No Snow for These Birds–

Where do Purple Martins Go in the Winter?

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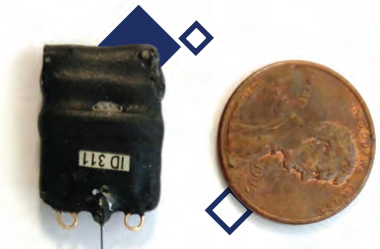
Purple Martin landlords across the United States and Canada know the habitat Purple Martins need at their breeding grounds – open spaces and a well cared for martin house that is often near humans, who enjoy the sights and sounds of the foraging martins. However, like all migratory songbirds, Purple Martins pull a disappearing act in the fall, making their return in the spring that much more anticipated.

Due to their affinity with people and a large concentration of humans over the Purple Martin's breeding range, we have a lot of knowledge about martins on their breeding grounds. There are extensive citizen-science projects using the knowledge of martin landlords, as well as academic studies by research teams. But once Purple Martins depart their breeding range, there is a lot less information available. Purple Martins overwinter mainly in the Amazon basin in Brazil and northern Bolivia (Fraser et al. 2012), where the terrain is more difficult and people are more concentrated. There are no martin houses in the Amazon, so where do martins roost? Considering that martins from across the breeding range share a broad wintering habitat, how do martins that are spread far apart on the breeding grounds interact when they are closer together on their wintering grounds?

These questions are incredibly important to answer. The breeding grounds are in the United States and Canada, but Purple Martins must overwinter safely in order to return to the martin landlords who eagerly await their arrival in the spring. There are numerous environmental disturbances happening worldwide, such as flooding, deforestation and habitat degradation that could be impacting martin winter habitat. By using migration tracking devices, such as geolocators, we were able to determine martin winter habitat at a very broad scale (100-200 km; Fraser et al. 2012), but it was not possible to determine fine-scale habitat use in South America.

We recently led a range-wide tracking study using a new tracking technology (Fraser et al. 2017). We collaborated with the PMCA and other researchers across the North American breeding range of Purple Martins to attach small, archival GPS units to the martins using backpack style harnesses. These units were deployed in 2014 and retrieved in 2015 from 14 martins (as the GPS units do not transmit data). The GPS units were programmed to turn on every 15 days during the overwintering period and collected a total of 7-10 points per martin at a very fine



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spatial scale (approx. 10 m/33 ft. accuracy). Our goal was to examine if Purple Martins from different breeding colonies share the same specific overwintering habitat at a fine scale and thus face the same threats during the winter season. We also aimed to determine what specific kind of roosting habitat Purple Martins are using in South America.

We found that Purple Martins moved around during the overwintering period, with 6-10 roost sites per bird (Figure 1) in a variety of habitats (Table 1). The majority of roost sites (56%) were on islands (either water islands - land surrounded on all sides by water, or habitat islands – roost habitat surrounded on all sides by a different habitat type). Of the island roost sites one third were on water islands in the Amazon River and its tributaries in the Amazon basin. Both types of islands may provide safety when roosting by limiting the access of land or arboreal predators from accessing Purple Martins during the night. This extensive use of rare, island-like habitats was surprising. By using geolocators, we had inferred that any forested or treed habitats were suitable for martins, but the GPS units showed us that martins seem to prefer an even more specific habitat type (islands) within this region. In contrast to on the breeding grounds, only a few roosts were directly associated with human habitation (Table 1). Roost-site habitat varied, with some birds using factories and other industrial structures, but with most birds using treed sites in relatively untouched parts of the Amazon Rainforest.

In addition to the habitat type, we also examined where individuals overwintered in relation to others from the same colony and from different colonies across the breeding range. As we were entering the roost locations into the mapping program, we were quickly able to see our hypothesis supported, that Purple Martins indeed mix extensively at their overwintering sites. However, we were shocked as we began to see individuals from two, then three, then four, then five breeding colonies 2000 km (1243 mi) apart at the breeding grounds (Texas, Florida, Minnesota, Pennsylvania and Ontario) sharing the exact same island, at approximately the same time (Figure 2)! From there we started looking for roosts that hosted multiple martins and found three over-wintering roosts containing birds from two or more distant breeding colonies. In our study, we tracked only 14 birds from six different breeding sites and were able to discover this pattern. As there are

Figure 1. *South American overwintering roosts and movements for Purple Martins as recorded by GPS units every 15 days. The colours represent breeding colonies (blue=FL, purple=TX, red=PA, yellow=ON, green=MN and pink=AB). The shape of the points represents unique individuals from each breeding colony. The coloured pinwheels represent roosts used by multiple martins with each section corresponding to the breeding colony that used it. Figure reprinted from "Determining fine-scale migratory connectivity and habitat selection for a long-distance migratory songbird by using new GPS technology by Fraser, K.C., Shave, A., Savage, A., Ritchie, A., Bell, K., Siegrist, J., Ray, J.D., Applegate, K., and Pearman, M. 2017. Journal of Avian Biology.* ***48(3)****: 339-345."*

Figure 2. *An overwinter roost site in the Amazon basin in the Madeira River used by birds from MN, FL, PA, ON and TX. Figure reprinted from "Determining fine-scale migratory connectivity and habitat selection for a long-distance migratory songbird by using new GPS technology by Fraser, K.C., Shave, A., Savage, A., Ritchie, A., Bell, K., Siegrist, J., Ray, J.D., Applegate, K., and Pearman, M. 2017. Journal of Avian Biology.* ***48(3)****: 339-345."*

approximately seven million martins (Partners in Flight Science Committee 2012), these shared roosts likely host very large numbers of martins and could prove to be important habitat for these birds.

Of the 96 roosts locations (for 14 birds) we identified, only 16.7% were in protected areas according to the IUCN and UNEP-WCMC (2015). This is incredibly important as if there is habitat loss at one of these large multi-bird roosts it could impact Purple Martins across a large portion of their breeding range. However, as Purple Martins have multiple overwintering roosts sites and show flexibility in their roost habitat, it may help buffer the impacts of current and future disturbances in their winter range. This fine-scale knowledge of Purple Martin habitat may also be used to develop protection of overwintering habitat for other related species such as Bank and Cliff Swallows that also overwinter in the Amazon like Purple Martins and are showing steep population declines.

GPS units are just starting to get small enough to track songbirds, such as the Purple Martin. Instruments such as these now make studying the wintering habitat of long-distance migratory birds possible in ways that were logistically impossible in the past. We are now able to assess habitat, population dynamics and the behavior of birds to further our knowledge and conservation techniques so that these beloved birds can safely return to their breeding colonies, where they are eagerly awaited in the spring.

Roost Habitat	Percentage (%)
Urban	4
Forest	53
Shrubland	19
Marsh	3
Water	9
Agricultural Land/Grassland	12

Table 1. Roost habitat during the overwintering period for Purple Martins. Habitat described as "water", were seasonally flooded areas that at times are under water.

GPS-Tracking Locations and Site-collaborators *(organized by north to south latitude):*
Alberta *– Myrna Pearman, Alisha Ritchie; Ellis Bird Farm, Lacombe*
Manitoba *– Dr. Kevin Fraser, Amanda Shave, Kelsey Bell; University of Manitoba, Winnipeg*
Ontario *–Edward Cheskey, Megan MacIntosh; Nature Canada, Ottawa*
Minnesota *- Kelly Applegate; Mille Lacs Band of Ojibwe, Department of Natural Resources, Mille Lacs; Larry Leonard, Brainerd*
Pennsylvania *– Joe Siegrist; Purple Martin Conservation Association, Erie*
Texas *– James Ray, Babcock & Wilcox Technical Services Pantex, Amarillo*
Florida *– Dr. Anne Savage, Disney's Animals, Science, and Environment*

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