

***Doing the Streets:***  
**Animals on the Road**  
**in a Rural Ontario Village**  
**2004-2006**

Frederick W. Schueler, Bishops Mills Natural History Centre,  
RR#2 Bishops Mills, Ontario, Canada K0G 1T0  
<bckcdb@istar.ca> <http://pinicola.ca>

**Roads & Ecopassages Forum, 20 March 2007, Toronto Zoo**

*the text of the talk, edited from Aleta Karstad's transcription, is  
inserted in blue*

Schueler has gathered up Turtles  
On roads from Alberta to Maine,  
And finds that, though they start as  
hamburg,  
A handful of shrapnel remains.

-- *christmas card ditty, ca 1979*

*I've been scraping road kills off the road for quite a while... We're using roads here as a nuclear physicist uses a particle detector, not to directly fret about the roads' impact on populations, but to find seasonal patterns of movement.*

 North  
Grenville

**BISHOPS MILLS**

THIS COMMUNITY  
PROTECTED



NEIGHBOURHOOD  
WATCH

*This study was done at our home in Bishops Mills, Ontario, which is a small village of about 100 inhabitants, maybe 30 houses, on the Smiths Falls Limestone Plain. After a preliminary season in the summer and fall of 2003, we set out in 2004-2006 to tally all on-road Animals on the 246 m of four streets fronting on land that we own, that intersect at 44.87246°N 75.70096°W (WGS84).*

*Surveys were made when possible, especially when the pavement was wet or animals were moving. Average duration of a survey was about 5-7 minutes. Air temperature, wind, cloud cover, precipitation, and the estimated percentage of the pavement that was wet were recorded at each survey. All AOR/DOR terrestrial vertebrates, and DOR Birds, were picked up and measured/dissected as appropriate, Cepaea snails were counted or measured, Lethocerus Water Bugs and other large Insects were counted, with regular reporting of Earthworms and slugs added in the spring of 2005.*



NATURAL HISTORY  
CENTRE



*My animal is the Northern Leopard Frog, Rana pipiens. I did my thesis on their Geographic Variation and I've been following their life history here since 1979. Unlike turtles, you can't put radio transmitters on them, they are immensely abundant, and they move across the countryside for a few km distances in different stages in their life histories. There's always different ages and sex classes crossing the road: in places separated by a hundred metres, you may have a movement predominantly of females and another of males, and what focused my interest in the village is non-breeding spring migrations of yearling frogs.*



44.8725°N  
75.7010°W

Our Streets:  
245.6 m in Bishops  
Mills, Ontario

*This is the Google Map vision of Bishops Mills. You are looking at 246 metres of the street. The red building is the Bishops Mills Natural History Centre which we were given in 2002, and the yellow lines across the streets are the limits of the sampling area, delimited by the limits of land that we own in the various parts of the village. The idea is that whenever there is a possibility that something might be on the road, to go out and find what it is. I've measured a lot of the animals, and determined their positions on the roads, but for this presentation I've only got time for the more abundant species, their numbers, and the years and months they were on the road in the village.*



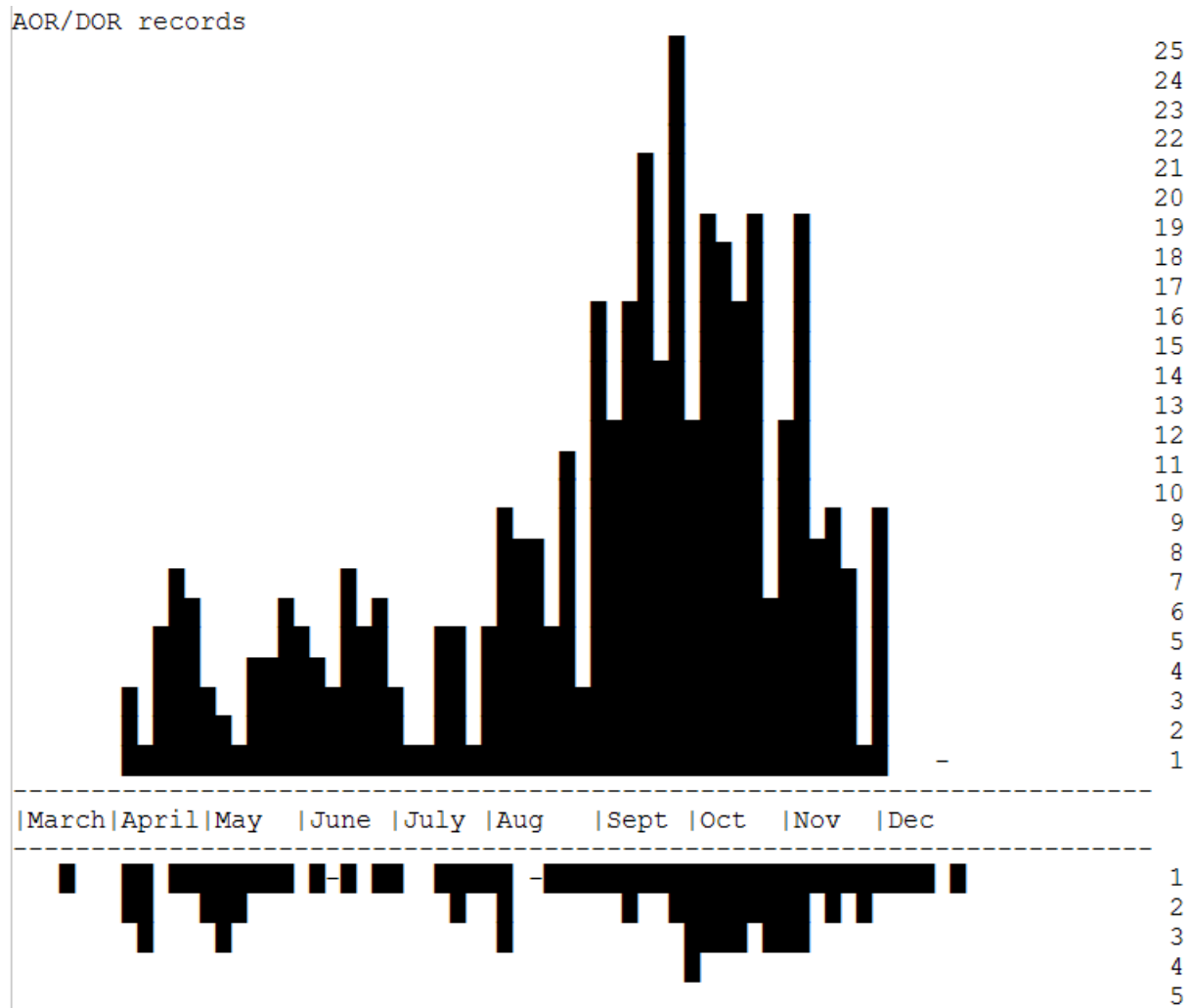
572 surveys (170 of 'no observation') on 392 days.

990 records, of 3342 individuals of 48 taxa

3.9/m in 2004, 5.8/m in 2005, 3.9/m in 2006.

*From 2004-2006 I was out 572 times on 392 days. I'm not discussing the numbers of DOR vs AOR, but in the middle of the range of mortality rates, about 86% of each species of frogs and toads was roadkilled.*

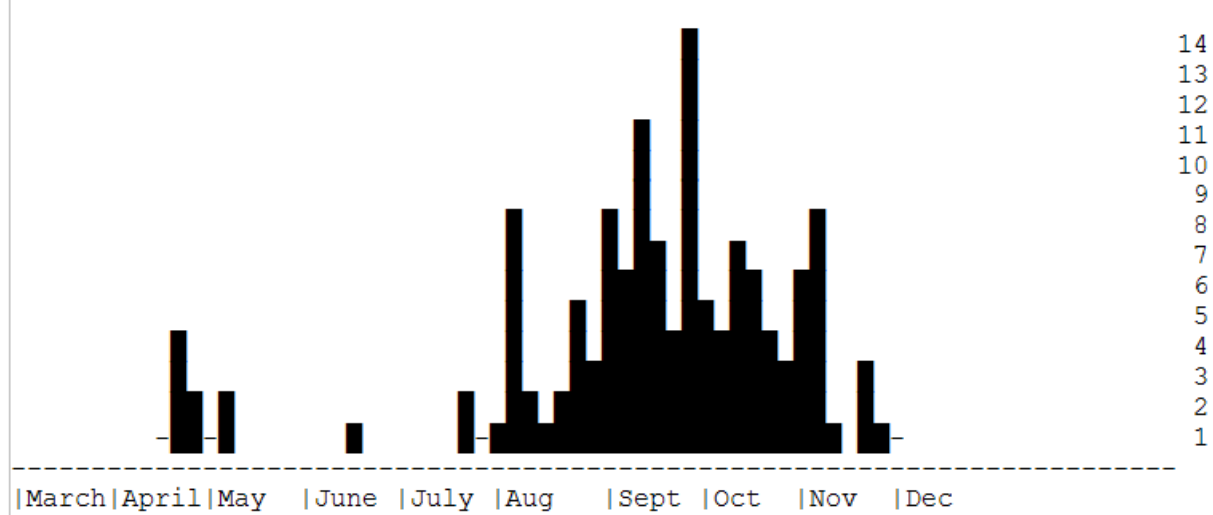
Overall seasonal pattern on the Streets of Bishops Mills.



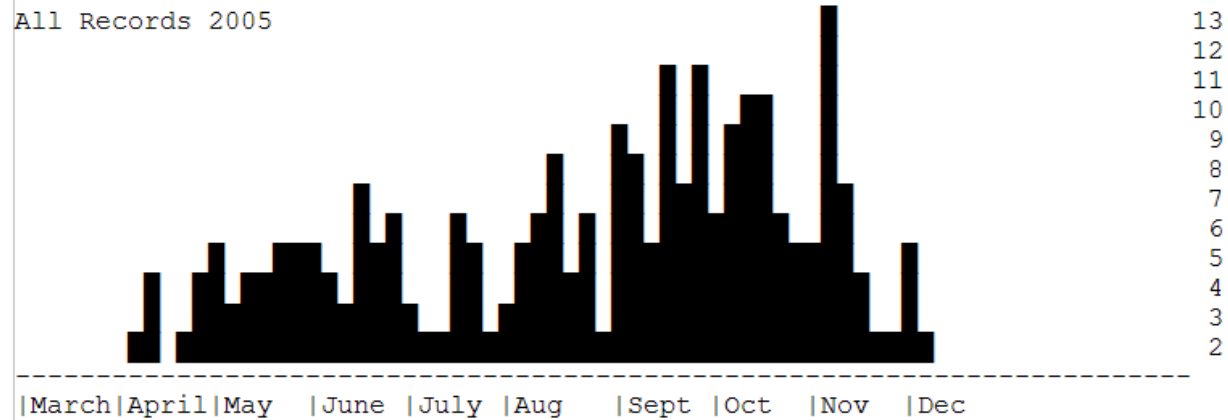
Kolmogrov-Smirnov comparison:  $D=0.1356$   $p=0.01$ , 821 AOR/DOR records, 170 non-observation records, 991 total records.

# Annual records on the Streets of Bishops Mills

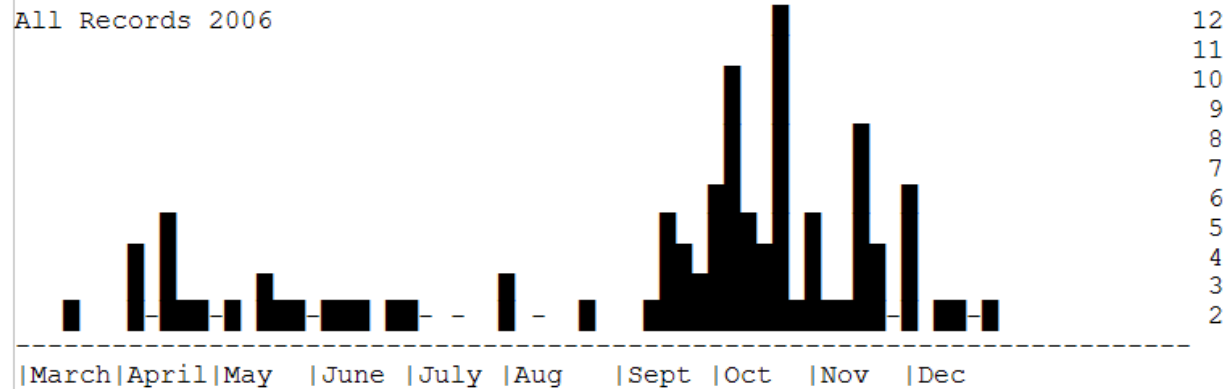
All Records 2004 -- Each  represents 2 records.



All Records 2005



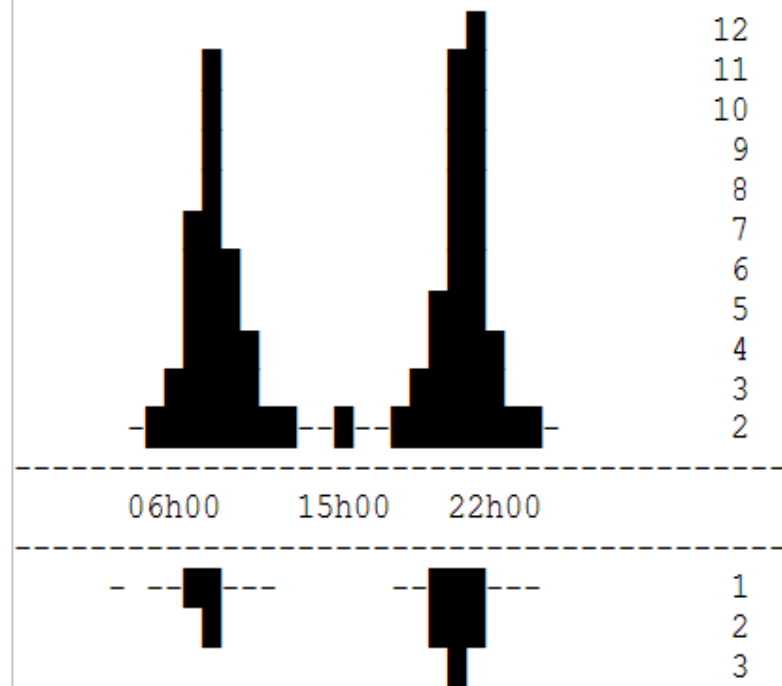
All Records 2006



*The two previous slides show the overall seasonal patterns. The first was the seasonal patterns of when I thought it was appropriate to go out and look (these paired histograms compare the distribution above and below the axis with the Kolmogorov-Smirnov D statistic). In this case  $p=0.01$  that the dates when I went out and found creatures were different from those when I didn't find anything on the road: different, but not very different. Things move mostly when it's wet -- slugs, snails, Earthworms, Anurans -- so there's very different patterns in the three different years depending, at least, on the weather. The following slide shows the time of surveys: the two peaks are nocturnal observations when things were actually moving, and then in the morning when I was scraping up carcasses and identifying grease spots.*

## Overall diurnal pattern on the Streets of Bishops Mills

AOR/DOR records



non-observation records -- Each symbol represents 10 records.

Kolmogrov-Smirnov comparisons:  $D=0.1732$   $p=0.00043$ , 821 AOR/DOR, 170 non-observation records, 991 total records.

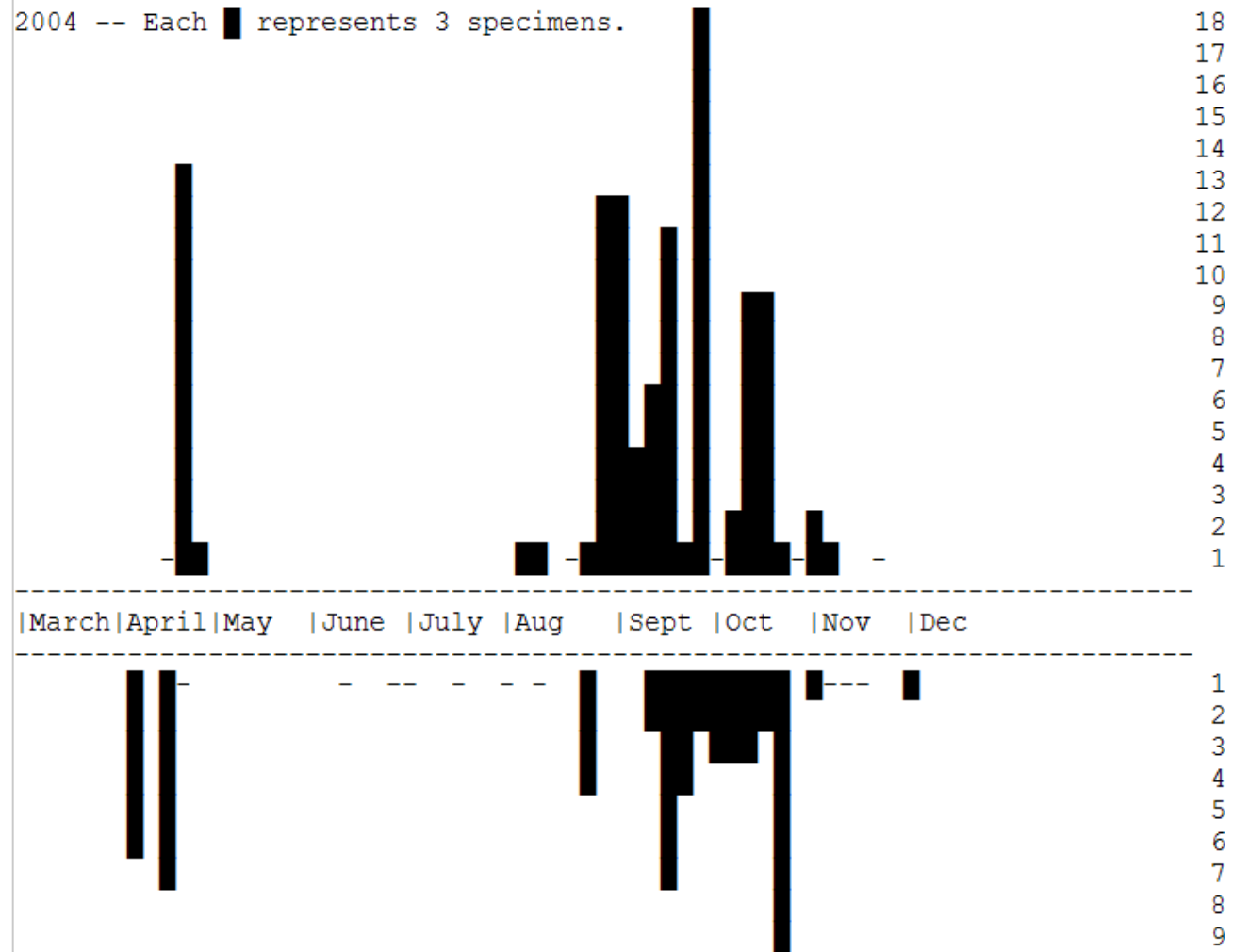


“The Frog Party “  
photo from back yard lily pond by Bev Wigney



Leopard Frog *Rana pipiens*

# Most different years for *Rana pipiens*



*Rana pipiens* 2006

Kolmogorov-Smirnov comparisons of histograms,  $D=0.2224$   $p=0.0000086$ , 361 2004 specimens, 191 2006 specimens.

*The most abundant Vertebrate was the Leopard Frog. To show the extent of year-to-year variation, I've used the Kolmogorov-Smirnov statistic to select the two years that were the most different. The first peak of activity is frogs that were moving to breed, the second is yearling frogs that were going out to gag down insects while the adults were still in the breeding ponds. 2006 was an incredible year for survival, as you see from the trickle of on-road records through the summer. The first of August is the traditional arrival date for the metamorphosed frogs. For some reason in 2004 they were out under one particular street lamp getting killed, and in 2006 there were lots but they were staying on the lawns. I don't know what the reason was. You can also see that final big spike in October -- what we call "**Burn Henry Ford in Effigy Night:**" the big movement to the creeks when there's terrible mortality. It happened in 2006, earlier than the usual mid-October, probably on 28 September, but we missed that night. These were both wet years, so we didn't have as much movement in December as we do in drought years.*

“A Frog In The Hand is Worth” photo by Bev Wigney



Green Frog *Rana clamitans*





photo by Brian Day

**Bull Frog** *Rana catesbeiana*



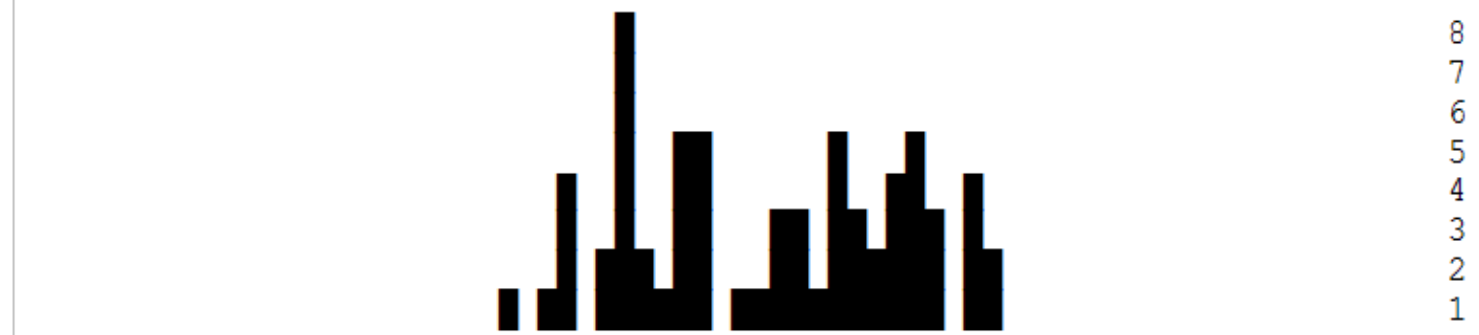
Photo by Bev Wigney



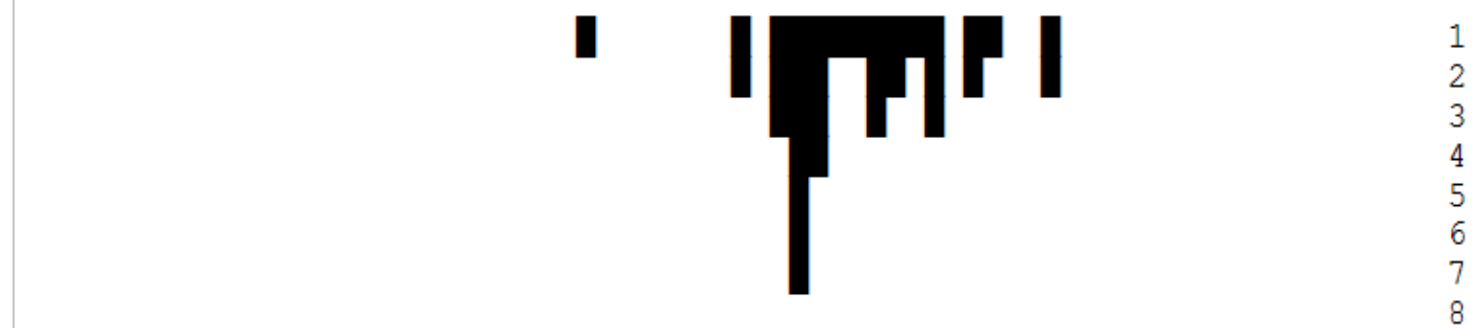
Green Frog *Rana clamitans*

# Green & Bull frogs on Streets of Bishops Mills: 2004-2006

*Rana clamitans* -- Each ■ represents 1 specimen.



|March|April|May |June |July |Aug |Sept |Oct |Nov |Dec



*Rana catesbeiana*

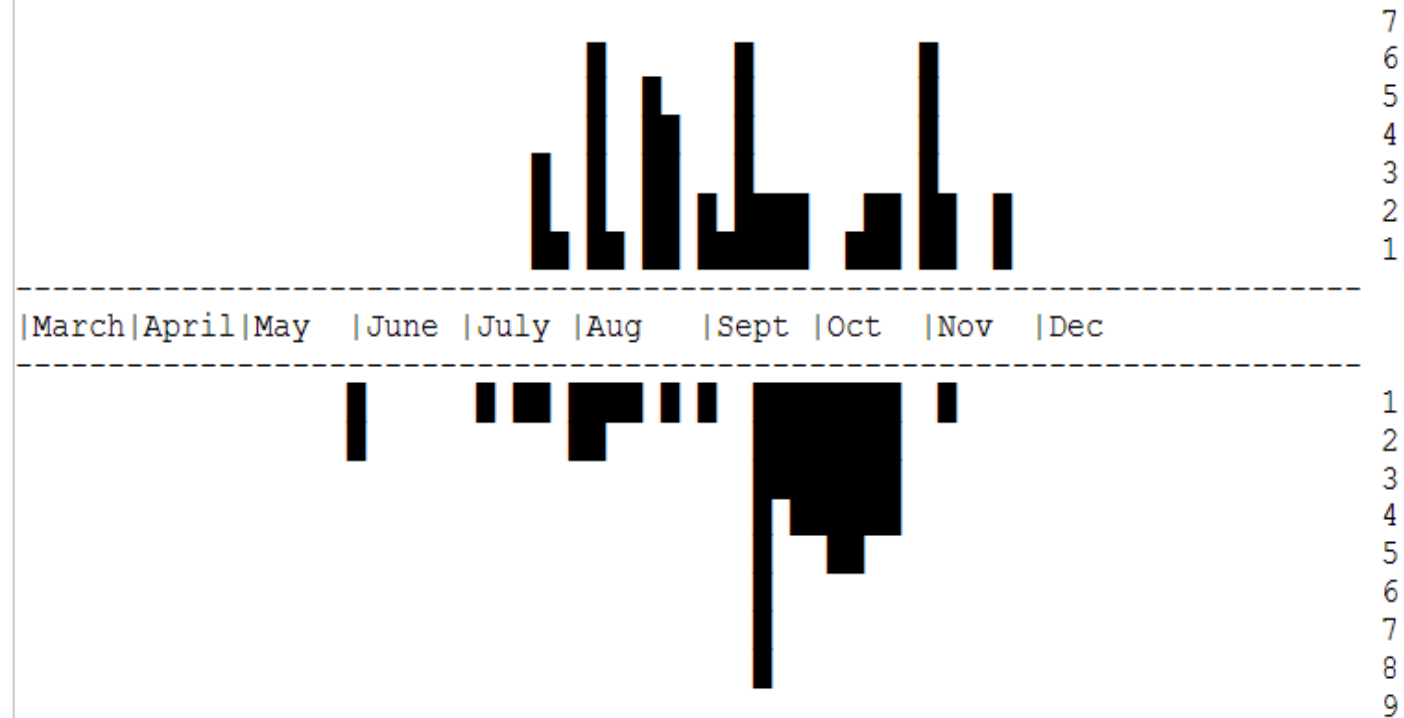
Kolmogrov-Smirnov comparisons of histograms  $D=0.4091$   $p=0.0012678$   
 66 *Rana clamitans*, 33 *Rana catesbeiana*

*Aquatic frogs must come at least 300m from the creek to reach this site: Green Frogs, mostly juveniles, were seen at about 1 frog/week from late June until early November. Bull Frogs were less abundant, mostly juveniles, from late July until late November, with no particular peak in abundance. They hibernate in very small bodies of water, ditches and half-metre holes. This is the difference between 2004 and 2005 & 6, together, since they had about the same pattern, with more of the juvenile Green Frogs out earlier in the season. Two Mink Frogs, R. septentrionalis, were found at the intersection in late May of 2005, and two Wood Frogs, R. sylvatica in late July and early August of 2005.*

# Aquatic Rana on the streets of Bishops Mills

Each ■ represents 1 specimen.

Aquatic Rana 2004



Aquatic Rana 2005&06

Kolmogorov-Smirnov comparisons of histograms  $D=0.3251$   $p=0.0096229$   
50 2004 specimens, 51 2005 & 2006 specimens.



“Porch Toad” photo by Bev Wigney



American Toad *Bufo americanus*



*Records of Toads, from breeding in late April until late October, were dominated by the juvenile cohort of 2004, which first appeared on the streets in late July of 2004, continued abundant through September, and reappeared as yearlings in early August of 2005. Apparently 2004 was an incredibly successful breeding year, producing this big peak of juveniles that showed up at about 20mm SVL and just faded away into either death or maturity in the course of 2005 and through 2006. This may be the first time in 5 or 6 years that Toads have successfully reproduced in our area.*



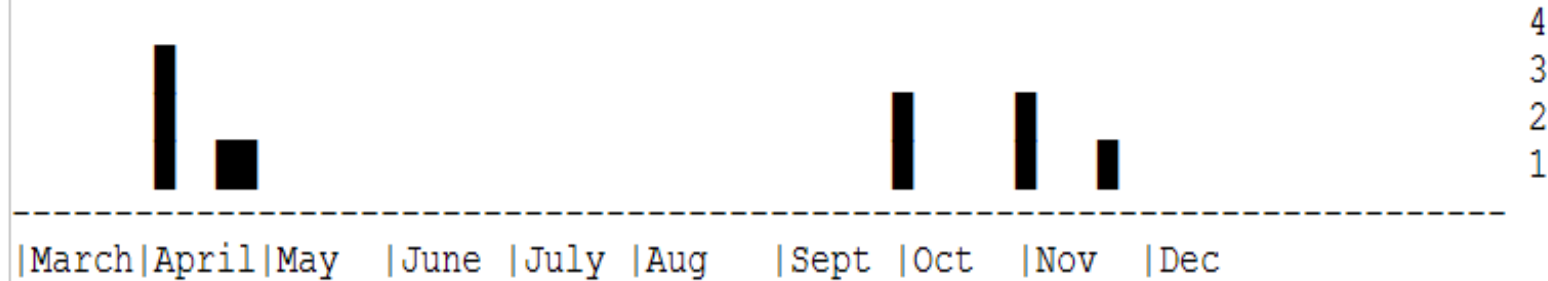
“It's Not Easy Being Green” photo by Bev Wigney



Gray Treefrog *Hyla versicolor*

## Hylids on the Streets of Bishops Mills

*Pseudacris crucifer*



*Hyla versicolor*

*Among Treefrogs, here are Peepers above the line, which we see road-killed both in the spring and fall, and Gray Tree Frogs scattered from early August to early November, half of them in 2005.*



photo by Bev Wigney



Eastern Garter Snake *Thamnophis sirtalis*



*There were 50 records of 60 individuals of non-anuran Vertebrates, mostly Snakes. Two wandering juvenile Water Snakes, Nerodia sipedon, were found in in September. The only Turtle was a hatchling Painted Turtle, Chrysemys picta. Except for one adult Ruffed Grouse, Bonasa umbellus, the only birds found dead on the road were a few single nestlings or fledglings.*

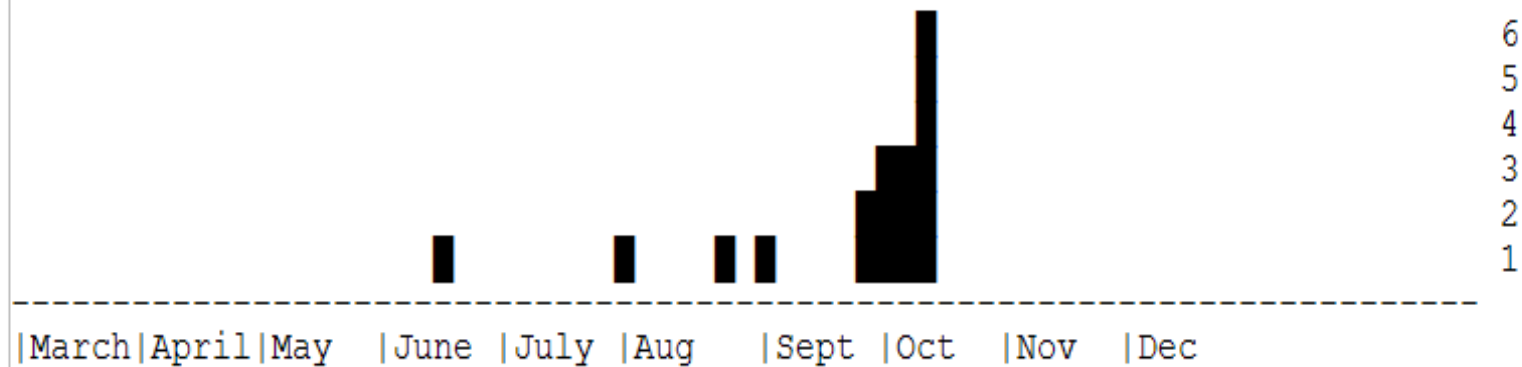
Photo by Brian Day



*Red Belly Snake Storeria occipitomaculata*

## Garter & Redbelly Snakes on the Streets of Bishops Mills

*Thamnophis sirtalis*



*Storeria occipitomaculata*

Garter Snakes are around and active all through summer, with a pulse of movement in late September & early October, whereas the Redbelly Snakes are only on the road when they're presumably moving to hibernation sites, from September to November.





Credit: photo by Roger W. Barbour

*Four Short-tail Shrews, Blarina brevicauda, were the only repeated mammal: One DOR Condylura cristata (Star-nose Mole), 1 AOR M. mephitis (Skunk), 1 AOR & 1 DOR Tamiasciurus (Red Squirrel), 2 DOR Peromyscus (White-footed Mouse); semi-domestic Cats (Felis catus), were mostly not recorded (2 DOR).*





Photo by Aleta Karstad

*Cepaea nemoralis*: *Hundreds were often active near the pavement, without trespassing onto the pavement where they would have been counted.*

*Cepaea nemoralis* snails, the progeny of an introduction by us in 1981, were the most abundant invertebrates. There were 158 records of 1214 individuals, with peaks of activity in late May to early July, late August and early September, and then a movement to hibernacula in late September or early October. Activity by a few individuals continued through the fall, with a few on the pavement even in the warm January of 2007.




*Cepaea nemoralis* in Bishops Mills: most different years

*Cepaea* 2005 -- Each ■ represents 10 specimens.



*Cepaea* 2006

Kolmogrov-Smirnov comparisons of histograms:  $D=0.3429$   $p=0.0000000$   
 587 2005 specimens, 533 2006 specimens.

Posted by AYDIN ÖRSTAN at 08:49 [1 comments](#) 

26 MAY 2005

→ **A colorful alien: *Arion subfuscus***



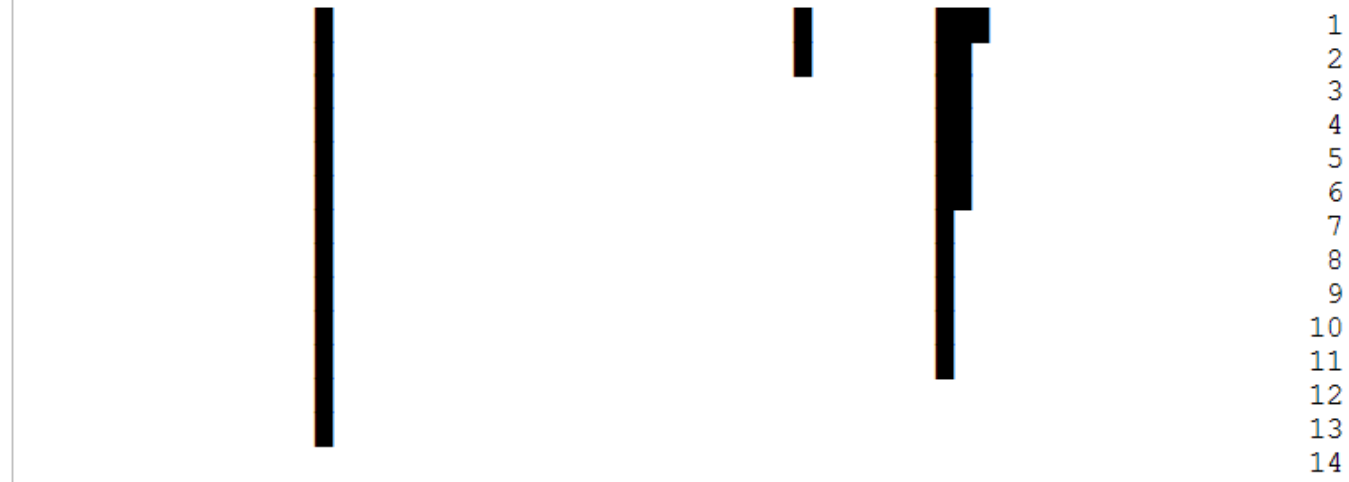
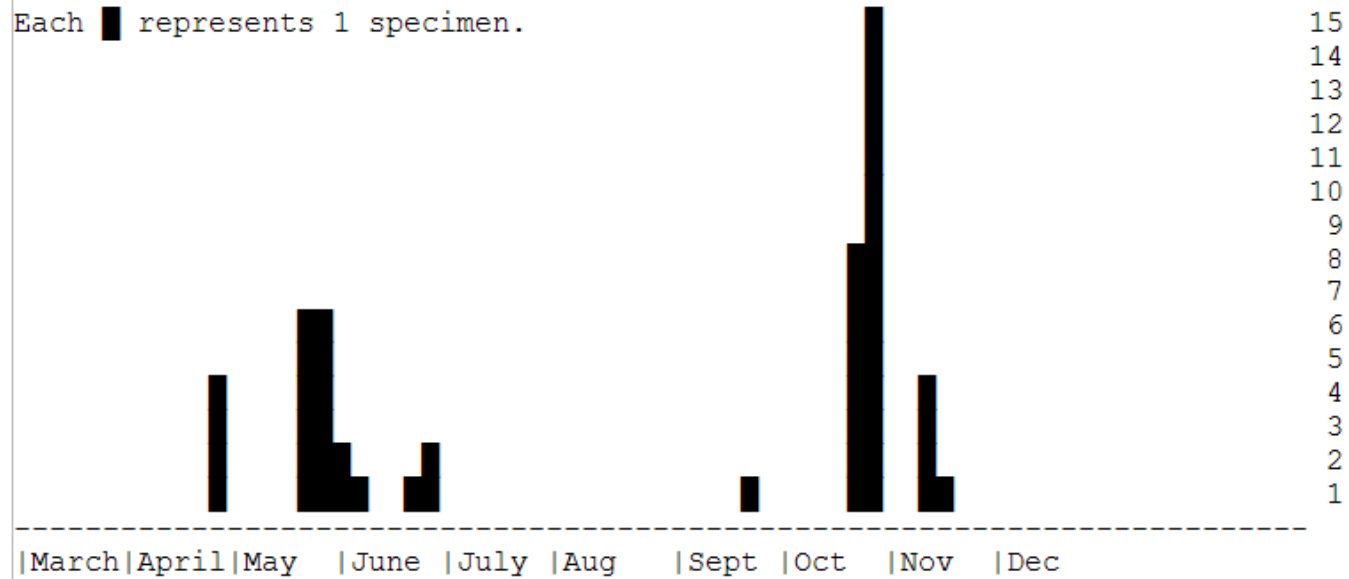
The European slug *Arion subfuscus* comes in different shades of brown, yellow and sometimes even red.

*Arion* were the only slugs seen on the streets in any numbers, with peaks of activity in late May and late October-early November. Abundance was strikingly lower in 2006 than in 2005

# Arion on the Streets of Bishops Mills: most different years

Arion 2005

Each ■ represents 1 specimen.

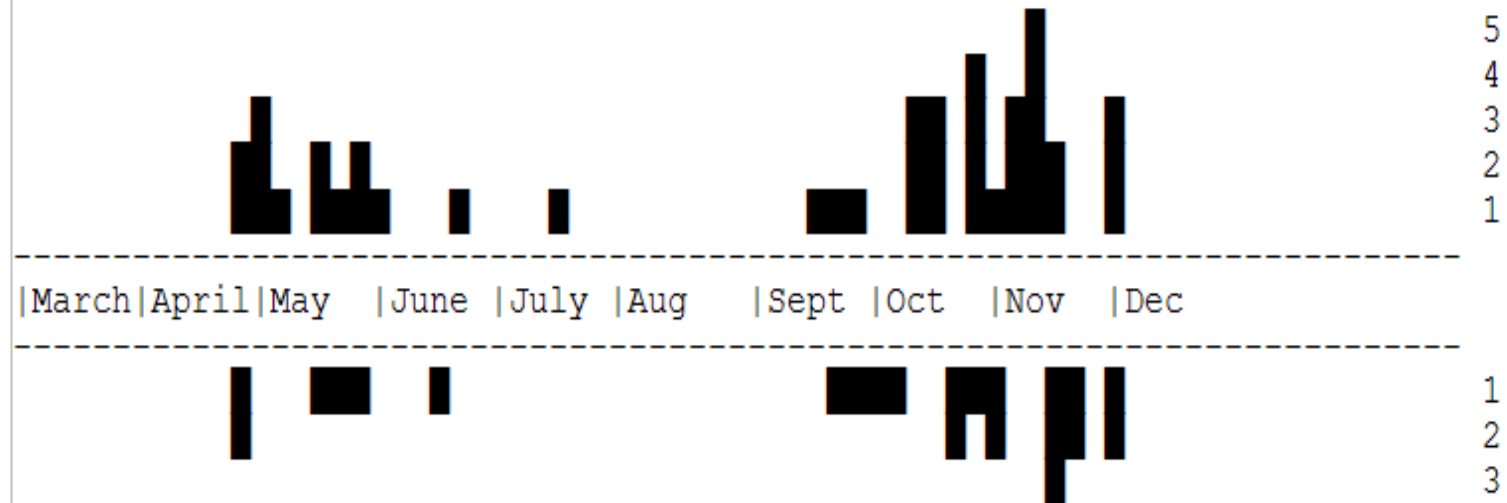


Arion 2006

Kolmogrov-Smirnov comparison of histograms:  $D=0.5258$   $p=0.0000308$ , 51 specimens in 2005, 33 specimens in 2006.

## Earthworms on the Streets of Bishops Mills

Earthworms 2005 -- Each  represents 1 record.



Earthworms 2006

approximate Kolmogorov-Smirnov comparison of histograms:  $D=0.1962$   $p=0.6639942$   
41 records in 2005, 22 records in 2006, 63 total records.

*Earthworms showed two pulses of activity, a spring pulse from late April through May, and throughout the fall.*



photo by Aleta Karstad

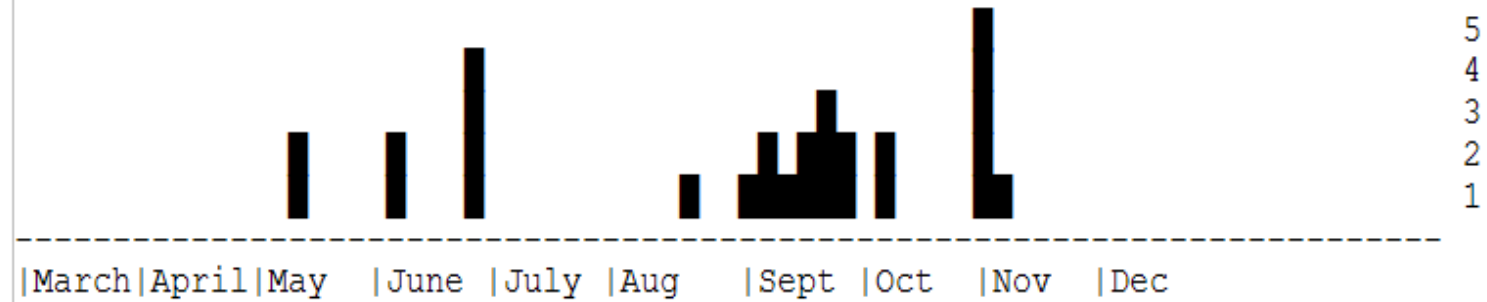


Eastern Toebiter *Lethoceras americanus*

*Lethocerus americanus* was the only Insect seen regularly, usually on the pavement under street lamps, from early April to early November. It was restricted to spring and fall pulses in 2006, but was seen sparsely through the summer in 2005.

***Lethocerus americanus* in Bishops Mills: most different years**

*Lethocerus americanus* 2005



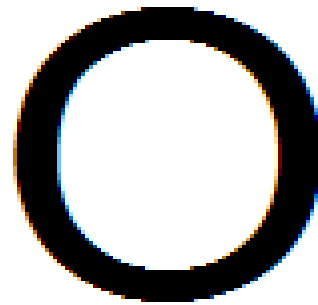
|March|April|May |June |July |Aug |Sept |Oct |Nov |Dec



*Lethocerus americanus* 2006

approximate Kolmogrov-Smirnov comparison of histograms  $D=0.5294$   $p=0.0053201$   
 28 specimerns in 2005, 17 specimens in 2006.

# Adopt a Crossing



(Logo under development)

*Like backyard monitoring of Anuran calling, tallying all on-road Animals along a short transect of streets not only allows us to estimate total mortality, but has also brought a number of seasonal movements to our attention that we weren't aware of before. Continuing through multiple years points out which movements are regularly annual, and which depend on differing weather or populations among years.*

**We've just begun the analysis with the present breakdown, and will proceed by separating counts of DORs and AORs, and relating movements to weather conditions and growth of individuals.**

*We recommend this exercise to anyone who lives near a road.*



Thanks to **Aleta Karstad** for putting the slides together under extreme pressure (and for what seems to be more-than-usual spousal toleration), **Donna Richoux & Frank Ross, Lars & Martha Karstad**, and *Canadian River Management Society* for financial support, **Cheryl Doran** for subsidy to the Ecopassages, **Jennifer Schueler** for roadwork, and **Bev Wigney & Brian Day** for photographs.

