seem especially favored as nesting areas.

**Key** Habitat condition is generally GOOD overall.

**Habitat**

Following Key Habitats (good):

1. Adair County
2. Powell County
3. Menifee County

## **CLASS AMPHIBIA**

### **Four-toed Salamander**

*Hemidactylium scutatum*

**Guilds** Emergent and shrub-dominated wetlands, running water, standing water, upland forest.

**Statewide** [Four-toedSalamander.pdf](#)

### **Map**

## **Conservation Issues**

### Miscellaneous Mortality Factors

6A Traffic/road kills

### Terrestrial habitat degradation

3F Urban/residential development. Habitat loss from urban development.

3K Surface mining. Surface mining and mountaintop removal.

3M Timber harvest. Logging (drying of forest floor/leaf litter.

3R Habitat and/or Population Fragmentation. From surface mining.

3U Loss, lack and degradation of special and unique microhabitats

**CLASS AMPHIBIA**

**Gray Treefrog** *Hyla versicolor*

<b>Federal Status</b>	<b>Heritage Status</b>	<b>GRank</b>	<b>SRank</b>	<b>GRank (Simplified)</b>	<b>SRank (Simplified)</b>
N	S	G5	S2S3	G5	S2

**G-Trend** Stable

**G-Trend** The eastern gray treefrog and its close relative (Cope’s gray treefrog) form a

**Comment** species complex that is widespread in eastern North America (Conant and Collins 1991). Although the diploid species (*Hyla chrysoscelis*) can be found throughout the state, the range of the tetraploid species (*Hyla versicolor*) barely extends into Kentucky from the north. Breeding colonies are known from 3 counties in the Fort Knox area and 2 counties in the Ashland area in extreme northeastern Kentucky (Kentucky State Nature Preserve Commission 2004, J.R. MacGregor Herpetology Maps 2004).

**S-Trend** Stable

**S-Trend** Eastern gray treefrog populations appear to be stable both rangewide and in

**Comment** Kentucky. Although the diploid Cope’s gray treefrog (*Hyla chrysoscelis*) occurs throughout the state, *Hyla versicolor* was not discovered in the Fort Knox area until the mid-1980’s and the Ashland population was only discovered in 2000. No range expansions or contractions have been noted in either population; this species and Cope’s gray treefrog occur together and often use the same breeding ponds at the same time of the year.

**Habitat /** Both species of gray treefrogs are more or less arboreal but can persist in

**Life History** weedfields, shrubby areas, and thickets as well as along tree-lined fencerows and in forests. Breeding sites include permanent and seasonal ponds (and tire ruts) in either forested or open habitats.

**Key** Habitat condition is apparently GOOD; this species is nearly ubiquitous in

**Habitat** Kentucky within its limited range.

Following Key Habitats (good):

1. Meade County
2. Hardin County
3. Breckinridge-Hardin-Meade counties

**Guilds** Emergent and shrub-dominated wetlands, standing water, upland forest.

**Statewide** [GrayTreefrog.pdf](#)

**Map**

# CLASS AMPHIBIA

## Gray Treefrog

*Hyla versicolor*

### Conservation Issues

#### Biological/ consumptive uses

- 5B Predation from native species. introduction of predatory fish into breeding ponds (Phillips et al. 1999).
- 5F Low population densities
- 5H Isolated populations (low gene flow)
- 5K Lack of suitable habitat for spawning, nesting, or breeding. Habitat loss (agriculture - breeding sites filled/grades).

#### Terrestrial habitat degradation

- 3A Row-crop agriculture (conversion to, annual reuse of fields, etc). Habitat loss (agriculture - breeding sites filled/grades).
- 3F Urban/residential development. Habitat loss due to urban expansion/development also urban expansion into limited areas.
- 3P Pollution/toxicity (e.g., heavy metals, pesticides, herbicides, acid rain). Contamination by pesticides/herbicides.
- 3R Habitat and/or Population Fragmentation. Wetland fragmentation (mining/agriculture).
- 3U Loss, lack and degradation of special and unique microhabitats

**CLASS AMPHIBIA**

**Green Salamander**

*Aneides aeneus*

<b>Federal Status</b>	<b>Heritage Status</b>	<b>GRank</b>	<b>SRank</b>	<b>GRank (Simplified)</b>	<b>SRank (Simplified)</b>
N	N	G3G4	S4	G3	S4

**G-Trend** Decreasing

**G-Trend** Appalachian Mountains from extreme southwestern Pennsylvania to north-

**Comment** central Alabama and extreme northeastern Mississippi; isolated population in Blue Ridge Mountains (Conant and Collins 1991). Widely distributed in eastern Kentucky (37 counties) where populations are nearly continuous along sandstone cliffines in the Cliff Section of the Cumberland Plateau; a small outlier in Casey County and another much further to the west near the Ohio River in Breckinridge County that matches up with otherwise-isolated sites in southern Indiana (J.R. MacGregor Herpetology Maps 2004).

**S-Trend** Stable

**S-Trend** Probably stable; documented in 30 counties since 1984 and probably still

**Comment** occurs in all historic counties in Kentucky. This species is not tracked by Kentucky State Nature Preserves Commission.

**Habitat /** Generally a habitat specialist dependent upon humid rock crevices; most

**Life History** populations occur along and near shaded sandstone cliffs and outcrops (including sandstone caves and rock shelters). Also found in limestone cliffs and shale cliffs (including coal mine entrances) to a limited degree; sometimes



found in limestone caves if sandstone occurs nearby. Also occurs in decaying logs, under loose bark on dead trees, within split trees/logs, in old sawdust piles, and in cavities and crevices in living trees.

**Key** Habitat condition is generally GOOD. Generally stable; the Daniel Boone

**Habitat** National Forest cliffline management policy will ensure that forest cover is maintained on public lands in the Cliff Section of the Cumberland Plateau.

Following Key Habitats (good):

1. Powell County
2. Breckinridge County
3. Whitley County

**Guilds** caves, rock shelters, and clifflines, Cumberland highland forest, upland forest.

**Statewide** [GreenSalamander.pdf](#)

**Map**

## **CLASS AMPHIBIA**

**Green Salamander**

*Aneides aeneus*

### **Conservation Issues**

#### Miscellaneous Mortality Factors

- 6G Stochastic events (droughts, unusual weather, pine beetle damage, flooding etc.). Unexplained population declines.

#### Terrestrial habitat degradation

- 3K Surface mining. Surface mining/mountaintop removal.
- 3M Timber harvest. Logging (without cliffline buffers).
- 3R Habitat and/or Population Fragmentation
- 3U Loss, lack and degradation of special and unique microhabitats

**CLASS AMPHIBIA**

**Green Treefrog** *Hyla cinerea*

Federal Status	Heritage Status	GRank	SRank	GRank (Simplified)	SRank (Simplified)
N	S	G5	S3	G5	S3

**G-Trend** Increasing

**G-Trend** The green treefrog is widespread in southeastern U.S.; its range extends

**Comment** northward along the Mississippi and lower Ohio River lowlands into western Kentucky (Conant and Collins 1991). Green treefrog populations are known from about 12-13 Kentucky counties. In the late 1970's and early 1980's it spread from the Mississippi River area (Fulton, Hickman, Carlisle, and Ballard Co) throughout the Jackson Purchase; in recent years the range has expanded further and the species now occurs along the shorelines of Kentucky and Barkley Lakes as well as eastward along the Ohio River at least into Breckinridge County (J.R. MacGregor 2004, Kentucky State Nature Preserve Commission 2004, Kentucky Herpetology Database 2004).

**S-Trend** Increasing

**S-Trend** Green treefrog populations are increasing both in Kentucky and elsewhere,

**Comment** especially in the northern portion of the range. In Kentucky, the green treefrog was known in the 1970's only from a few isolated colonies in counties bordering the Mississippi River. Since that time, the range has expanded throughout the Jackson Purchase area and Land Between The Lakes National

Recreation Area and eastward along the Ohio River into Breckinridge County.

Recent records (1984-2004) exist for all counties that are known to harbor green treefrogs in Kentucky (J.R. MacGregor data, Kentucky State Nature Preserve Commission 2004).

**Habitat /** Green treefrogs occur in and near cypress swamps and other wetland habitats

**Life History** with abundant cover in the form of emergent herbaceous vegetation, and seem to prefer areas that are more or less open. They may also require adjacent bottomland forests for hibernation. Calling males often perch on low vegetation near standing water; tadpoles develop in warm shallow waters.

**Key** Habitat condition overall is GOOD. The amount of suitable habitat for the  
**Habitat** green treefrog appears to be stable to increasing in Kentucky.

Following Key Habitats (good):

1. Fulton County
2. Hickman County
3. Ballard County

## **CLASS AMPHIBIA**

### **Green Treefrog**

*Hyla cinerea*

**Guilds** Emergent and shrub-dominated wetlands, forested wetland.

**Statewide** [GreenTreefrog.pdf](#)

**Map**

### **Conservation Issues**

Miscellaneous Mortality Factors

6A Traffic/road kills

Terrestrial habitat degradation

3F Urban/residential development. Fragmentation by highways/urbanization  
(NatureServe 2004).

3R Habitat and/or Population Fragmentation. Wetland fragmentation  
(mining/agriculture), fragmentation by highways/urbanization (NatureServe  
2004).

3T Suppression of disturbance regimes. Natural reforestation of open

3U Loss, lack and degradation of special and unique microhabitats

**CLASS AMPHIBIA**

**Mole Salamander**

*Ambystoma talpoideum*

<b>Federal Status</b>	<b>Heritage Status</b>	<b>GRank</b>	<b>SRank</b>	<b>GRank (Simplified)</b>	<b>SRank (Simplified)</b>
N	N	G5	S3	G5	S3

**G-Trend** Stable

**G-Trend** Widespread in Piedmont and Coastal Plain of southeastern U.S.; scattered in

**Comment** upland areas northward into Illinois, Kentucky, and Virginia (Conant and Collins 1991). Recently discovered in southwestern IN (M. Lodato, pers. comm. 2004). Known from about 15 Kentucky counties; occurs mostly in the Jackson Purchase, Land Between The Lakes National Recreation Area, and in the western Mississippian Plateau. Also an old University of Kentucky museum specimen exists from Bagget’s Pond in McLean County (J.R. MacGregor Herpetology Maps 2004). Mole salamanders were introduced into ponds on the Dourson Farm in Powell County and continue to persist there in low numbers (D. Dourson, pers. comm.). More field survey work is needed for the mole salamander, particularly in the Western Coal Field and western Mississippian Plateau where road cruising on rainy evenings may yield additional data.

**S-Trend** Unknown

**S-Trend** Mole salamander populations that occur in bottomland hardwood forests in the

**Comment** Jackson Purchase are probably declining due to continuing habitat loss as a

result of wetland conversion and/or degradation. Populations that breed in small ponds in upland woods are likely faring better except in areas where development is taking place (J.R. MacGregor data). This species has been recorded since 1984 in 14 of 15 historic counties (exception: McLean County in the Western Coal Field). The mole salamander is no longer tracked by Kentucky State Nature Preserves Commission.

**Habitat /** Adults are fossorial; some may construct their own burrows while others move  
**Life History** into small mammal tunnels, old root channels, and similar underground retreats; most populations are associated with native forest but at least one colony near Lamasco is located within a loblolly pine plantation. Breeding takes place in a variety of aquatic situations including vernal pools, ponds, ditches, shallow swamps, and low spots in swampy woodlands; most known breeding sites in Kentucky are located within or close to forested areas. Some populations that breed in permanent ponds here are paedomorphic but mass transformations may occur when water levels drop during prolonged dry periods (J.R. MacGregor data). The scattered series of isolated rainfall-driven forested wetlands located in shallow sinkholes on the karst plain in southern Logan, Todd, Christian, and eastern Trigg counties form an interesting and important population center for the mole salamander in Kentucky.

# CLASS AMPHIBIA

## Mole Salamander

*Ambystoma talpoideum*

**Key** Habitat condition is generally FAIR in the Jackson Purchase.

### Habitat

Following Key Habitats (good):

1. Logan County
2. Fulton County
3. Lyon County

**Guilds** Emergent and shrub-dominated wetlands, forested wetland, standing water, upland forest.

**Statewide** [MoleSalamander.pdf](#)

### Map

## Conservation Issues

Biological/ consumptive uses

5B Predation from native species. Fish getting into breeding ponds.

Miscellaneous Mortality Factors

6A Traffic/road kills

Terrestrial habitat degradation

3A Row-crop agriculture (conversion to, annual reuse of fields, etc). Loss of bottom hardwoods/associated wetlands.

3K Surface mining



3M Timber harvest

3R Habitat and/or Population Fragmentation

3U Loss, lack and degradation of special and unique microhabitats

**CLASS AMPHIBIA**

**Northern Crawfish Frog**

*Rana areolata circulosa*

<b>Federal Status</b>	<b>Heritage Status</b>	<b>GRank</b>	<b>SRank</b>	<b>GRank (Simplified)</b>	<b>SRank (Simplified)</b>
N	S	G4T4	S3	G4	S3

**G-Trend** Decreasing

**G-Trend** The northern crawfish frog is discontinuously distributed in prairie regions and

**Comment** along the prairie-forest interface in the lower midwest (Conant and Collins 1991, Minton 2001). The Kentucky distribution includes 10 counties in the Jackson Purchase and Western Coal Field; extant populations occur in Livingston County and through much of the Jackson Purchase (Kentucky State Nature Preserve Commission 2004; J.R. MacGregor Herpetology Maps 2004).

**S-Trend** Decreasing

**S-Trend** This frog is not doing well rangewide. The crawfish frog (*Rana areolata*) as a

**Comment** species is listed as "near threatened" by the Global Amphibian Assessment as of November 29, 2004. Minton (2001) noted that *R. a. circulosa* was once plentiful in southwestern Indiana in the 1970's but has since declined to the point where it is now listed as "Endangered" by IN. Similar trends have been reported in other parts of the range. The northern crawfish frog seems to be doing well in some portions of its range in Kentucky (i.e., at West Kentucky Wildlife Management Area in McCracken County) but may be disappearing elsewhere. Recent (1984-2004) records exist from Livingston County (J.R.

MacGregor and BPB data) and from 6 counties in the Jackson Purchase region (Hendricks 1991; Hendricks pers. comm.) but none have been verified in Hickman County or the Western Coal Field in the past 20 years. These frogs are explosive breeders and can be easily located only during the short but rather unpredictable early breeding season; during some years the proper weather conditions never come about and no breeding takes place. Much additional survey work is warranted.

**Habitat /** Adults characteristically spend most of their time underground in crayfish burrows, sometimes emerging at night to feed. Most Kentucky colonies are associated with prairie soils (W. D. Hendricks, pers. comm.) and occur primarily in pastures and other grassland habitats. Breeding ponds can be either seasonal or permanent and are primarily located in agricultural landscapes. Our general lack of knowledge concerning the habitat requirements of adult northern crawfish frogs outside the breeding season warrants the gathering of additional data by the use of radiotelemetry on lands managed by state and/or federal agencies (i.e. West Kentucky Wildlife Management Area or Clarks River National Wildlife Refuge).

## **CLASS AMPHIBIA**

### **Northern Crawfish Frog**

*Rana areolata circulosa*

**Key** Habitat condition overall is FAIR.

#### **Habitat**

Following Key Habitats (good):

1. McCracken County
2. Marshall County
3. Livingston County

**Guilds** grassland/agricultural, standing water.

**Statewide** [NorthernCrawfishFrog.pdf](#)

#### **Map**

### **Conservation Issues**

Biological/ consumptive uses

- 5F Low population densities
- 5H Isolated populations (low gene flow)
- 5K Lack of suitable habitat for spawning, nesting, or breeding. Loss of suitable breeding ponds and habitat loss (agriculture - breeding sites filled/graded).
- 5L Parasitism and disease. Egg/tadpole mortality/die-off.

Miscellaneous Mortality Factors

- 6A Traffic/road kills
- 6G Stochastic events (droughts, unusual weather, pine beetle damage, flooding etc.). Premature dry-up of breeding pools and ice damage to eggs at

breeding pools.

#### Terrestrial habitat degradation

- 3A Row-crop agriculture (conversion to, annual reuse of fields, etc). Habitat loss (agriculture - breeding sites filled/graded).
- 3F Urban/residential development. Habitat loss (urban expansion/development, expansion into very limited range and fragmentation by highways/urbanization).
- 3P Pollution/toxicity (e.g., heavy metals, pesticides, herbicides, acid rain). Contamination by pesticides/herbicides.
- 3R Habitat and/or Population Fragmentation. Fragmentation by highways/urbanization.
- 3U Loss, lack and degradation of special and unique microhabitats

**CLASS Amphibia**

**Northern Dusky Salamander**

*Desmognathus fuscus*

<b>Federal Status</b>	<b>Heritage Status</b>	<b>GRank</b>	<b>SRank</b>	<b>GRank (Simplified)</b>	<b>SRank (Simplified)</b>
N	N	G5T5	S5	G5	S5

**G-Trend** Stable

**G-Trend** Apparently stable at a rangewide scale, but local declines in Northern Dusky

**Comment** Salamander populations have been documented in some portions of the range. Petranka (1998) refers to this salamander as one of the most common species in North America.

The Northern Dusky Salamander occurs in about 19 states in the eastern, Midwestern, and southeastern United States (U.S. Geological Survey/National Amphibian Atlas, accessed 3/15/2010). State heritage programs list this species as S4, S5, or unranked throughout its range as follows: Connecticut (S4), Delaware (S5), District of Columbia (S5), Indiana (S4), Kentucky (S5), Maine (S5), Maryland (S5), Massachusetts (S4S5), New Hampshire (S5), New Jersey (SNR), New York (S5), North Carolina (S5), Ohio (SNR), Pennsylvania (S5), Rhode Island (S4), South Carolina (SNR), Tennessee (S5), Vermont (S5), Virginia (S5), and West Virginia (S5) (NatureServe, accessed 3/11/2010).

Despite this rosy assessment, there appear to be problems in some areas.

Urbanization has wiped out populations in portions of the Midwest and New England (Lannoo 2005); stream scouring [from rapid runoff], siltation, and loss of ground cover are likely among the major reasons for low densities of this species in urban areas (Petranka 1998). Surface mining has been implicated in the elimination of Northern Dusky Salamanders from many small streams in portions of the Appalachian region (Petranka 1998). “Dusky salamanders are sensitive to stream pollution and siltation. *Desmognathus fuscus* larvae are absent from many streams draining coal strip mines in Kentucky and Tennessee... stream siltation and high metal concentrations appear to be the two primary factors in reducing or eliminating *Desmognathus* from these streams...” (Gore 1983). Perhaps the most disturbing recent report concerning this species has come from Acadia National Park in Maine: “We investigated and reviewed the current and historic distribution of Northern Dusky Salamanders in Acadia National Park (ANP)...during 1938-2003. Historical data indicated that Northern Dusky Salamanders were once widespread and common in ANP. We conducted intensive surveys for stream salamanders during 2000-2003 and observed only two adult Northern Dusky Salamanders on one stream. No eggs or larvae were observed...This investigation is the first to document the decline of a stream-dwelling amphibian species in a national park with widespread mercury contamination of its surface waters.” (Bank et al 2006). Another study coauthored by some members of this group (Bank, Crocker, Connery, and Amirbahman 2007) reported high levels of mercury in the tadpoles of green

the

Northern

frogs

and bullfrogs from several ponds within Acadia National Park. The source of the mercury is believed to be atmospheric deposition from solid waste incinerators and other facilities upwind from the park.

**S-Trend** Decreasing

**S-Trend** Decreasing in at least some sections of Kentucky. The Northern Dusky

**Comment** Salamander is being added to the Kentucky Wildlife Action Plan on the basis of documented population declines in the Mammoth Cave National Park region (MacGregor 2007) and large sections of the state impacted by surface mining (i.e. see Gore 1983), and suspected declines in Rowan and Elliott counties in northeastern Kentucky (MacGregor, unpublished data).

Barbour (1971) considered the Northern Dusky Salamander to be an abundant species in the state, writing that "...Nearly every little woodland stream in Kentucky supports a population." Data gleaned from numerous museum collections and biologists' field notes shows that this species has been documented from about 80 Kentucky counties and ranges across the state from the Cumberland River in Livingston, Lyon, and Trigg counties eastward to the Virginia and West Virginia borders. The only large gaps in the Kentucky range are in portions of the Bluegrass Region and Western Coal Field. West of the Cumberland River this species is replaced by the closely-related Spotted Dusky Salamander (*Desmognathus conanti*).



has

The best-documented decline in the Northern Dusky Salamander in Kentucky taken place at Mammoth Cave National Park (MCNP), a 70,000-acre block of land that has seen very little disturbance since the time that much of the area was purchased for protection in the 1930's. Museum specimens and field note records in MCNP files for this salamander from springs and spring-fed creeks within the park date back as far as 1929; many additional collections and observations were made through the 1930's and these salamanders continued to be found in abundance at least until 1961. In the early 1980's, Marilyn Hale, a graduate student at the University of Louisville, conducted an amphibian survey

at

MCNP and was able to document Northern Dusky Salamanders in very low numbers and at only two locations within the park (Hale 1984). More recently, MacGregor (2007) searched nearly every previously known Northern Dusky Salamander location within the park and was able to locate only a single specimen in a rocky spring in the head of Big Hollow – an area where the species had been seen abundantly in 1961. All of these springs and headwater streams that were surveyed still contain Southern Two-lined Salamanders (*Eurycea cirrigera*), Longtail Salamanders (*E. longicauda*), and Red Salamanders (*Pseudotriton*

ruber)

but the Northern Dusky Salamanders have virtually disappeared. Other serious declines appear to have taken place in the areas near Morehead in northeastern Kentucky but the historic locality data is so vague that good documentation of population changes is difficult. Coal is largely absent from this region and there has been little or no mining activity.

**Habitat / Life History** Barbour (1971) wrote that: "...they are far more abundant under the stones and logs along small woodland streams...springs and spring runs are commonly inhabited. Information from NatureServe (accessed 3/11/2010) described the habitat as follows: "Rock-strewn woodland streams, seepages, and springs...usually near running or trickling water...hides under leaves, rocks, or other objects in or near water, or in burrows. Eggs are laid near water under moss or rocks, in logs, and in stream-bank cavities. Larval stage usually aquatic."

Northern Dusky Salamanders remain fairly common in many areas in eastern Kentucky where there are rocky woodland streams that have not been severely impacted by coal mining and other mineral extraction activities.

**Key** Carter County (along Cave Branch at Carter Caves State Resort Park).

**Habitat**

**Guilds** Caves, rock shelters, and cliffines, Forested wetland, Running water, Upland forest.

**Statewide** [Northern Dusky Salamander.pdf](#)

**Map**

## Conservation Issues

Aquatic habitat degradation

- 2B Gravel/sand removal or quarrying (e.g., mineral excavation). Degradation of headwater stream habitat by gravel mining, stream channelization, agriculture and development, alteration or loss of springs and seeps, and valley fills.

Adults and aquatic larvae are affected.

- 2E Stream channelization/ditching. Degradation of headwater stream habitat by gravel mining, stream channelization, agriculture and development, alteration or loss of springs and seeps, and valley fills. Adults and aquatic larvae are affected.
- 2F Riparian zone removal (Agriculture/development). Degradation of headwater stream habitat by gravel mining, stream channelization, agriculture and development, alteration or loss of springs and seeps, and valley fills. Adults and aquatic larvae are affected.
- 2I Periodic cessation or removal of spring flows or seeps. Degradation of headwater stream habitat by gravel mining, stream channelization, agriculture and development, alteration or loss of springs and seeps, and valley fills. Adults and aquatic larvae are affected.
- 2M Valley fills. Degradation of headwater stream habitat by gravel mining, stream channelization, agriculture and development, alteration or loss of springs and seeps, and valley fills. Adults and aquatic larvae are affected.

#### Biological/ consumptive uses

- 5H Isolated populations (low gene flow). Biological and consumptive factors likely to be affecting this species in Kentucky include low gene flow between isolated populations (particularly in the Bluegrass Region)
- 5L Parasitism and disease. Biological and consumptive factors likely to be affecting this species in Kentucky include emerging diseases such as chytrid fungus.

- 5O Bait collection. Bait collection may affect local populations but does not seem to be a major factor in the current decline.

#### Point and non-point source pollution

- 4A Acid mine drainage other coal mining impacts . Impacts to headwater stream ecosystems from coal mining, oil and gas drilling, and highway runoff (deicing salts, etc.).
- 4D Oil and gas drilling operations associated runoff. Impacts to headwater stream ecosystems from coal mining, oil and gas drilling, and highway runoff (deicing salts, etc.).
- 4I Runoff from transportation routes (deicing salt, gas, others). Impacts to headwater stream ecosystems from coal mining, oil and gas drilling, and highway runoff (deicing salts, etc.).

#### Siltation and increased turbidity

- 1A Coal mining. Siltation and increased turbidity from coal mining, agriculture, road construction, urbanization, timber harvest, and certain recreational activities such as horseback riding and ATV use. Such activities can smother larvae in headwater streams.
- 1B Agriculture. Siltation and increased turbidity from coal mining, agriculture, road construction, urbanization, timber harvest, and certain recreational activities such as horseback riding and ATV use. Such activities can smother larvae in headwater streams.
- 1C Road construction. Siltation and increased turbidity from coal mining, agriculture, road construction, urbanization, timber harvest, and certain

recreational activities such as horseback riding and ATV use. Such activities can smother larvae in headwater streams.

1D Urbanization/Development General Construction. Siltation and increased turbidity from coal mining, agriculture, road construction, urbanization, timber harvest, and certain recreational activities such as horseback riding and ATV use. Such activities can smother larvae in headwater streams.

1E Silviculture. Siltation and increased turbidity from coal mining, agriculture, road construction, urbanization, timber harvest, and certain recreational activities such as horseback riding and ATV use. Such activities can smother larvae in headwater streams.

1F Recreational activities (atv, horseback riding). Siltation and increased turbidity from coal mining, agriculture, road construction, urbanization, timber harvest, and certain recreational activities such as horseback riding and ATV use. Such activities can smother larvae in headwater streams.

#### Terrestrial habitat degradation

3J Bridge/Highway construction/maintenance. Terrestrial habitat degradation in areas bordering headwater streams, springs, and seeps by road construction, – populations become fragmented and unique essential microhabitats such as springs and seeps are lost or degraded.

3K Surface mining. Terrestrial habitat degradation in areas bordering headwater streams, springs, and seeps by surface mining – populations become fragmented and unique essential microhabitats such as springs and seeps are lost or degraded.

- 3M Timber harvest. Terrestrial habitat degradation in areas bordering headwater streams, springs, and seeps by timber harvest, become fragmented and unique essential microhabitats such as springs and seeps are lost or degraded.
- 3P Pollution/toxicity (e.g., heavy metals, pesticides, herbicides, acid rain).  
Terrestrial habitat degradation in areas bordering headwater streams, springs, and seeps by various kinds of water pollution – populations become fragmented and unique essential microhabitats such as springs and seeps are lost or degraded.
- 3R Habitat and/or Population Fragmentation. Terrestrial habitat degradation in areas bordering headwater streams, springs, and seeps by cause populations become fragmented and unique essential microhabitats such as springs and seeps are lost or degraded.
- 3U Loss, lack and degradation of special and unique microhabitats. Terrestrial habitat degradation in areas bordering headwater streams, springs, and seeps by cause populations become fragmented and unique essential microhabitats such as springs and seeps are lost or degraded.

Unknown factors/variables

- 7A Unknown threats. They nearly disappeared from springs and spring-fed creeks in the vicinity of Mammoth Cave National Park where they once could be found in abundance. Similar declines are suspected in NE Kentucky. The exact causes of these declines remain unknown.

**CLASS AMPHIBIA**

**Northern Leopard Frog***Rana pipiens*

<b>Federal Status</b>	<b>Heritage Status</b>	<b>GRank</b>	<b>SRank</b>	<b>GRank (Simplified)</b>	<b>SRank (Simplified)</b>
N	S	G5	S3	G5	S3

**G-Trend** Decreasing**G-Trend** The northern leopard frog is a widely distributed species in the northern,

**Comment** midwestern, and northeastern U.S. The range extends southward through the Bluegrass Region of Kentucky (Conant and Collins 1991). It is known historically from at least 22 Kentucky counties extending westward from Mason County to Carroll County along the Ohio River and southward into Mercer, Jessamine, and Madison counties (Kentucky State Nature Preserve Commission 2004, J.R. MacGregor Herpetology Maps 2004).

**S-Trend** Decreasing**S-Trend** Northern leopard frog populations have declined dramatically throughout large

**Comment** sections of the range, but the species does seem to be holding its own at least in some areas. The available data indicates that northern leopard frogs are declining here and have become scarce or extirpated in many Bluegrass counties in Kentucky. Although new sites are being found with some degree of regularity, most of these have not been monitored long enough to generate any long-term data. Recent records (1984-2004) exist for northern leopard frogs in only 10 Kentucky counties; all others (12 counties) are considered historical. The northern leopard frog was a common species in rural Jessamine County

through most of the 1970's but disappeared abruptly in 1980 (J.R. MacGregor data); it was also common during the 1960's in Mason County, when a number of specimens were collected and deposited at the University of Kentucky, but many years have passed since a live individual has been seen there as well.

**Habitat /** Adult northern leopard frogs are most often found in low meadows, grassy  
**Life History** fields, and pastures bordering ponds, swampy areas, and sluggish streams. At least some tree cover is usually present nearby, but the frogs seem to do most of their insect hunting in the open areas. Typical breeding sites are seasonal or permanent ponds located in pastures or old fields; submerged and emergent vegetation are usually present in these ponds. Swamps and oxbows serve as excellent breeding habitat but these are scarce in the highly modified landscapes of the Bluegrass. On the Kentucky River Wildlife Management Area in Owen and Henry counties, northern leopard frogs have been documented in 2003 and 2004 as calling from several areas of recent origin (2 moist soil units and a shallow flooded field behind a beaver dam). Tadpoles were present in the moist soil units later in the season but not at the beaver dam where fish predation is likely posing a problem.



## CLASS AMPHIBIA

### Northern Leopard Frog

*Rana pipiens*

**Key** Habitat condition overall is UNKNOWN. However, many ponds that appear

**Habitat** suitable for use as breeding sites are unoccupied, and there are often long distances between known breeding colonies.

Following Key Habitats (good):

1. Scott County
2. Franklin County
3. Owen and Henry counties
4. Madison County

**Guilds** Emergent and shrub-dominated wetlands, grassland/agricultural, standing water.

**Statewide** [NorthernLeopardFrog.pdf](#)

**Map**

### Conservation Issues

Biological/ consumptive uses

- 5B Predation from native species. Competition/predation by bullfrogs (NatureServe 2004).
- 5K Lack of suitable habitat for spawning, nesting, or breeding. Loss of suitable breeding ponds and habitat loss (agriculture - breeding sites filled/graded).
- 5L Parasitism and disease. Disease problems (adult die-offs).

## Miscellaneous Mortality Factors

- 6A Traffic/road kills
- 6G Stochastic events (droughts, unusual weather, pine beetle damage, flooding etc.). Premature dry-up of breeding pools and ice damage to eggs at breeding pools. Populations in Indiana have declined drastically (Minton

## Terrestrial habitat degradation

- 3A Row-crop agriculture (conversion to, annual reuse of fields, etc). Habitat loss (agriculture - breeding sites filled/grades).
- 3F Urban/residential development. Habitat loss (urban expansion/development), urban expansion into very limited range and fragmentation by highways/urbanization.
- 3P Pollution/toxicity (e.g., heavy metals, pesticides, herbicides, acid rain). Contamination by pesticides/herbicides.
- 3R Habitat and/or Population Fragmentation. Fragmentation by highways/urbanization (NatureServe 2004).
- 3U Loss, lack and degradation of special and unique microhabitats

**CLASS AMPHIBIA**

**Redback Salamander**

*Plethodon cinereus*

<b>Federal Status</b>	<b>Heritage Status</b>	<b>GRank</b>	<b>SRank</b>	<b>GRank (Simplified)</b>	<b>SRank (Simplified)</b>
N	S	G5	S3	G5	S3

**G-Trend** Unknown

**G-Trend** Widespread throughout northeastern U.S. and adjacent Canada, barely extending

**Comment** into northern Kentucky (Conant and Collins 1991). The northern redback salamander is known only from a limited area of northern Kentucky in portions of Boone, Kenton, and Owen counties; there is also a single specimen from Fleming County in the University of Louisville collection (Kentucky Herpetology Database 2004, Kentucky State Nature Preserves Commission Database 2004, J.R. MacGregor Herpetology Maps 2004).

**S-Trend** Decreasing

**S-Trend** Northern redback salamanders tend to be quite abundant in good habitat.

**Comment** Populations appear to be doing well along Eagle Creek in Owen County and at a few recently visited sites in Boone and Kenton counties (J.R. MacGregor field data 2000-2004), but no organized monitoring has been done to check on the condition of most populations. Urban and industrial development continues to impact potential habitat at a rapid rate in northern Kentucky, and this species is almost certainly on the decline in that region of the state. Efforts to locate additional specimens in Fleming County have thus far been unsuccessful (J.R.

MacGregor data).

**Habitat /** The northern redback salamander is completely terrestrial. Adults and juveniles

**Life History** live in wooded areas; females deposit small clusters of eggs in early summer in underground retreats or within decaying stumps and logs. Larval development takes place within the egg and thus there is no free-living aquatic larval stage. Populations are highest on ridges and steep slopes with mature forest cover, abundant leaf litter and/or woody debris on the surface, and (often) rocky or gravelly soils (J.R. MacGregor). These salamanders appear to be able to persist in low numbers in developed areas as long as some forest cover, adequate access to underground winter/dry weather retreats, and leaf litter or other surface debris remain available.

**Key** Habitat condition at the present time is only FAIR, and the prognosis for the  
**Habitat** foreseeable future is generally POOR.

Following Key Habitats (good):

1. Owen County
2. Boone County
3. Boone County

## **CLASS AMPHIBIA**

### **Redback Salamander**

*Plethodon cinereus*

**Guilds** upland forest.

**Statewide** [RedbackSalamander.pdf](#)

**Map**

### **Conservation Issues**

Terrestrial habitat degradation

- 3F Urban/residential development. Habitat loss and fragmentation from development.
- 3M Timber harvest. Logging (drying of forest floor/leaf litter).
- 3Q Invasive/exotic plants (including fescue). Exotic shrubs (*Lonicera maackii*).
- 3R Habitat and/or Population Fragmentation. Fragmentation from
- 3U Loss, lack and degradation of special and unique microhabitats

**CLASS AMPHIBIA**

**Southern Leopard Frog**

*Rana sphenoccephala*

<b>Federal Status</b>	<b>Heritage Status</b>	<b>GRank</b>	<b>SRank</b>	<b>GRank (Simplified)</b>	<b>SRank (Simplified)</b>
N	N	G5	S5	G5	S5

**G-Trend** Stable

**G-Trend** The southern leopard frog is widely distributed in the southeastern U.S.

**Comment** (Conant and Collins 1991). Southern leopard frogs are known from about 70 counties extending throughout all of southern and western Kentucky (to the south and west of the Bluegrass) with a northeastern extension through the eastern Knobs into Carter, Lewis, and Greenup counties; the species is generally absent from the rugged terrain of eastern Kentucky and from the Bluegrass Region (J.R. MacGregor Herpetology Maps 2004).

**S-Trend** Stable

**S-Trend** Populations are probably stable both rangewide and throughout much the

**Comment** species' range in Kentucky. The southern leopard frogs in Carter, Lewis, and Greenup counties and taxonomically perplexing - southern leopard frogs in this area seem somewhat intermediate between this form and the northern leopard frog - and appear to be in decline. The southern leopard frog is considered to be a common species here and records are not tracked by Kentucky State Nature Preserves Commission.

**Habitat /** Adult southern leopard frogs are most often found in meadows, grassy fields,

**Life History** pastures, and other open habitats near ponds, swamps, and streams and in edge habitats bordering bottomland forests. Like northern leopard frogs, these frogs seem to do most of their insect hunting in the open areas. Typical breeding sites are seasonal or permanent ponds, road ruts, and shallow swamps and other wetlands located in or near open areas. Submerged and emergent vegetation will usually be present in these ponds.

**Key Habitat** Habitat condition overall is GOOD, except for the disappearing population in the northeastern part of the state where it is POOR.

Following Key Habitats (good):

1. Greenup County
2. Ballard County
3. Adair County

**Guilds** Emergent and shrub-dominated wetlands, forested wetland, grassland/agricultural, standing water, upland forest.

**Statewide** [SouthernLeopardFrog.pdf](#)

**Map**

## **CLASS AMPHIBIA**

**Southern Leopard Frog**

*Rana sphenoccephala*

### **Conservation Issues**

Biological/ consumptive uses

- 5K Lack of suitable habitat for spawning, nesting, or breeding. Habitat loss (agriculture - breeding sites filled/grades).

Miscellaneous Mortality Factors

- 6A Traffic/road kills
- 6G Stochastic events (droughts, unusual weather, pine beetle damage, flooding etc.). Premature dry-up of breeding pools and ice damage to eggs at breeding pools.

Terrestrial habitat degradation

- 3A Row-crop agriculture (conversion to, annual reuse of fields, etc).  
Loss/conversion of bottomland hardwoods and habitat loss (agriculture - breeding sites filled/graded).
- 3F Urban/residential development. Habitat loss (urban expansion/development and urban expansion into very limited range (affects isolated Rana sphenoccephala populations along Ohio River in northeast Kentucky).
- 3K Surface mining
- 3P Pollution/toxicity (e.g., heavy metals, pesticides, herbicides, acid rain).  
Contamination by pesticides/herbicides.



3R Habitat and/or Population Fragmentation. Wetland fragmentation  
(mining/agriculture).

3U Loss, lack and degradation of special and unique microhabitats

**CLASS AMPHIBIA**

**Southern Zigzag Salamander**

*Plethodon ventralis*

<b>Federal Status</b>	<b>Heritage Status</b>	<b>GRank</b>	<b>SRank</b>	<b>GRank (Simplified)</b>	<b>SRank (Simplified)</b>
N	N	G4	S4	G4	S4

**G-Trend** Unknown

**G-Trend** The southern zigzag salamander ranges from south-central Kentucky southward into central Alabama (Highton 1997). The species is known from 19 Kentucky counties; it occurs from Cumberland and Whitley north into the Knob region of Estill, Garrard, and Lincoln, west to the eastern edges of Green and Metcalfe counties (J.R. MacGregor Herpetology Maps 2004).

**S-Trend** Stable

**S-Trend** This newly-described species is apparently doing well; new populations are continuing to be discovered (J.R. MacGregor data) as additional fieldwork is done to work out the contact zone between this species and the eastern zigzag salamander (*P. dorsalis*) and to determine the extent of its range in the southeastern portion of the state. It seems most common in McCreary County and in the Mississippian limestone regions of Jackson, Lincoln, Rockcastle, Pulaski, Adair, Clinton, and Wayne counties. Recent (1984-2004) records exist for all Kentucky counties within the known range (J.R. MacGregor data). This species is not tracked by Kentucky State Nature Preserves Commission.

**Habitat /** The southern zigzag salamander is completely terrestrial. Adults and juveniles  
**Life History** live in wooded areas; females deposit small clusters of eggs in early summer in underground retreats. Larval development takes place within the egg and thus there is no free-living aquatic larval stage. Populations are highest on ridges and steep slopes with mature forest cover, abundant leaf litter and/or woody debris on the surface, and (often) rocky soils or much outcropped rock (J.R. MacGregor data). It is more or less a habitat specialist; most populations occur along shaded clifflines and rock outcrops (including caves and rock shelters). It is also quite common in abandoned limestone quarries.

**Key** Habitat condition for this species is generally GOOD. Daniel Boone National  
**Habitat** Forest cliffline and cave management guidelines should ensure that forest cover is maintained in some of the best habitat throughout the southern portion of the Cliff Section of the Cumberland Plateau.

Following Key Habitats (good):

1. McCreary County
2. Lincoln County
3. Jackson and Rockcastle counties

## **CLASS    AMPHIBIA**

### **Southern Zigzag Salamander**

*Plethodon ventralis*

**Guilds**        caves, rock shelters, and clifflines, upland forest.

**Statewide**    [SouthernZigzagSalamander.pdf](#)

**Map**

### **Conservation Issues**

#### Miscellaneous Mortality Factors

6A    Traffic/road kills

#### Terrestrial habitat degradation

3A    Row-crop agriculture (conversion to, annual reuse of fields, etc)

3M    Timber harvest. Logging (without cliffline buffers) and drying of forest  
floor leaf litter.

3R    Habitat and/or Population Fragmentation. Surface mining causing  
fragmentation.

3U    Loss, lack and degradation of special and unique microhabitats

**CLASS Amphibia**

**Spotted Dusky Salamander**

*Desmognathus conanti*

<b>Federal Status</b>	<b>Heritage Status</b>	<b>GRank</b>	<b>SRank</b>	<b>GRank (Simplified)</b>	<b>SRank (Simplified)</b>
N	N	G5T5	S3	G5	S3

**G-Trend** Stable

**G-Trend** Apparently stable on a rangewide scale, but local declines in Spotted Dusky

**Comment** Salamander populations have been documented in some portions of the range.  
At

the present time, the extensive contact zone between the Northern and Spotted Dusky Salamanders has not been thoroughly documented and the ranges of these two very similar species have not been completely worked out in many areas, including southern Illinois (Bonett 2002).

Spotted Dusky Salamanders occur in about 9 states, ranging from extreme southern Illinois (?) and western Kentucky southward and eastward into eastern Arkansas, Louisiana, Mississippi, Alabama, Georgia, and northwestern Florida (U.S. Geological Survey/National Amphibian Atlas, accessed 3/15/2010). Five state heritage programs within its range list this species as S5 as follows: Alabama (S5), Georgia (S5), Louisiana (S5), Mississippi (S5), and Tennessee (S5), but it is listed as an S1 species in Arkansas, S2 in Illinois, and S3 in Kentucky and is unranked in Florida (NatureServe, accessed 3/11/2010).

disappeared

Populations along Crowley's Ridge in eastern Arkansas seem to have (Lannoo 2005). Other local populations have been extirpated or reduced as a result of urbanization (near Atlanta, GA – Orser and Shure 1972) and stream siltation and sedimentation due to the effects of construction and farming (Petranka 1998). A recent study completed at Eglin Air Force Base in northwestern Florida (Means and Travis 2007) showed that Spotted Dusky Salamanders had declined in numbers by 68% between an early survey during 1969-1975 and a second survey of the same ravines by the same researcher in 1997-1998. Salamander capture rates in 26 ravines sampled both times fell from 13.56/hour during the initial survey to 4.66/hour during the follow-up study. During the same study, Southern Dusky Salamander (*Desmognathus auriculatus*) numbers fell from 8.65/hour to 0 – showing total extirpation – while catch per unit effort remained nearly unchanged between the survey periods for both the Southern Two-lined Salamander and Red Salamander. The areas surveyed for salamanders were forested ravines and steepheads that had not been logged or otherwise visibly disturbed between survey periods.

**S-Trend** Unknown

**S-Trend** The Spotted Dusky Salamander is being added to the Kentucky Wildlife Action

**Comment** Plan due to its ecological similarity to the Northern Dusky Salamander, its limited

range in our state that includes at least two small, isolated, fragile populations, and the unexplained declines that have occurred in other parts of the range (Crowley's Ridge in Arkansas and Eglin Air Force Base in Florida).

The Type Locality for the Spotted Dusky Salamander is a small unnamed spring-fed stream located about 2 miles south of Smithland in Livingston County (Rossman 1958).

Spotted Dusky Salamanders are known from 7 counties in western Kentucky.

The largest populations occur between the Cumberland and Tennessee Rivers in Livingston County, at Land Between the Lakes (LBL) in Lyon and Trigg counties,

and in the Blood River drainage in southeastern Calloway County. Additional populations are scattered and isolated; a colony occurs in the Terrapin Creek drainage in Graves County near the Calloway County line; another occupies several small springs near the Tennessee River in northeastern McCracken County; and a small colony occupies seepage habitats near Laketon in Carlisle County. The McCracken County and Carlisle County populations appear to be very vulnerable to extirpation. A formerly healthy population of Spotted Dusky Salamanders inhabiting a spring-fed woodland stream on the west side of LBL was eliminated during the relocation and reconstruction of highway 68/80 during 2008-2009 (JRM, personal observation).

**Habitat /** Populations in Livingston, Lyon, and Trigg counties occupy small rocky spring-fed creeks in forested habitats. Populations along the Blood River and Terrapin  
**Life** Creek occur in cold springs, seeps, and lowland spring-fed streams along the  
**History** floodplain in close association with another SWAP species, the Three-lined

Salamander (*Eurycea guttolineata*). Extensive logging activity north of Grubbs Road in Calloway County in the mid-2000's resulted in extensive sediment deposits at some downstream locations. The imperiled McCracken County colony occupies at least 2 small gravelly streams within the city limits of Paducah. The highly imperiled Carlisle County colony occurs in seepage habitat at the base of the loess bluffs bordering the Mississippi River floodplain near Laketon (MacGregor, unpublished data).

**Key** Generally Good at LBL since Forest Service management will likely maintain

**Habitat** forest cover along headwater streams. Fair in Blood River area and Terrapin Creek where sites are vulnerable to activities on private lands nearby. Poor in McCracken and Carlisle counties where colonies are small and isolated.

**Guilds** Forested wetland, Running water, Upland forest.

**Statewide** [Spotted Dusky Salamander.pdf](#)

**Map**



## Conservation Issues

### Aquatic habitat degradation

- 2B Gravel/sand removal or quarrying (e.g., mineral excavation). Degradation of headwater stream habitat by gravel mining, stream channelization, agriculture and development, and alteration or loss of springs and seeps. Adults and aquatic larvae are affected.
- 2E Stream channelization/ditching. Degradation of headwater stream habitat by gravel mining, stream channelization, agriculture and development, and alteration or loss of springs and seeps. Adults and aquatic larvae are affected.
- 2F Riparian zone removal (Agriculture/development). Degradation of headwater stream habitat by gravel mining, stream channelization, agriculture and development, and alteration or loss of springs and seeps. Adults and aquatic larvae are affected.
- 2I Periodic cessation or removal of spring flows or seeps. Degradation of headwater stream habitat by gravel mining, stream channelization, agriculture and development, and alteration or loss of springs and seeps. Adults and aquatic larvae are affected.

### Biological/ consumptive uses

- 5H Isolated populations (low gene flow). Biological and consumptive factors likely to be affecting this species in Kentucky include low gene flow between isolated populations (particularly in Carlisle, Graves, and McCracken counties)
- 5L Parasitism and disease. Biological and consumptive factors likely to be

affecting this species in Kentucky include emerging diseases such as chytrid fungus.

- 5O Bait collection. Bait collection may be affecting some populations but does not seem to be a major factor in the current decline.

#### Point and non-point source pollution

- 4I Runoff from transportation routes (deicing salt, gas, others). Impacts to headwater stream ecosystems from highway runoff (deicing salts, etc.).

#### Siltation and increased turbidity

- 1B Agriculture. Siltation and increased turbidity from agriculture, road construction, timber harvest, and certain recreational activities such as horseback riding and ATV use. Such activities can smother larvae in headwater streams.
- 1C Road construction. Siltation and increased turbidity from agriculture, road construction, timber harvest, and certain recreational activities such as horseback riding and ATV use. Such activities can smother larvae in headwater streams.
- 1E Silviculture. Siltation and increased turbidity from agriculture, road construction, timber harvest, and certain recreational activities such as horseback riding and ATV use. Such activities can smother larvae in headwater streams.
- 1F Recreational activities (atv, horseback riding). Siltation and increased turbidity from agriculture, road construction, timber harvest, and certain recreational activities such as horseback riding and ATV use. Such activities

can smother larvae in headwater streams.

#### Terrestrial habitat degradation

- 3J Bridge/Highway construction/maintenance. Terrestrial habitat degradation in areas bordering headwater streams, springs, and seeps by road construction. Road construction has recently eliminated an excellent site at LBL.
- 3M Timber harvest. Terrestrial habitat degradation in areas bordering headwater streams, springs, and seeps by timber harvest– populations become fragmented and unique essential microhabitats such as springs and seeps are lost or
- 3P Pollution/toxicity (e.g., heavy metals, pesticides, herbicides, acid rain). Terrestrial habitat degradation bordering headwater streams, springs, and seeps by road construction, timber harvest, and agricultural runoff – populations become fragmented and unique essential microhabitats such as springs and seeps are lost/degraded
- 3R Habitat and/or Population Fragmentation. Terrestrial habitat degradation bordering headwater streams, springs, and seeps by road construction, timber harvest, and agricultural runoff – populations become fragmented and unique essential microhabitats such as springs and seeps are lost/degraded
- 3U Loss, lack and degradation of special and unique microhabitats. Terrestrial habitat degradation bordering headwater streams, springs, and seeps by road construction, timber harvest, and agricultural runoff – populations become fragmented and unique essential microhabitats such as springs and seeps are lost/degraded

**CLASS      AMPHIBIA**

**Streamside Salamander**

*Ambystoma barbouri*

<b>Federal</b>	<b>Heritage</b>	<b>GRank</b>	<b>SRank</b>	<b>GRank</b>	<b>SRank</b>
<b>Status</b>	<b>Status</b>			<b>(Simplified)</b>	<b>(Simplified)</b>
N	N	G4	S4	G4	S4

**G-Trend**      Stable

**G-Trend**      Very limited range in central Kentucky, extending into western West Virginia,

**Comment**      southwest Ohio, and southeast Indiana; also Livingston County, Kentucky

(Conant and Collins 1991). Recently discovered in middle Tennessee (Scott 19xx). Nearly endemic to Kentucky. Recorded from about 60 Kentucky

counties ranging from Breckinridge to Lawrence, south to the Tennessee state line in Wayne, Clinton, and Cumberland counties; also isolated in Livingston County (J.R. MacGregor Herpetology Maps 2004).

**S-Trend**      Stable

**S-Trend**      Apparently stable; confirmed in at least 49 counties since 1984 (J.R.

**Comment**      MacGregor data); one of the most frequently encountered salamanders within

its range during road cruises on suitable rainy evenings in fall, winter, and spring; eggs and larvae can readily be found in appropriate habitat from the

onset of breeding through late spring and early summer (J.R. MacGregor 2004;

East Kentucky Power Cooperative data). This species is not tracked by

Kentucky State Nature Preserves Commission.

**Habitat /** Adults are fossorial; some construct their own burrows while others move into

**Life History** small mammal tunnels, old root channels, and similar underground retreats.

Breeding takes place in a variety of aquatic situations including vernal pools, old tire ruts, ponds, ditches, low spots in swampy woodlands, and headwater streams. The common name “streamside salamander” is something of a misnomer; the adults can be found in and along small creeks in the Bluegrass Region during the breeding season but (like other *Ambystoma*) move to more terrestrial habitats during the remainder of the year. Although the adults of most Kentucky *Ambystoma* species appear to require forested habitat outside of the breeding season, the streamside salamander and the closely-related smallmouth salamander (*Ambystoma texanum*), along with the eastern tiger salamander (*A. tigrinum*), seem to be able to persist in open habitats as well. Streamside salamanders are frequently dug or plowed from gardens in rural and suburban areas in the Bluegrass Region, and eggs and larvae are often observed in urban backyard streams and ditches and agriculture areas (J.R. MacGregor data).

## **CLASS AMPHIBIA**

### **Streamside Salamander**

*Ambystoma barbouri*

**Key** Habitat Condition is FAIR to GOOD overall.

#### **Habitat**

Following Key Habitats (good):

1. Adair County
2. Jessamine County
3. Jessamine County

**Guilds** forested wetland, grassland/agricultural, running water, standing water, upland forest.

**Statewide** [StreamsideSalamander.pdf](#)

#### **Map**

### **Conservation Issues**

Miscellaneous Mortality Factors

6A Traffic/road kills

Point and non-point source pollution

4D Oil and gas drilling operations associated runoff

Terrestrial habitat degradation

3A Row-crop agriculture (conversion to, annual reuse of fields, etc)

3F Urban/residential development. Urban development (habitat loss).

3P Pollution/toxicity (e.g., heavy metals, pesticides, herbicides, acid rain).

Agriculture pesticides/herbicides.

3R Habitat and/or Population Fragmentation

3U Loss, lack and degradation of special and unique microhabitats

**CLASS AMPHIBIA**

**Three-lined Salamander**

*Eurycea guttolineata*

<b>Federal Status</b>	<b>Heritage Status</b>	<b>GRank</b>	<b>SRank</b>	<b>GRank (Simplified)</b>	<b>SRank (Simplified)</b>
N	T	G5	S2	G5	S2

**G-Trend** Unknown

**G-Trend** Widespread in southeastern U.S., ranging northward to the east of the

**Comment** Mississippi River into extreme southwestern Kentucky (Conant and Collins 1991). In Kentucky, the three-lined salamander occurs only in the Terrapin Creek and Blood River drainages in the Jackson Purchase region (Kentucky Herpetology Database 2004, Kentucky State Nature Preserves Commission Database 2004, J.R. MacGregor Herpetology Maps 2004).

**S-Trend** Decreasing

**S-Trend** Three-lined salamanders continue to occur in both areas where they have

**Comment** historically been found. The Terrapin Creek population appears to be doing well (J.R. MacGregor 2004 field data) but the Blood River population at McCuiston Woods was apparently impacted by sediment from one or more upstream logging operations (J.R. MacGregor 2003 and 2004 field data) that eliminated virtually all larvae in several lowland springs and made adults very difficult to find.

**Habitat /** In Kentucky, the three-lined salamander occurs most commonly under fallen

**Life History** bark, downed wood, and drift piles near cold springs and spring-fed creeks



along the forested floodplains of Terrapin Creek and Blood River. General habitat types used by this species here include cypress and tupelo swamps, sluggish streams and adjacent floodplains, springs, buttonbush ponds, open wetlands with emergent vegetation, and bottomland hardwood forests.

Crayfish burrows are used as emergency retreats to escape from predators and as refugia during cold or dry weather. Eggs are presumably laid underground in springs during the winter months; larvae develop in springs with cover in the form of dead leaves and woody debris, watercress, or similar vegetative cover.

**Key** Habitat condition is only FAIR overall.

**Habitat**

Following Key Habitats (good):

1. Calloway County
2. Graves County

**Guilds** forested wetland, running water.

**Statewide** [Three-lined Salamander.pdf](#)

**Map**

## **CLASS AMPHIBIA**

### **Three-lined Salamander**

*Eurycea guttolineata*

### **Conservation Issues**

#### Biological/ consumptive uses

5F Low population densities. Always has been rare in Kentucky.

#### Miscellaneous Mortality Factors

6A Traffic/road kills

#### Terrestrial habitat degradation

3A Row-crop agriculture (conversion to, annual reuse of fields, etc). Loss of bottom hardwoods/associated wetlands.

3M Timber harvest. Logging (drying of forest floor/leaf litter).

3R Habitat and/or Population Fragmentation

3U Loss, lack and degradation of special and unique microhabitats

3V Long-term loss of hard mast trees (American Chestnut, poor oak regeneration). Loss of seeps from mining/logging.

**CLASS AMPHIBIA**

**Three-toed Amphiuma**

*Amphiuma tridactylum*

<b>Federal Status</b>	<b>Heritage Status</b>	<b>GRank</b>	<b>SRank</b>	<b>GRank (Simplified)</b>	<b>SRank (Simplified)</b>
N	E	G5	S1	G5	S1

**G-Trend** Unknown

**G-Trend** South-central U.S., northward along Mississippi River lowlands to extreme

**Comment** southeast Missouri and southwest Kentucky (Conant and Collins 1991).

Occurs in the western tip of Kentucky, with recent records from Fulton and Hickman counties; also one pre-1971 record from Ballard Wildlife Management Area (Ballard County - photo by Tom C. Fuller in Barbour 1971) and a specimen from "Kentucky Lake" (Kentucky Herpetology Database 2004, Kentucky State Nature Preserves Commission Database 2004, J.R. MacGregor Herpetology Maps 2004). This species is difficult to trap and monitor, and therefore its total range in the state is poorly known (J.R. MacGregor data).

**S-Trend** Stable

**S-Trend** Apparently doing well at known locations in Fulton and Hickman counties;

**Comment** recorded from 2000-2004 in both areas. Additional field survey work is needed.

**Habitat /** Occurs in cypress swamps and other extensive forested wetlands. Several have

**Life History** been found in seasonally flooded ditches in the Reelfoot Lake area; may burrow into the soil and aestivate when habitat dries out in summer/fall (J.R.

MacGregor data).

**Key** Habitat condition is FAIR overall.

**Habitat**

Following Key Habitats (good):

1. Fulton County
2. Hickman County

**Guilds** Emergent and shrub-dominated wetlands.

**Statewide** [Three-toedAmphiuma.pdf](#)

**Map**

## **CLASS AMPHIBIA**

### **Three-toed Amphiuma**

*Amphiuma tridactylum*

### **Conservation Issues**

#### Aquatic habitat degradation

- 2E Stream channelization/ditching. Channelization/riparian wetland loss.
- 2H Wetland loss/drainage/alteration . Loss of bottom hardwoods/assoc wetlands and loss of cypress swamps/assoc wetlands.

#### Biological/ consumptive uses

- 5F Low population densities. Always has been rare in Kentucky.

#### Terrestrial habitat degradation

- 3A Row-crop agriculture (conversion to, annual reuse of fields, etc). Loss of bottom hardwoods/associated wetlands.
- 3R Habitat and/or Population Fragmentation

**CLASS AMPHIBIA**

**Wehrle's Salamander**

*Plethodon wehrlei*

<b>Federal Status</b>	<b>Heritage Status</b>	<b>GRank</b>	<b>SRank</b>	<b>GRank (Simplified)</b>	<b>SRank (Simplified)</b>
N	E	G5	S1	G5	S1

**G-Trend** Unknown

**G-Trend** Wehrle’s salamander occurs in the Appalachian Mountains and outliers from

**Comment** extreme southwestern New York to the northern edge of North Carolina (Conant and Collins 1991). Isolated populations of a peculiar yellow-spotted morph occupy a series of scattered locations in the Pine Mountain area of Kentucky/Tennessee and southwestern Virginia; these have been recorded from a total of 3 sites in southeastern Kentucky, all of which are situated in and near the Cumberland Mountains (Kentucky Herpetology Database 2004, Kentucky State Nature Preserves Commission Database 2004, J.R. MacGregor Herpetology Maps 2004).

**S-Trend** Unknown

**S-Trend** Overall population trends are generally unknown rangewide for the species and

**Comment** are also unknown - but probably stable - for the yellow-spotted form that occurs in Kentucky. A visit to the Lilley Cornett Woods site (Letcher County) in April 2004 yielded 3 live individuals; a new location was discovered in in 2004 Harlan County (by James Kiser). Several evenings of searching at the Pine Mountain Wildlife Management Area locality during 2004 failed to yield

additional specimens; the record here consists of a single juvenile that was collected in a pitfall trap.

**Habitat /** Like other members of the genus *Plethodon*, Wehrle's salamander is completely

**Life History** terrestrial. In Kentucky, they are associated strongly with cliffs and probably occur also in caves and on rocky wooded slopes. Reproduction is poorly documented; it is likely that the females deposit small clusters of eggs terrestrially in underground retreats. Larval development takes place within the egg and thus there is no free-living aquatic larval stage. Like several other Kentucky salamanders, this species is a habitat specialist dependent upon rock crevice habitats; all known populations occur along and near shaded sandstone, limestone, or shale cliffines (including areas near abandoned coal mine entrances).

**Key** Habitat condition within the limited known range of Wehrle's salamander in

**Habitat** Kentucky appears to be GOOD.

Following Key Habitats (good):

1. Letcher County

**Guilds** caves, rock shelters, and cliffines, Cumberland highland forest, upland forest.

## **CLASS AMPHIBIA**

### **Wehrle's Salamander**

*Plethodon wehrlei*

Statewide [Wehrle's Salamander.pdf](#)

### **Map**

### **Conservation Issues**

Biological/ consumptive uses

5F Low population densities. Always has been rare in Kentucky.

Terrestrial habitat degradation

3K Surface mining. Surface mining and mountaintop removal.

3M Timber harvest. Logging without cliffline buffers and drying of forest floor leaf litter.

3R Habitat and/or Population Fragmentation. Surface mining.

3U Loss, lack and degradation of special and unique microhabitats



**CLASS AMPHIBIA**

**Western Lesser Siren** *Siren intermedia nettingi*

<b>Federal Status</b>	<b>Heritage Status</b>	<b>GRank</b>	<b>SRank</b>	<b>GRank (Simplified)</b>	<b>SRank (Simplified)</b>
N	N	G5T5	S3S4	G5	S3

**G-Trend** Unknown

**G-Trend** The western lesser siren occurs throughout the south-central U.S., extending

**Comment** northward in Mississippi River drainage into Illinois and Indiana; isolated populations have been found in northern Indiana and southwestern Michigan (Conant and Collins 1991). This species is known from about 18 counties in western Kentucky, ranging essentially throughout the Jackson Purchase and also occurring at scattered locations in Land Between The Lakes National Recreation Area and the Western Coal Field (J.R. MacGregor Herpetology Maps 2004).

**S-Trend** Unknown

**S-Trend** Population trends are unknown, but the western lesser siren may be on the

**Comment** decline in Kentucky. Recent (1984-2004) records are available from only 11 counties, but this species is difficult to capture without the use of specialized trapping techniques; further survey work is needed. This species is not tracked by Kentucky State Nature Preserves Commission.

**Habitat /** The western lesser siren dwells in various types of wetland habitat ranging from

**Life History** cypress and tupelo swamps and flooded areas in bottomland hardwoods to

sluggish streams, oxbows, bayous, sloughs, buttonbush ponds, open wetlands with emergent vegetation, ditches, and flooded fields; it may burrow into the soil and estivate during dry periods.

**Key** Habitat condition for the siren in Kentucky is generally only FAIR.

**Habitat**

Following Key Habitats (good):

1. Hickman County
2. Livingston County
3. Trigg County

**Guilds** Emergent and shrub-dominated wetlands, standing water.

**Statewide** [WesternLesserSiren.pdf](#)

**Map**

## **CLASS AMPHIBIA**

**Western Lesser Siren**

*Siren intermedia nettingi*

### **Conservation Issues**

Aquatic habitat degradation

2E Stream channelization/ditching. Channelization/riparian wetland loss.

2H Wetland loss/drainage/alteration . Loss of bottom hardwoods/assoc wetlands and loss of cypress swamps/assoc wetlands.

Point and non-point source pollution

4A Acid mine drainage other coal mining impacts . Acid mine drainage/runoff contamination.

4D Oil and gas drilling operations associated runoff

Terrestrial habitat degradation

3A Row-crop agriculture (conversion to, annual reuse of fields, etc). Loss of bottom hardwoods/associated wetlands.

3K Surface mining

3R Habitat and/or Population Fragmentation

**CLASS AMPHIBIA**

**Wood Frog**

*Rana sylvatica*

<b>Federal Status</b>	<b>Heritage Status</b>	<b>GRank</b>	<b>SRank</b>	<b>GRank (Simplified)</b>	<b>SRank (Simplified)</b>
N	N	G5	S5	G5	S5

**G-Trend** Unknown

**G-Trend** The wood frog is widely distributed in the northern and central U.S. (Conant

**Comment** and Collins 1991). This species is common throughout much of eastern and south-central Kentucky (from 70 counties), becoming sporadically distributed to the west across the Mississippian Plateau. It is scarce and local in the Western Coal Field; isolated colonies also occur in uplands along the Kentucky River in Fayette County and in the wooded bottoms along the Ohio River in Bracken and Campbell counties (J.R. MacGregor Herpetology Maps 2004). Woods frogs from Fayette County were introduced into a woodland pond near Fort Bramlett in Jessamine County and have returned to breed there for 2 consecutive years (J.R. MacGregor data).

**S-Trend** Unknown

**S-Trend** Long considered a common species in eastern Kentucky, the wood frog remains

**Comment** common in many areas (documented in 69 of the 70 known counties since 1980 - 66 of these since 1984 - J.R. MacGregor data). However, during the past few years, J.R. MacGregor and others have documented some strange things at some of the breeding ponds. Total larval die-offs for wood frogs, eastern

spadefoots, marbled and Jefferson salamanders, and perhaps other species have occurred for 2 consecutive years at what was once a prime wood frog breeding site on Burnt Ridge Road in Berea College Forest along the Rockcastle-Madison county line; some sick *Ambystoma* larvae were collected there in 2003 and found to have been infected with an Iridovirus. Additional ponds in several portions of the Daniel Boone National Forest have been incidentally checked in recent years in April and May and found to be totally free of wood frog tadpoles - perhaps indicating additional (but undocumented) die-offs. Further field investigation to determine the extent of this problem is warranted. An isolated wood frog population that occurs along the Kentucky River palisades off Jacks Creek Road in Fayette County is threatened by rapid residential development that has eliminated some upland forest habitat and several breeding ponds. The wood frog is not tracked by Kentucky State Nature Preserves Commission.

**Habitat /** Wood frogs characteristically occur in forested areas; breeding takes place very

**Life History** early in the spring in seasonal and permanent woodland ponds, roadside ditches, and water-filled tire ruts along little-used woods roads.

## **CLASS AMPHIBIA**

### **Wood Frog**

*Rana sylvatica*

**Key** Habitat condition overall is GOOD.

#### **Habitat**

Following Key Habitats (good):

1. Fayette County
2. Powell County
3. Pulaski and McCreary counties

**Guilds** Cumberland highland forest, standing water, upland forest.

**Statewide** [WoodFrog.pdf](#)

#### **Map**

### **Conservation Issues**

Biological/ consumptive uses

- 5K Lack of suitable habitat for spawning, nesting, or breeding. Loss of suitable breeding ponds.
- 5L Parasitism and disease. Egg/tadpole mortality/die-off and larval die-offs (Iridovirus).

Miscellaneous Mortality Factors

- 6A Traffic/road kills
- 6G Stochastic events (droughts, unusual weather, pine beetle damage, flooding etc.). Premature dry-up of breeding pools and ice damage to eggs at breeding pools.

## Terrestrial habitat degradation

- 3A Row-crop agriculture (conversion to, annual reuse of fields, etc)
- 3F Urban/residential development. habitat loss (urban expansion/development) and urban expansion into very limited range (affects isolated *Rana sylvatica* populations along Jacks Creek Road in Fayette County). Fragmentation by highways/urbanization (NatureServe)
- 3K Surface mining
- 3M Timber harvest. Habitat loss (modification) and timber harvest around breeding sites (NatureServe 2004).
- 3R Habitat and/or Population Fragmentation. fragmentation by highway/urbanization (NatureServe 2004)
- 3U Loss, lack and degradation of special and unique microhabitats

## AMPHIBIAN LITERATURE CITED

- Bank, M. S., J. B. Crocker, S. Davis, D. K. Brotherton, R. Cook, J. Behler, and B. Connery. 2006. Population declines of northern dusky salamanders at Acadia National Park, Maine, USA. *Biological Conservation* 130 (2006) 230-238.
- Bank, M. S., J. Crocker, B. Connery, and A. Amirbahman. 2007. Mercury bioaccumulation in green frog (*Rana clamitans*) and bullfrog (*Rana catesbeiana*) tadpoles from Acadia National Park, Maine, USA. *Environmental Toxicology and Chemistry*, Vol. 26, No. 1, pp. 118–125.
- Barbour, R.W., 1971. *Amphibians & reptiles of Kentucky*. University Press of Kentucky, Lexington, Kentucky.
- Bonett, R. M. 2002. Analysis of the contact zone between the dusky salamanders *Desmognathus fuscus fuscus* and *Desmognathus fuscus conanti* (Caudata: Plethodontidae). *Copeia* 2002:344-355.
- Braun, E.L.. *Deciduous Forests of Eastern North America*. 596 pp. 1950. Philadelphia, The Blakiston Co.
- Conant, R., Collins J.T.. *A field guide to reptiles and amphibians. Eastern and Central North America*. 450 . 1991. Boston, MA, Houghton Mifflin Company.
- DeLorme. *Kentucky Atlas and Gazetteer*. 1997. DeLorme.
- Gore, J. A. 1983. The distribution of desmognathine larvae (Amphibia: Plethodontidae) in coal surface impacted streams of the Cumberland Plateau, USA. *Journal of Freshwater Ecology* 2:13-23.
- Hale, M. F. 1984. A survey of the amphibians of Mammoth Cave National Park. M.S. thesis, University of Louisville. 121 pp.
- Hansen, K. L. 1958. Breeding pattern of the eastern spadefoot toad. *Herpetologica* 14:57-67.
- Hendricks, W.D., McKinney, L.E., Palmer-Ball Jr, B.L., Eans. M.. *Biological inventory of the Jackson Purchase Region of Kentucky. Final Report*. 1991. Frankfort, KY., Kentucky State Nature Preserves Commission.



Highton, R., 1997. Geographic protein variation and speciation in the *Plethodon dorsalis* complex. *Herpetologica* 53:345-356.

Kentucky Herpetology Database. Kentucky Herpetology Database. 2004. East Kentucky Power Cooperative. 2004.

Kentucky State Nature Preserves Commission . Kentucky State Nature Preserves Commission Database. 2004. Kentucky State Nature Preserve Commission . 2004. Notes: Data printouts

Klemens, M.W. 1993. Amphibians and reptiles of Connecticut and adjacent regions. State Geological and Natural History Survey of Connecticut, Bulletin Number 112, Hartford, CT.

Kuehne, R.A., Barbour, R.W.. American Darters. 177pp. 1983. Lexington, KY, University of Kentucky.

Lannoo, M (Ed.). 2005. Amphibian Declines: the conservation status of United States species. University of California Press. 1025 pp.

MacGregor, J.. 2004. Notes: Personal field notes and maps

MacGregor, J. R. 2007. Results of an Amphibian, Reptile, and Turtle Survey of Mammoth Cave National Park, Kentucky. 18 pp

McCoy, C. J. 1982. Amphibians and reptiles in Pennsylvania. Carnegie Museum of Natural History, Special Publications, Number 6. Pittsburgh, PA.

Means, D. B. 2005. *Desmognathus fuscus* (Green, 1818), Northern Dusky Salamander. Pp. 708-710, In M. Lannoo (Ed.). Amphibian Declines: the conservation status of United States species. University of California Press. 1025 pp.

Means, D. B. and R. M. Bonett. 2005. *Desmognathus conanti* Rossman, 1958, Spotted Dusky Salamander. Pp. 705-706, In M. Lannoo (Ed.). Amphibian Declines: the conservation status of United States species. University of California Press. 1025 pp.

Means, D. B. and J. Travis. 2007. Declines in ravine-inhabiting dusky salamanders of the Southeastern US Coastal Plain. *Southeastern Naturalist* 6(1):83-96.

Minton, S.A.. Amphibians and Reptiles of Indiana. 404 pp. 2001. Indianapolis, IN., Indiana Academy of Science.

NatureServe. NatureServe Explorer: An online encyclopedia of life. World Wide Web . 2004. NatureServe, Arlington, Virginia. October 27th, 2004.

Orser, P. N. and D. J. Shure. 1972. Effects of urbanization on the salamander *Desmognathus fuscus fuscus*. *Ecology* 53:1148-1154.

Palis, J. G. 2005. *Scaphiopus holbrookii* Harlan, 1935, Eastern Spadefoot. Pp. 511-513, In M. Lannoo (Ed.). *Amphibian Declines: the conservation status of United States species*. University of California Press. 1025 pp.

Pearson, P.G. 1955. Population ecology of the spadefoot toad, *Scaphiopus h. holbrookii* (Harlan). *Ecological Monographs* 25: 233-267.

Petranka, J.W., 1998. *Salamanders of the United States and Canada*. Smithsonian Institution Press, Washington, D.C.

Redmond, W.H., Scott, A.F.. *Atlas of Amphibians in Tennessee; Miscellaneous Publication Number 12*. 94pp. 1996. Clarksville, Tennessee, The Center for Field Biology, Austin Peay State University.

Rossman, D. A. 1958. A new race of *Desmognathus fuscus* from the south-central United States. *Herpetologica* 14: 158-160.

U.S. Environmental Protection Agency. Level III ecoregions of the continental United States (revision of Omernik, 1987). 2002. Corvallis, Oregon, USEPA–National Health and Environmental Effects Research Laboratory. Notes: Map M-1, various scales.

U.S. Geological Survey. 2010. National Amphibian Atlas. Patuxent Wildlife Research Center (available online at <http://www.pwrc.usgs.gov:8080/mapsserver/naa/>)

Woods, A.J., Omernik, J.M., Martin, W.H., Pond, G.J., Andrews, W.M., Call, S.M., Comstock, J.A., Taylor, D.D.. *Ecoregions of Kentucky (color poster with map, descriptive text, summary tables, and photographs): (map scale 1:1,000,000)*. 2002. Reston, VA, U.S. Geological Survey.