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Cover Photograph: *Cistothorus platensis* (Sedge Wren) at Freshkills Park, Staten Island, New York City, NY taken in August 2020. Photograph © Shannon R. Curley.

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Breeding by Sedge Wrens at an Urban Reclaimed Landfill in New York

José R. Ramírez-Garofalo[1,2,*], Shannon R. Curley[1,3,*] and Caitlin E. Field[3]

Abstract - *Cistothorus platensis* (Naumann) (Sedge Wren) are highly specialized songbirds typically associated with grasslands, wet meadows, and the fringes of marshes. In New York State, where they are listed as a threatened species, Sedge Wrens breed in low numbers far from coastal urban areas. Nevertheless, from August–October 2020, we documented breeding by three pairs of Sedge Wrens at a reclaimed urban landfill in New York City, within Freshkills Park on Staten Island's west shore. The birds were observed to have fledged at least three young and remained on-site until at least 11 October 2020. This nesting represents the first successful breeding by Sedge Wrens in New York City since 1960 and shows that this species may persist, even in highly urbanized areas, if suitable habitats are retained or created.

Introduction

Temperate grasslands have drastically declined due to land-conversion and lack of protection (Hoekstra et al. 2005). Consequently, in North America, grassland-associated birds are among the most imperiled species groups on the continent (Rosenberg et al. 2019). *Cistothorus platensis* (Naumann) (Sedge Wren) is a grassland-habitat specialist that requires wet meadows, grasslands, or marsh fringes to breed (Herkert et al. 2020). Sedge Wrens occur erratically throughout their breeding range, demonstrating little to no site fidelity (Bedell 1996, Burns 1982, Walkinshaw 1935). At the northern limits of their breeding distribution, in Quebec, Canada, their breeding territories occur in wet meadows, with occupied sites having high lateral visibility and lower shrub cover and density than unoccupied sites (Robert et al. 2009). In restored habitats, Sedge Wren prefers grasses of about 1 m tall, suggesting that late-season arrival is linked to vegetation growth and height in annually managed habitat (Schramm et al. 1986). Landscape-level variables are also likely important in evaluating the occupancy of breeding locations of Sedge Wrens. For example, in South Dakota, smaller habitats with a high proportion of surrounding grasslands were more likely to be occupied than larger patches with a lower proportion of grassland habitat (Horn and Koford 2004).

According to the North American Breeding Bird Survey (BBS), the Sedge Wren population has remained stable from 1966–2019 (Sauer et al. 2019). However, it should be noted that, due to the highly nomadic breeding behavior of Sedge Wrens, the predetermined transect routes may be deficient in accurately sampling this species. In addition, Sedge Wren is a species known for midsummer arrival dates at breeding territories. These late-breeding attempts are missed by the BBS, which are conducted primarily in June (Bedell 1996). They typically make multiple nests on their breeding territories, some of which are decoy nests (much like congeneric *Cistothorus palustris* L.[Marsh Wren]), and one nest, which a female chooses to line with feathers and lay eggs (Burns 1982). Their breeding season is extended,

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with birds arriving at higher latitude breeding sites in May and lower latitude breeding sites in August and September (Kroodsma et al. 1999). This difference in arrival times between high latitude and lower latitude areas suggests that Sedge Wrens are itinerant breeders, which breed (or attempt to breed) at higher latitudes and then attempt to do so again later at lower latitudes (Herkert et al. 2020, Kroodsma et al. 1999). However, compared to their well-studied vocal repertoire (Kroodsma et al. 1999), relatively little is known about their breeding biology and dispersal behavior (Herkert et al. 2020).

Sedge Wrens were once widespread breeding birds in suitable habitats in northeastern North America. However, since the late-19th and early-20th centuries, they have contracted their range and now breed in very few numbers throughout the region. Their current breeding range includes the entirety of the Midwest and the eastern United States and Canada, with the highest density of breeding birds occurring in the Midwest and relatively low densities throughout the northeast (Herkert et al. 2020). One exception is in local areas within Québec, where they can reach densities that rival the Midwestern population. For example, in 2005, Robert et al. (2009) found densities of 0.21 Sedge Wrens per hectare at Lake Saint-François National Wildlife Area, Quebec (with Robert et al. 2019 giving at least 120 pairs as the number of birds nesting in that area). However, outside of this regionally important area, Sedge Wrens are absent as breeders in Québec and may be listed as threatened or vulnerable in the near future (Robert et al. 2019). They have been recorded in the Canadian Maritimes during breeding bird atlas surveys (Erskine 1992, Stewart et al. 2015) but have only been confirmed breeding on one occasion; in 2002 on Sable Island, Nova Scotia (Stewart et al. 2015).

In the northeastern United States, the occurrence of breeding Sedge Wrens is also extremely erratic. Since about 1940, they have been absent as breeders from Rhode Island except for an isolated breeding record in 2005 (S. Mitra, City University of New York, New York, NY, USA pers. comm.) and are now only observed as rare fall migrants (R. Ferren and R. Veit unpub. manuscript). By the early 1970s, they were extirpated entirely from Connecticut (Zeranski and Baptist 1990) but were confirmed as breeders in Windham County as recently as 2018 (Elphick 2018). In New Hampshire, they were also extirpated by the 1980s (Keith and Fox 2015) and have not since bred in the state. In Massachusetts, Sedge wrens were once more widespread but are currently listed as endangered (Massachusetts Division of Fisheries and Wildlife 2015). Since the 1970s, they rarely breed at low densities (Veit and Petersen 1993) and are primarily confined to the western part of the state (Kamm et al. 2013). In Maine, they breed very sporadically throughout the state and are also listed as endangered (Maine Department of Inland Fisheries 2003). In Vermont, Sedge Wrens are found in low numbers on the western edge of the state where they nest in undisturbed wet meadows and are listed as endangered (Renfrew 2013). In New Jersey, Sedge Wrens are listed as endangered and breed sporadically in the southern half of the state and regularly overwinter in low numbers (Boyle 2011, Walsh et al. 1999). In 2020, a pair was observed in Burlington County, New Jersey, with a male carrying nesting material (Sobocinski 2020). However later observations did not find evidence of breeding (Schill 2020).

As in other states in the northeastern US, Sedge Wrens are rare breeders in New York and are listed as state-threatened. Their breeding areas are mainly confined to the northeastern expanses of the state within the St. Lawrence Valley and Lake Ontario Plain (McGowan and Corwin 2008). In New York City and on Long Island, New York (approximately 550 km south of the core of New York State's Sedge Wren breeding population; Fig. 1), where Sedge Wrens were historically present in suitable habitat, the species has been extirpated as a breeding bird since 1960 (Buckley et al. 2018). Here, we provide documentation of breeding by Sedge Wrens at a reclaimed landfill in New York City—Freshkills Park on Staten Island. This record

suggests that given suitable grassland habitat, likely combined with low disturbance levels, Sedge Wrens can successfully breed in even densely populated urban areas.

Field-site Description

Freshkills Park is a reclaimed landfill on the west shore of Staten Island, New York, in New York City. This park will be developed on the former Fresh Kills Landfill, which was considered the world's largest at its closure in 2001. It is currently undergoing a three-decade transformation from landfill to urban park. While an active landfill (1948–2001), Fresh Kills received a total of 150,000,000 tons of municipal solid waste, which were filled into four individual mounds–North, South, East, and West mounds (New York City Department of Parks and Recreation 2020). The mounds range from 94 ha (North) to 220 ha (West). South Mound was capped in 1996, followed by North Mound in 1997. The Fresh Kills Landfill officially closed in 2001 (New York City Department of Parks and Recreation 2009). The capping of East Mound was finished in 2011, and the capping of West Mound is underway, with completion expected in 2021. Each mound is capped with three layers of soil: a soil barrier layer, a barrier protection layer, and a planting layer, as well as three geotextile layers: an impermeable layer, a gas venting layer, and a water drainage layer (New York City Department of Parks and Recreation 2009). These geotextile and soil layers prevent landfill material from migrating into the surrounding environment, capture landfill gas emissions, manage stormwater and prevent further leachate from forming (Malcolm Pirnie Incorporated 1996; Malcolm Pirnie Incorporated 2001). The observations presented here occurred on the East Mound (Fig. 2), a ~120 ha reclaimed native grassland that was

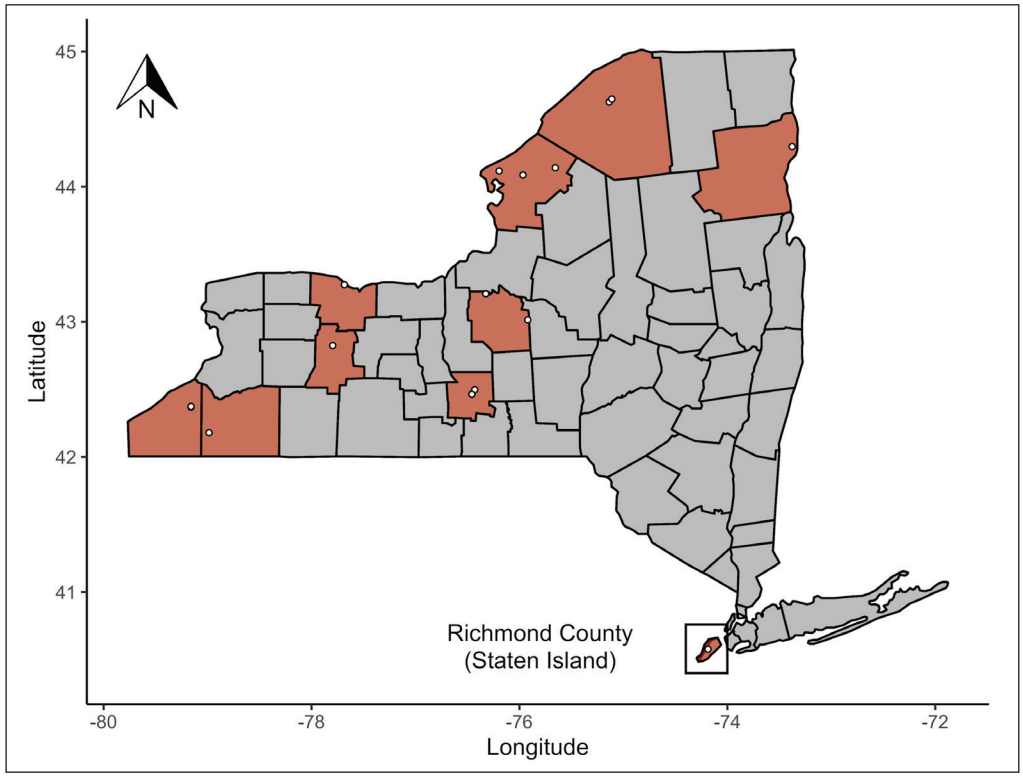

Figure 1. Counties in New York State that recorded Sedge Wrens from June–September 2020, shaded in orange. White dots represent individual Sedge Wren locations reported to the eBird database (Sullivan et al. 2009).

seeded with a native warm-season grass mix composed of *Andropogon scoparium* Nash (Little Bluestem), *Andropogon gerardii* Vitman (Big Bluestem), *Sorghastrum nutans* L. (Indiangrass), *Panicum virgatum* L. (Switchgrass), and *Tridens flavus* L. (Hitchc.)(Purpletop). The site is allowed to remain damp throughout the year. The mounds are currently managed and mowed once per year in the fall by the New York City Department of Sanitation to avoid ground-nesting birds, as is recommended by the New York State Department of Environmental Conservation (T. Killeen, New York City Department of Sanitation, New York, NY, USA pers. comm.). The current mowing window spans from September–November, and the New York City Department of Parks and Recreation communicates to the New York City Department of Sanitation the time at which sensitive grassland bird populations have fledged and when mowing may be completed.

At Freshkills Park, several grassland bird species occur in large numbers, most of which have colonized the site since 2015. All of the following data is derived from an unpublished manuscript by the authors: *Passerculus sandwichensis* L. (Savannah Sparrow) was one of the first species to colonize the East Mound and have been present in large numbers (> 200 pairs) since the early 2000s. In May 2015, *Ammodramus savannarum* (Gmelin) (Grasshopper Sparrow) were first recorded breeding at Freshkills Park and have since been intensely monitored. By 2020, at least 53 breeding pairs were recorded at the Park—only nesting on the East Mound. Likewise, *Passerina caerulea* L. (Blue Grosbeak) was first recorded breeding in

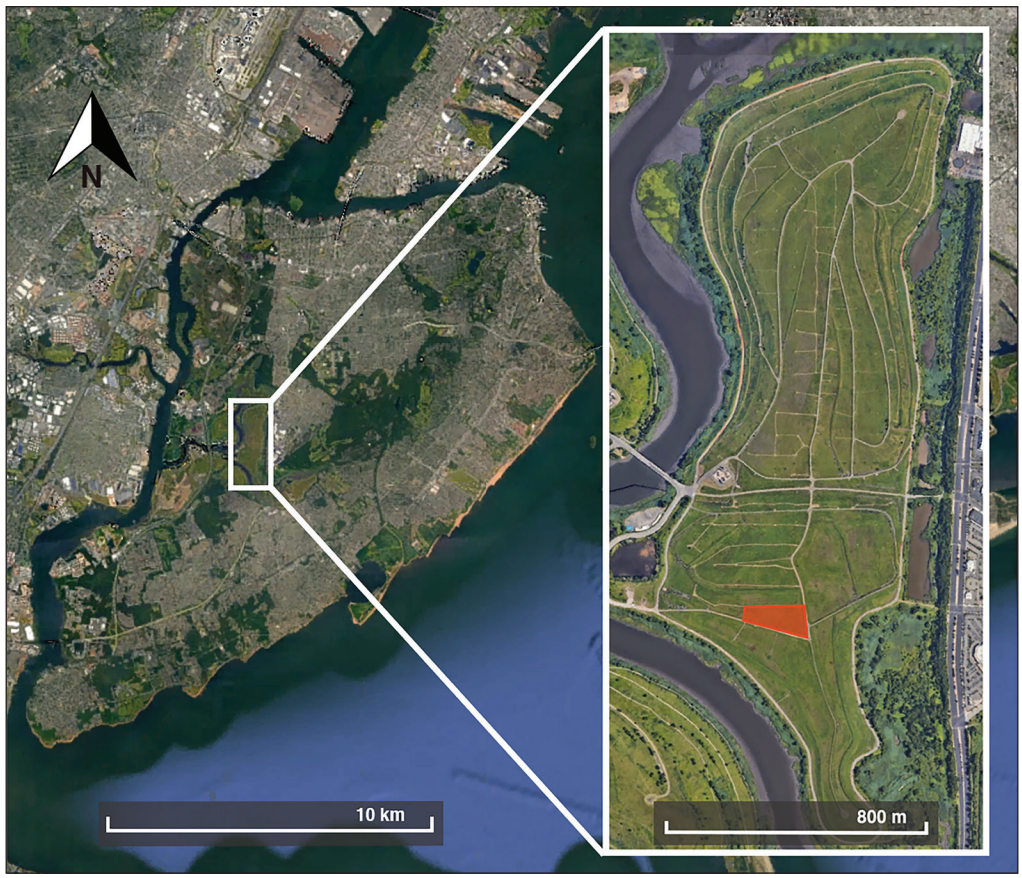

Figure 2. Map of Staten Island, New York. Inset centered on the East Mound at Freshkills Park, with the orange shaded box over the portion of the East Mound where Sedge Wren nests were located in 2020.

2015 and has since bred in each year with a maximum of six pairs in 2019. In June 2020, two additional grassland specialists were recorded breeding in the Park: three pairs of *Sturnella magna* L. (Eastern Meadowlark) and six pairs of *Dolichonyx oryzivorus* L. (Bobolink), both of which had not been found breeding in New York City in well over 10 years by that point (see Bourque 2007, McGowan and Corwin 2008).

Observations

On 6 August 2020 at 1100 hours, we found a singing Sedge Wren on Freshkills Park's East Mound during grassland bird banding operations. The bird approached within 1 m of our mist nets but was not captured (Fig. 3a). It remained singing in the vicinity for the next six hours, moving back and forth between the main access road and a central stand of bluestems and switchgrass (Fig. 3b). We confirmed the presence of a second male at approximately 1530 hrs that day, based on the two birds' overlapping songs in different parts of the meadow. From 8 August–15 October 2020, we conducted point count surveys on the North, South, and East mounds twice a week to determine if Sedge Wrens occurred in other parts of the park. However, we found that they were only present in a small section on the southside of East Mound (Fig. 3a,b). During this time, behavioral observations of the Sedge Wrens on East Mound were conducted opportunistically.

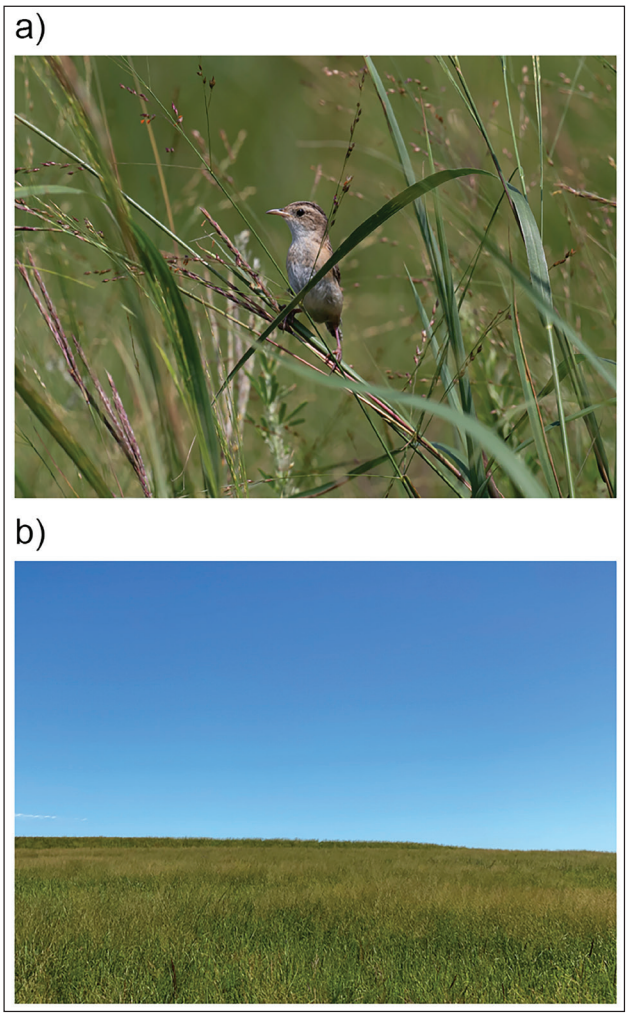

Figure 3. (a) The first Sedge Wren that was documented on East Mound, Freshkills Park, 6 August 2020. (b) Habitat where the Sedge Wren colony was located, which is dominated by stands of native bluestem and switchgrass.

We determined if a nest attempt occurred by observing the returning and leaving of individual birds from potential nest-sites, with birds returning to approximately the same location (within a meter) throughout the entire observation period. On 12 August, we observed the birds bringing nesting material to a central location within the taller sedge in the presumed territory's center. On 14 August, we confirmed at least three singing birds, all of which were returning to individual nest sites. From 31 August–10 September, we observed the adult birds foraging and subsequently returning to the nest sites with insects, suggesting

brood provisioning was occurring. On 16 September, we confirmed the first fledgling, based on juvenile body plumage. On 29 September, at least three juveniles were present, though it is unclear if these birds were from the same nest. The birds remained on-site until at least 11 October; however, between fledging and departure, the birds were generally elusive and hard to locate without hearing vocalizations. Once the birds departed, a surveyor's wheel was used to find the approximate distance between the three nesting locations. We found that the territories were roughly evenly spaced, approximately 76 m apart from each other.

Discussion

In the early 20th century, Sedge Wrens were considered locally common in some areas of New York City (Chapman 1906) but were declining throughout the region by the time of Griscom (1923), who considered them uncommon to rare breeders. Cruickshank (1942) described their local distribution as being from Idlewild, Queens County (in salt marshes destroyed for John F. Kennedy International Airport) to the William Floyd Estate in Mastic, Suffolk County. Sedge Wrens last bred in New York City in 1960 in the high salt marshes northeast of Rockaway Boulevard, near John F. Kennedy International Airport (Buckley et al. 2018, Bull 1964). On Staten Island, which was then known for its expansive salt marshes (Davis 1892, Siebenheller 1981), Sedge Wrens were last found breeding in 1943 on the eastern shore at the Oakwood Beach marshes (Siebenheller 1981). Thus, the breeding record we report here is the first time this species has bred in New York City in 60 years, despite increased human development over that time (Sanderson and Brown 2007, Siebenheller 1981). This breeding record of a highly specialized, regionally-rare grassland bird is an important milestone in the success of ecological reclamation at Freshkills Park. This record also adds to the growing list of species that appear to be attempting to re-establish in the highly urbanized New York City area following large gaps in reported breeding (Ramírez-Garofalo et al. 2020), further highlighting the need for increased preservation (and creation) of urban greenspaces.

In northeastern North America, Sedge Wrens may initiate breeding "late" in the breeding season, from July–September (Herkert et al. 2020, Kroodsma et al. 1999), suggesting these individuals may be itinerant breeders from northern populations. As noted by Buckley et al. (2018), early records (early 20th century and prior) of birds in August and September may represent individuals that were prospecting for breeding sites for the following year (see Reed et al. 1999) or birds that were actively breeding and going undetected, as local observers may have been unaware of their late-season breeding at that time. At Freshkills Park, we are confident that Sedge Wrens have not gone undetected during any part of the breeding season due to daily survey coverage of the site and regular bird banding sessions. If they return, color banding studies on Sedge Wrens will be undertaken, which may help elucidate whether the state does, in fact, host birds that are breeding at higher latitudes—or even within New York itself—then dispersing southward to do so again.

Sedge Wrens winter in areas close to, and with similar habitat as, their breeding range. In New York and New Jersey, this was true until the mid-20th century (Buckley et al. 2018), though a satisfactory reason for their disappearance has never been explicitly investigated. As the winter climate in the northeast continues to become milder as a result of anthropogenic climate change (Bryan et al. 2015), Sedge Wrens may once again begin to overwinter in appropriate habitats, such as urban grasslands like those found in Freshkills Park and other reclaimed landfills. As such, land managers must consider the potential presence of this species when devising end-of-season mowing regimes and other management activities, even beyond the early fall when breeders depart.

Although we did not observe any predation on the wrens, several mammalian predators could potentially threaten Sedge Wren nests**.** For example, *Vulpes vulpes* L. (Red Fox) is becoming an increasingly common species on Staten Island, as well as near the Sedge Wren territory within Freshkills Park (New York City Department of Parks and Recreation unpub. data). Up to three Red Fox families were simultaneously observed in the grasses within 300 m of the colony. On multiple occasions, we also found Red Fox scat within 20 m of the nest sites. Other predators observed include *Procyon lotor* L. (Raccoon), *Felis catus* L. (Feral Cat), and *Mephitis mephitis* Schreber (Eastern Skunk), as well as one opportunistic predator, *Odocoileus virginianus* Zimmerman (White-tailed Deer), which occasionally predate ground-nesting birds (Pietz and Granfors 2000). If Sedge Wrens return to this site or any suitable habitat in the New York City area more generally, interactions between this species and predatory mammals should be carefully monitored.

Despite their success at Freshkills Park, Sedge Wrens are negatively associated with human development in proximity to their breeding colonies in other parts of their range (Howe et al. 2007, Panci et al. 2017). Since the last Sedge Wren breeding record in 1960, New York City's urban expansion has continued apace (Buckley et al. 2018, Plunz 2016, Sanderson and Brown 2007), causing a decline in the amount of suitable habitat in New York City for this species. Floyd Bennet Field, Shirley Chisholm State Park (formerly Pennsylvania Avenue-Fountain Avenue Landfill), and Edgemere Landfill all have varying grassland habitat but are also filled with non-native/invasive short-grasses and woody vegetation (e.g., Bourque 2007), which is not preferred vegetation for Sedge Wren breeding habitat. Perhaps most promising, Shirley Chisholm State Park has native grass meadows (New York State Department of Parks, Recreation and Historic Preservation 2020) but also has large numbers of daily visitors, which may deter Sedge Wrens and other species from breeding there. Nevertheless, these sites may, in the future, provide adequate habitat for Sedge Wrens if managed for grassland breeding birds, through methods such as rotational mowing to preserve tall grasses, protection from future development, and water management that allows parts of the grasslands to remain damp.

The increased presence of breeding grassland specialists within Freshkills Park can be used as a benchmark to monitor the success of ongoing restoration and management efforts. While it has been found that reclaimed surface mines in the midwestern United States can host healthy populations of grassland birds (Bajema et al. 2001, DeVault et al. 2002, Galligan et al. 2006), little to no assessments have been made of reclaimed landfills in the United States—outside of Freshkills Park. With 1,901 inactive landfills in New York State as of 2021 (New York State Department of Environmental Conservation 2021), 816 in New Jersey as of 2014 (State of New Jersey Department of Environmental Protection 2014), and 228 in Connecticut as of 2013 (Connecticut Department of Energy and Environmental Protection 2013), there are many opportunities at the regional-level to develop and apply new management strategies. Sedge Wrens are known to use restored grasslands in North America (Schramm et al. 1986) but no data has been published on their use of reclaimed grasslands, nor on their use of grasslands in urban areas generally. If Sedge Wrens establish themselves in New York City as consistent breeders—particularly on the city's reclaimed lands—there may be the opportunity to have an accessible colony for the study of their dispersal and breeding behavior in this novel habitat.

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