BRIDGING THE GAP FOR BATS

Bat exclusion essential to bridge work

BY KARLA REEVE-WISE

Bats make a substantial contribution to the global ecosystems and agriculture. They provide food for numerous predators, perform vital services for the ecosystem (pollinate, disperse seeds, fertilize with their guano and slow the spread of disease by influencing insect populations), function as ecological indicators and inspire industry and tourism opportunities. These flying primates are so important to our environmental health that it's imperative we remove them in a safe manner from manmade infrastructure slotted for demolition and improvement and reestablish equivalent habitat on a new structure. Bat conservation can be accomplished by changing a scope of work to avoid any disturbance, planning to do the work when bats are not present, excluding the bats prior to the work or installing bat boxes on new bridge structures that don't support current bat occupancy. My experience on three road projects illustrates some of those methods. The projects include a bridge requiring road maintenance, a smaller bridge demolition and improvement over a railroad and a large bridge demolition improvement over water.

Dodge Road Bridge

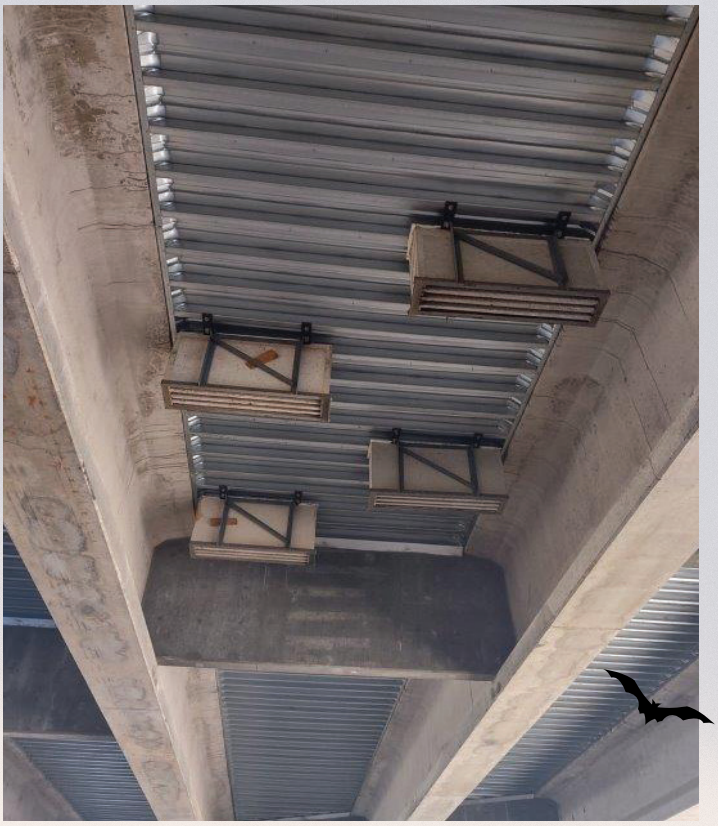
In my transportation career, I have been exposed to many bridge projects as an environmental planner either directly or indirectly through coworkers' assignments, and several of these structures contained habitat for bats. The type of bridge usually associated with occupancy is the box beam girder bridge. I remember my first bridge project with bats had a colony of western pipistrelles (Parastrallus hesperus) living in it and was located at Dodge Road Bridge over the Rillito River in Tucson. It was a road maintenance project, and not only did we have to remove the bats, we also had to do it in a way that would allow the little creatures back into the crevices once the work was completed. It was a relatively small bridge but still a challenge because it was my first exposure to the bat exclusion process. We used backer rod and expandable spray foam to block the empty crevices. Some work occurred at night while the bats were out feeding. Once the exclusion work was completed, routine inspections had to occur because the movement and vibration of the vehicles passing over the bridge, the hot and cold expansion of the concrete bridge girders throughout the seasons, and the wind all can cause the exclusion devices to wiggle out of the crevices over time. On occasion, the backer rod had to be repaired and crevices rechecked to make sure bats had not reentered them. Once the work was completed, the backer rod and spray foam were removed, and the bats were allowed to reenter. No loss of habitat occurred, and it was satisfying to see the bats back in the bridge.

Houghton Road Bridge

Each new bridge project with bats taught me new ways of working with our consultants to complete the task. Never has the work been done the same way twice, as a project's needs and situation always seem to vary. Every bridge is a new child with its own personality. One of the more challenging projects was when we had to exclude bats on the Houghton Road Bridge over the Union Pacific Railroad (UPRR). The box beam girders were to be replaced with I-beams, meaning there would be no habitat for the bats to return to once the original structure was demolished, so we needed to replace the habitat by attaching bat boxes to the underside of the new bridge. Additionally, the UPRR would not allow us to work under the bridge to perform the exclusion.

This bridge contained several species of bats, including Mexican free-tailed (Tadarida brasiliensis), cave myotis (Myotis velifer), big brown (Eptesicus fuscus) and pallid (Antrozous pallidus). After determining the approximate number of bats occupying the bridge, a bat box was ordered and installed flush with the bottom of the deck so the heat of the bridge would transfer to the box and provide some temperature buffering. The box was installed around the same time as the exclusion was initiated so the bats would get used to the box and have a place to reside while their habitat was being removed. The interior portions of the panels of the box were sprayed with a diluted guano "tea mixture" so it smelled like bats and to encourage its use.

Dodge Road Bridge over the Rillito River, Tucson, Arizona.



New Houghton Road I-beam bridge with bat boxes installed, Tucson, Arizona.

Everyone involved was very excited when the bats started using the box right away! Success! What a great day that was for the team.

The spans on either side of the railroad were excluded using backer rod with a flexible caulk sealant placed on top of the backer rod. This approach removed the need for ongoing inspections to ensure the backer rod was not wiggling out of the crevices during the months it took for the new bridge to be built. The clear plastic tubular one-way valves were removed after the bats vacated the crevices.

The portion of bridge over the UPRR was going to be a challenging top-down exclusion. With the help of the City of Tucson's Road Maintenance crew, the pavement over the tops of the box beam girder crevices was removed. Workers took turns knocking out the concrete and putty to open and access the crevices from the top of the bridge deck. The length to the bottom of the box beam was measured, backer rod was placed from the top of the crevices, and it was pushed down until it was just above the bottom of the crevices. Flexible caulk sealant was used to secure the backer rod in place. There was no room for do-overs in this situation, and we worked during several cold and windy nights in early March because the bat population was minimal at that time of year. It was my task to inspect each crevice and approve it before we moved on to the next location. The big brown bats were very curious and often popped up into the crevices to see what we were doing. As a requirement from the UPRR, we all took shifts watching for the trains and sounding the alarm to stop work as every train passed under the bridge. We had to stop work so often, I lost count of how many trains passed through this area in the middle of the night.

The next step was constructing half of the new bridge, which took several months. The bat box on the old bridge was occupied by bats and now needed to be excluded, disassembled and moved to the I-beam bridge. Again, this process was completed when bat occupation was minimal, and we used backer rod to fill the crevices while the bats were out of the box. We relocated the box quickly to reduce the time the bats were without habitat, and the bats reoccupied the box immediately, another great moment and indicator of success! This allowed for the demolition of the old bridge, and the second half of the bridge was constructed. Additional bat boxes were added to the bridge later.

Gilbert Road Bridge

Gilbert Road Bridge at the Salt River is the longest and probably one of the most important bridges to bats in Arizona. The project involving this bridge, still ongoing, has had many different challenges, such as performing a partial exclusion on the bridge's north and south end spans in mid-winter, being restricted to work during the day, time constraints for completing the activity and the sheer number of bats occupying the bridge during the activity. All the lessons I learned from my direct and ancillary involvement as an environmental planner for a public transportation agency have mattered on this project. This bridge contained several thousands of Mexican free-tailed bats when work began. Many migrated for the winter, but just as many seemed to stay. Perhaps the most important step to meeting the tight schedule was maintaining the supply flow. If you run out of supplies,

Gilbert Road Bridge over the Salt River, Mesa, Arizona.

work stops. The bucket trucks and their operators, as well as the biologist, must stop work while supplies are replenished, so it was imperative to track the use of the materials versus the inventory available on-site and ensure the needed items were always on hand. We used backer rod, expandable spray foam, and the clear plastic tubular one-way valves to complete the task. Due to the winter cold, expandable foam and sealant could not be used in the morning hours, and we could not use the products after 3:00 p.m., just in case the bats exited. Bats often "touchback" into the crevices they just exited, and we had to make sure any applied foam or sealant was dry before they might exit in the evening hours. As a result, the sequence of work focused our efforts on placing backer rod into the overhead crevices in the cooler mornings, and any use of expandable foam and sealant took place later in the day, but not beyond 3:00 p.m. The number of one-way valves inserted into the crevices was dependent on the number of bats occupying the crevice.

Once the exclusion devices were placed, we waited two to four weeks for the bats to exit through the one-way valves. The crevices were checked routinely for occupancy by removing the backer rod in the occupied cervices. Once vacated, the one-way valves were sealed with foam and marked as completed with red paint but left in place. Once all the bats were excluded, the team revisited the site to perform routine inspections on the backer rod and repair any areas that worked their way loose until the bridge spans were demolished. The two buffer spans were left undemolished, and these spans had flexible caulk sealant applied since they will remain in place until final demolition of the remaining spans. This will remove the need for routine inspections of the backer rod.

Bat boxes have been designed into the new bridge, and the remaining spans will not be excluded until the portion of the bridge containing the bat boxes is completed and the boxes are installed. The remaining spans will likely be excluded and demolished in the next one to two years, depending on how quickly the bridge is built. My favorite part of this project was watching all the team members and contractors gain additional understanding and passion for bat conservation. I hope that I have imparted the same sentiment in you. ✪

Karla Reeve-Wise is an environmental planner and project manager knowledgeable in multiple environmental laws, rules, and regulations. Her 20 years of experience in local transportation managing State and Federal environmental regulatory issues has provided her with many opportunities to work on bat conservation for various types of bridge projects.