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Alligators, Raccoons, and Bats Underfoot: Wildlife Living in Stormwater Sewers[1]

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Urban Wildlife and Artificial Habitats

As cities grow and develop, the spaces available for wildlife to live, move, and find food diminish (Peterson 2002). Some species have demonstrated remarkable resilience to these human pressures and have adapted their behaviors to survive in an environment with altered food sources, increased noise and light pollution, and a scarcity of sheltered resting areas (Shochat et al. 2010). Examples include chimney swifts (*Chaetura pelagica*) nesting in chimneys and wells (Wheeler 2013), feral pigeons (*Columba livia*) feeding on discarded human food (Sacchi et al. 2002), and raccoons (*Procyon lotor*) taking advantage of humans by foraging in trash bins and using buildings for refuge (Nixon et al. 2001; Prange et al. 2003). Some bats, including Rafinesque's big-eared bats (*Corynorhinus rafinesquii*), big brown bats (*Eptesicus fuscus*), tricolored bats (*Perimyotis subflavus*), and southeastern myotis bats (*Myotis austroriparius*), have been found hunting insects attracted to artificial lights and roosting in buildings or highway overpasses (Gehrt and Chelsvig 2008; Smith et al. 2024).

Traditionally, we think of forests, wetlands, and parks as wildlife habitats, but not underground drainpipes. However, a growing body of research shows many species use human infrastructure in surprising ways. Wildlife-friendly overpasses and underpasses have shown great success in reconnecting fragmented habitats and reducing roadkill (Bond and Jones 2008). Furthermore, even man-made corridors not designed for wildlife use have proved to be beneficial for animal movement (Chen et al. 2021). Stormwater sewer systems, networks of underground pipes designed to carry rainwater away from roads and parking lots and into nearby lakes, streams, or retention ponds (Che et al. 2014), are an example of this phenomenon. Although their primary purpose is flood control, these extensive, interconnected structures can serve as hidden habitats and movement corridors for wildlife.

Figure 1. Camera trap with custom magnetic base that allows researchers to monitor wildlife movement through underground sewer systems.
Credit: Alan Ivory, UF/IFAS

This publication summarizes research on the diversity of wildlife that inhabit stormwater sewers and documents their behavior in this environment. Our target audience is homeowners in suburban and urban neighborhoods who are curious about their local wildlife and how these species are making use of human-created spaces. Our goals are to raise awareness about this understudied urban habitat and highlight both the opportunities and the risks these spaces present to wildlife and humans.

What’s Down There?

Stephen King’s convincing horror novel *It* notwithstanding, we are happy to report that no terrifying murder clowns have been found within the sewer system. On the other hand, researchers *have* discovered a plethora of wildlife species using the sewers. Ivory et al. (2024) documented 35 species of wildlife across 39 locations in the stormwater sewer systems of Alachua County, Florida (Table 1). The researchers used camera traps, a tool commonly used by hunters and wildlife managers (McDonald et al. 2025), mounted from magnetic bases on manhole covers to capture videos of wildlife moving through stormwater pipes (Figures 1 and

2). This species-rich community includes mammals, birds, reptiles, amphibians, fish, and aquatic and terrestrial invertebrates, reflecting the adaptability of wildlife to human-engineered habitats.

Mammals

Mammals were the most frequently documented group within the sewers and included both native species, such as Virginia opossums (*Didelphis virginiana*), and invasive species, including black rats (*Rattus rattus*) and domestic cats (*Felis catus*). Raccoons were the most commonly observed animal and often displayed the greatest range of behaviors. Some species, including armadillos (*Dasypus novemcinctus*), opossums, domestic cats, river otters (*Lontra canadensis*), southeastern myotis bats, raccoons, black rats, and hispid cotton rats (*Sigmodon hispidus*), were all recorded using the sewer network as sheltered movement corridors. Opossums were particularly noteworthy for carrying their young on their back through the sewers. River otters apparently had a specific preference for sewer pipes that connect one water body to the next. They used sewer pipes to move under roads, thereby avoiding crossing the road aboveground, presumably to avoid the risk of getting hit by vehicles (Figure 3).

Figure 2. Diagram of camera trap set up within a stormwater sewer system to provide a top-down view of wildlife.
Credit: Alan Ivory, UF/IFAS

Southeastern myotis bats, raccoons, and black rats were all documented roosting or denning within the sewer pipes. During the colder months, large groups of bats were frequently documented roosting under manhole covers. Raccoons were often observed in isolated areas of the pipeline, which they seem to prefer for resting and nursing their young (Figure 4). Black rats were observed foraging as well constructing nests from leaf debris and human-discarded trash that accumulated in the stormwater sewers (Figure 5).

Figure 3. Video of a family group of river otters exiting a sewer pipe to enter a nearby creek on the University of Florida campus, using the stormwater system as a travel corridor. Click the image to watch the video.
Credit: Alan Ivory, UF/IFAS

Southeastern myotis bats, raccoons, and eastern grey squirrels (*Sciurus carolinensis*) were observed feeding within the stormwater systems, often in unique ways. Squirrels frequently collected acorns and other food items that were washed into the pipe — the sewers likely provided a protected area for feeding, allowing them to avoid predators such as hawks. Raccoons were often documented hunting a range of small prey, including frogs, crawfish, fish, and snails, as well as collecting human-discarded food items, such as fruits (Figures 6, 7, 8). While raccoons were most frequently found entering and leaving sewer systems at pipe outlets, there were also several recorded instances of raccoons climbing manhole ladders and entering/leaving at curb inlets that provided easy access to the sewer system (Figure 9). Bats were documented employing a foraging tactic called "gleaning," where they land on the pipe floor to capture ground-dwelling insects, in addition to their typical foraging strategy of aerial capture of insects (Figure 10).

Birds

In contrast to mammals, birds were most often found at the pipe openings of stormwater sewers. Several species of wading birds, including great blue herons (*Ardea herodias*) and snowy egrets (*Egretta thula*), were frequently observed foraging immediately outside pipe outlets. However, anhingas (*Anhinga anhinga*) were recorded swimming through stormwater pipes (Figure 11), northern waterthrush (*Parkesia noveboracensis*) were seen foraging in isolated puddles within stormwater pipes, and Carolina wrens (*Thryothorus ludovacianus*) were often found carrying nesting materials within stormwater sewer systems.

Figure 4. Video of an adult raccoon carrying its young into a dead-end sewer pipe. The pair remained in this quiet section of the system for several hours, using it as a den site. Click the image to watch the video.
Credit: Alan Ivory, UF/IFAS.

Figure 5. Black rats were observed foraging as well as constructing nests from leaf debris and human-discarded trash that accumulated in the stormwater sewers. A pair of rats remained in this section continuously for many days before leaving, never to be seen again. Click the image to watch the video.
Credit: Alan Ivory, UF/IFAS.

Reptiles

Reptiles large and small found myriad uses for stormwater sewers. American alligators (*Alligator mississippiensis*) were frequently captured on video using the pipe network to move safely under busy roads (Figure 12) and to ambush prey. Alligators were also documented strategically waiting at pipe exits for potential prey to emerge and using a dead-end pipe as an improvised fish trap, corralling fish into it to aid in their capture (Figure 13).

Figure 6. Video of a raccoon investigating a discarded ketchup packet in a sewer pipe beneath the University of Florida campus, highlighting scavenging behavior. Click the image to watch the video.
Credit: Alan Ivory, UF/IFAS

Turtles, specifically yellow-bellied sliders (*Trachemys scripta scripta*), were documented foraging for vegetation in the sewer system, and brown anole lizards (*Anolis sagrei*) were seen feeding on insects there. Yellow-bellied sliders, eastern racers (*Coluber constrictor*), and banded water snakes (*Nerodia fasciata*) were found navigating these underground spaces. Sliders were able to move through water-flooded pipes to travel from one water body to another, while water snakes and the more terrestrial eastern racers predominantly used drier systems to move around in relative safety and to bask.

Environmental and Structural Influences on Wildlife Presence

While the environmental and construction-based factors that influence wildlife occupancy of stormwater sewer systems have only been studied for raccoons and bats (Ivory et al. 2025), their design likely plays a major role in determining which systems tend to be used by different wildlife species. For instance, southeastern myotis bats predominantly roosted in sewers constructed from large-diameter pipes, with less aboveground disturbance, reflecting their preferences for hunting grounds with ample insect abundance and an easily navigable pipe for flight back to a roosting location. This is consistent with the current knowledge of bats roosting under bridges and overpasses (Keeley and Tuttle 1999; Smith et al. 2024). The preference for areas with limited impervious surfaces may also be related to the known influence of noise on bat presence (Lehrer et al. 2021).

Figure 7. Video of a raccoon foraging on a snail in standing water at the bottom of a sewer pipe, demonstrating the use of sewers as feeding grounds. Click the image to watch the video.
Credit: Alan Ivory, UF/IFAS

Figure 8. Video of a raccoon feeding on a crayfish near the outlet of a stormwater pipe connected to a creek, illustrating how animals forage at the edges of sewer systems. Click the image to watch the video.
Credit: Alan Ivory, UF/IFAS

Risks and Management Concerns

While many species successfully make use of stormwater sewer systems, this is not true for all wildlife. Some species become stranded or unintentionally trapped in these structures, particularly during heavy rains when water and debris are washed into the sewer-pipe network. For example, Eastern spadefoot toads (*Scaphiopus holbrooki*), southern toads (*Anaxyrus terrestris*), and DeKay's brown snakes (*Storeria dekayi*) were documented within the sewers following large storms (Ivory et al. 2024). These species likely become stranded after being swept into the system with floodwater and debris. Once inside, the nearest pipe exit may be a great distance away, making it nearly impossible for them to find their way back to the surface. Management solutions could help reduce these risks. Installing small ramps or ledges within the pipe would allow stranded wildlife to move upward toward a curb inlet and back into their terrestrial habitats. Additionally, adding protective screens or curb inlet filters could help block small species from entering the system in the first place, while still allowing water to flow through (Operation TRAP 2025). These additional measures also have the potential to prevent trash from entering the stormwater sewer system (Figure 14), resulting in cleaner waterways.

Figure 9. Two raccoons climb down through a roadside curb inlet, using a manhole ladder to access the stormwater sewer network below. Click the image to watch the video.
Credit: Alan Ivory, UF/IFAS.

Bats, particularly southeastern myotis bats, appear to use these spaces for roosting and foraging, which puts them at some risk because of certain stormwater management practices. During routine maintenance, when water managers flush sediments and debris from the sewers, or during heavy rains when flow suddenly increases, roosting bats may become trapped between segments of pipe filling with water. An incident that results in a large number of roosting bats drowning could have serious implications for rare species that may use stormwater sewer systems, such as the endangered tricolored bat, which often roosts alongside southeastern myotis bats and is known to roost in culverts in Florida (Smith et al. 2024). While Ivory et al. (2024) did not document bat breeding within the stormwater sewers included in their study, bat presence was seasonal, suggesting that bats may be using sewers as habitat for maternity colonies. Managers can alleviate the risk to endangered bats by monitoring sewer systems consistently and, potentially, changing the timing of sewer maintenance flushes to avoid drowning mothers and their babies.

Figure 10. Video of southeastern myotis bats navigating a sewer pipe, with some flying deeper into the system, while one individual gleans an insect from the pipe floor. Click the image to watch the video.
Credit: Alan Ivory, UF/IFAS.

Conclusion

Research from Alachua County reveals that stormwater sewer systems are far more than simple drainage infrastructure. Sewer systems provide habitat for a diverse range of urban wildlife, which use the systems for shelter, travel, and sustenance. While these behaviors highlight the ability of some species of wildlife to use human-made infrastructure, they can also expose animals to new risks. Recognizing the dual role of this infrastructure—as both an engineering utility and an unintentional wildlife refuge—is the first step toward developing management strategies that better support our urban ecosystems and the resilient species that navigate the hidden world beneath our feet.

Figure 11. Video of an anhinga swimming through the sewer pipe, while a yellow-bellied slider forages below. Click the image to watch the video.
Credit: Alan Ivory, UF/IFAS.

Figure 12. Video of an alligator swimming under a major highway in Gainesville, Florida. Click the image to watch the video.
Credit: Alan Ivory, UF/IFAS.

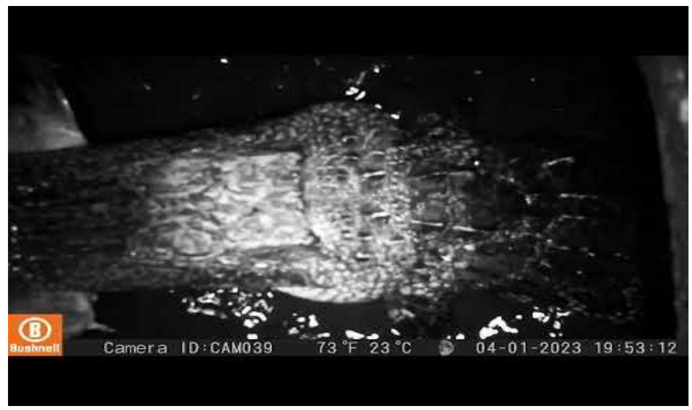

Figure 13. Video of an American alligator consuming a fish inside a shallow section of sewer pipe at the end of a box culvert, where prey was trapped in still water. Click the image to watch the video.
Credit: Alan Ivory, UF/IFAS.

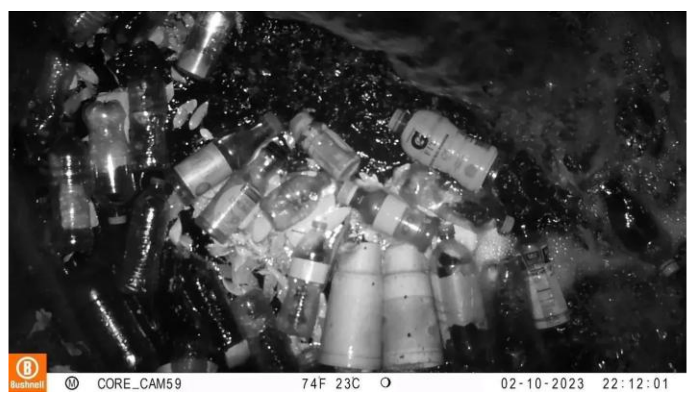

Figure 14. An abundance of human-discarded trash within a stormwater sewer pipe. Screens at curb inlets could prevent such trash accumulation and also exclude small reptiles from being swept into sewers by heavy rain.
Credit: Alan Ivory, UF/IFAS

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Table 1. Number of observations for each species observed within Alachua County's stormwater sewer system.

Scientific Name	Common Name	Observations
Mammal		
Dasypus novemcinctus	nine-banded armadillo	82
Didelphis virginiana	Virginia opossum	321
Felis catus	domestic cat	50
Lontra canadensis	river otter	29
*Lynx rufus**	bobcat	1
Myotis austroriparius	southeastern myotis	694
*Odocoileus virginianus**	white-tailed deer	3
Procyon lotor	raccoon	1810
Rattus rattus	black rat	324
Scalopus aquaticus	eastern mole	5
Sciurus carolinensis	eastern gray squirrel	58
Sigmodon hispidus	hispid cotton rat	124
Reptile		
Alligator mississippiensis	American alligator	50
Anolis sagrei	brown anole	19
Coluber constrictor	eastern racer	4
*Nerodia fasciata**	banded watersnake	1
*Plestiodon laticeps**	broadhead skink	1
Storeria dekayi	DeKay's brownsnake	2
Trachemys scripta scripta	yellow-bellied slider	27
Amphibian		
Anaxyrus terrestris	southern toad	1
Osteopilus septentrionalis	Cuban treefrog	3
*Rana grylio**	pig frog	1
Scaphiopus holbrooki	eastern spadefoot	127
Bird		
Anhinga anhinga	anhinga	13
*Ardea alba**	great egret	24
*Ardea herodias**	great blue heron	2
*Buteo jamaicensis**	red-tailed hawk	1
*Cardinalis cardinalis**	northern cardinal	1
*Corvus brachyrhynchos**	American crow	2
*Dumetella carolinensis**	gray catbird	1
*Egretta thula**	snowy egret	1
Parkesia noveboracensis	northern waterthrush	3

Scientific Name	Common Name	Observations
Thryothorus ludovacianus	Carolina wren	10
*Strix varia**	barred owl	1
*Zenaida macroura**	mourning dove	2
* Species did not enter the stormwater system but were observed on the camera trap.		

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