COMMON RAVEN (*Corvus corax*) RANGE EXPANSION ONTO THE ERIE/ONTARIO LAKE PLAIN OF NEW YORK STATE

Sarah A. Lazazzero (Piecuch)
1530 Jefferson Road
New York State Department of Transportation
Rochester, New York 14622 USA

Connie M. Adams
270 Michigan Avenue
New York State Department of Environmental Conservation
Buffalo, New York 14203 USA

During much of the historical era, from the late 19th through mid 20th Centuries, the Common Raven (*Corvus corax*) was absent from most of New York State and quite rare even in the most remote parts of the Adirondack Mountains (Bull 1974). More recently, the New York State population has expanded dramatically, increasing at a rate of 9% per year from 1966-2015 (Sauer et al. 2017). During this period, however, nesting reports have generally remained restricted to locations of higher elevation such as the Allegheny and Tug Hill Plateaus, and Catskill and Adirondack Mountains (Boarman and Heinrich 1999, USDA NRCS 2006, McGowan 2008, eBird 2012). In the Niagara Frontier region of southeastern Ontario and western New York, Beardslee and Mitchell (1965) emphasized the species' rarity but noted a definite migration presence during April and October. Here we report the first documented nestings by Common Ravens on the Erie Ontario Lake Plain, the area of low topographic relief along the Lake Erie and Lake Ontario shorelines.

The Lake Erie and Lake Ontario shorelines are also known as the Erie/Ontario Lake Plain Ecoregion of New York State (herein referred to as the Lake Plain). Ecoregions are areas of general similarity in ecosystems and in the type, quality, and quantity of environmental resources (USEPA 2016). The Lake Plain Ecoregion in New York includes portions of Chautauqua, Erie, Niagara, Orleans, Monroe, and Wayne Counties (Fig. 1, p.133; Bryce et. al. 2010). A small part of Cayuga County is also in the Lake Plain, but we did not discuss Cayuga County in this report due to its relatively small amount of area that falls within the Lake Plain Ecoregion.

Prior to 2017, there were three previously known nests within the Lake Plain, all dating from after the 2000-2005 census period of the Second Atlas of Breeding Birds in New York State (McGowan and Corwin 2008). One nest, in Erie County, was located at the Huntley Station power plant in Tonawanda and was first reported in 2011. The other two nests were in Monroe County. The first

Monroe County nest was reported in 2011 and was located at Mendon Ponds County Park in Mendon (eBird 2012). The second Monroe County nest was first reported in 2015 and was located near the smokestacks of Rochester Gas and Electric Corporation's Russell Station in Greece, NY.

During the 2017 breeding season five new Common Raven nests were documented within the Lake Plain of New York. These nests were located in Erie, Niagara, Monroe, and Wayne Counties. One of the Erie County nests was located on the exterior stairway of an abandoned building on the former Bethlehem Steel Corporation Lackawanna Plant in Buffalo (Figs. 2 & 3, p. 134). A second Erie County nest location was identified in the Buffalo Crushed Stone quarry in Lancaster. The Niagara County nest was located in a tower of the coal generation station at the Delphi Plant in Lockport (Bob Elam, pers. comm.). The Monroe County nest was located on the superstructure of a railroad truss bridge over the Erie Canal in Pittsford (Fig. 4, p. 134). The Wayne County nest was in a New York State Department of Transportation (NYSDOT) salt barn in Sodus (Figs. 5 & 6, p. 135).

There were also several reports of probable nests in the Lake Plain counties starting in 2013. However, due to their unconfirmed status, the locations are not included in this report. The probable nest locations were generally associated with larger natural areas (NYPA Reservoir, Iroquois National Wildlife Refuge, Thousand Acre Swamp, and Webster Park), landfills (High Acres and Niagara County) and power plants (Ginna). We propose that the new nest locations are indicative of Common Raven's breeding range expansion onto the Lake Plain of New York State since the publication of the Second Atlas of Breeding Birds in New York State.

At the time of this writing there have been eight nest sites of Common Raven documented on the Lake Plain (Table 1), whereas up to 2005 there were no Common Raven nests documented on the Lake Plain (McGowan 2008). This coincides with documented southward breeding expansion of Common Raven in Ontario, Canada (Peck 2005). Additionally, Common Raven sightings reported to Cornell's eBird database have been steadily increasing for the Lake Plain counties as a whole (Fig. 7, p. 136; eBird 2017). The increasing raven population (Sauer et al. 2017), the increase in eBird reports, several new nest locations, and the documented southward expansion of Common Raven in Ontario suggest the species is expanding its breeding range in New York State and nesting occurrences are likely to become more common on the Lake Plain.

Common Ravens prefer heavily contoured landscapes (e.g., cliffs), which provide thermals for long-distance foraging; and also areas with cliffs, trees, or human structures necessary for nesting (Boarman and Heinrich 1999). In contrast, the Lake Plain is relatively flat. The expansion of the Common Raven's nesting range into what was previously considered sub-optimal habitat may be attributed to saturation of territories in optimal habitat or the natural adaptability of a highly adaptable species.

Table 1: Summary Table of Common Raven Nest locations in the Erie/Ontario Lake Plain.

Nest Site Name	Location	Description	Year*	Additional Notes/Observations
Huntley Station Power Plant	Tonawanda, Erie Co.	Somewhere on the grounds of the power plant.	2011	Confirmed nesting reports are only available in eBird for 2011, 2014 and 2015. Current status unknown.
Mendon Ponds County Park	Mendon, Monroe Co.	In a spruce tree along Quaker Pond trail within the County park.	2011	A pair has nested every year since 2011 and are reported year-round in the area.
Russell Station	Greece, Monroe Co.	In the smokestack area of power plant.	2015	Nest was last reported in 2016. Russell Station was demolished in 2016.
Bethlehem Steel Corp. Lackawanna Plant	Buffalo, Erie Co.	On an exterior stairwell of an abandoned building.	2017	Raven chased the nesting peregrine pair who had occupied this site since 2013.
Stone Quarry	Lancaster, Erie Co.	Adult observed carrying food or nesting material toward stone quarry during breeding season.	2017	Only one report made for the location on 27 April, 2017.
Delphi Plant	Lockport, Niagara Co.	Near the smokestack tower of the coal generation station.	2017	Pair was first observed in the area in 2015. Probable nesting in 2016. Confirmed nest in 2017 season, with three fledglings observed.
Pittsford Railroad bridge over Erie Canal	Pittsford, Monroe Co.	Top of superstructure where several beams come together.	2017	Fledged 3 young in 2017.
Sodus Salt Barn	Sodus, Wayne Co.	Top of the frame arch inside the NYSDOT salt barn.	2017	Fledged 5 young in 2017. Nest fell down at end of 2017 breeding season.

* First year nesting behavior was confirmed.

All but one (Mendon Ponds Park) of the recent nests on the Lake Plain were constructed on or within manmade structures. These new nest locations support Boarman and Heinrich's (1999) account that ravens are adaptable, use a diversity of nest substrates, and benefit from resources provided by human activities. Range expansion into more densely human populated areas along the Lake Plain will likely lead to more opportunities for raven-human interactions, and possibly potential conflicts, in the future.

Additional Observation Information for the Sodus Salt Barn Nest:
NYSDOT workers observed nest building attempts by the Common Ravens early in 2017. The workers noted that sticks dropped during nest-building attempts were not retrieved by the ravens. After what appeared to be many failed attempts at nest building, it was thought the ravens had moved on. In April the Sodus work crews relocated to a different maintenance facility for summer work activities. The gates and buildings at the Sodus facility were locked, and there was little to no human activity in the area. However, the front of the salt barn is always open for the ravens to access (Fig. 5).

In early May, a State of Emergency was declared due to historically high water levels in Lake Ontario. The Sodus NYSDOT facility was re-opened due to the emergency and became the headquarters for the Army Reserve sandbag-making operation. On 4 May 2017 the raven nest was discovered in the roofing frame of the salt barn. The Sodus salt barn nest was precariously built, wedged between cross beams of the barn's frame (Figs. 5 & 6). Five chicks were observed in the nest during feedings.

The adult ravens appeared to actively forage along the railroad corridor immediately adjacent to the NYSDOT property. After a food drop for the nestlings, one of the adults would often fly over the rail corridor and return to the nest within a few minutes with another food item, while the other adult was still visibly perched on a nearby telephone pole. This was observed several times over the nestling stage. On 26 May, the adult ravens started to leave food on the floor within the barn instead of bringing it to the nest.

The first chick observed to fledge the nest was recorded on 2 Jun. A second chick fledged on 3 Jun. Shortly after the second chick fledged, the nest fell down. Two other birds that were still in the nest managed to fly off without obvious injury. The fifth chick was not seen on the nest after 1 Jun but was observed outside of the salt barn and is presumed to have fledged prior to 2 Jun.

The NYSDOT work crews kept an eye out for the young as they left the nest and avoided any harmful interactions. The pair managed to raise and fledge five chicks despite the intensive amount of human activity associated with the sandbagging operation that occurred in close proximity to the salt barn and surrounding buildings.

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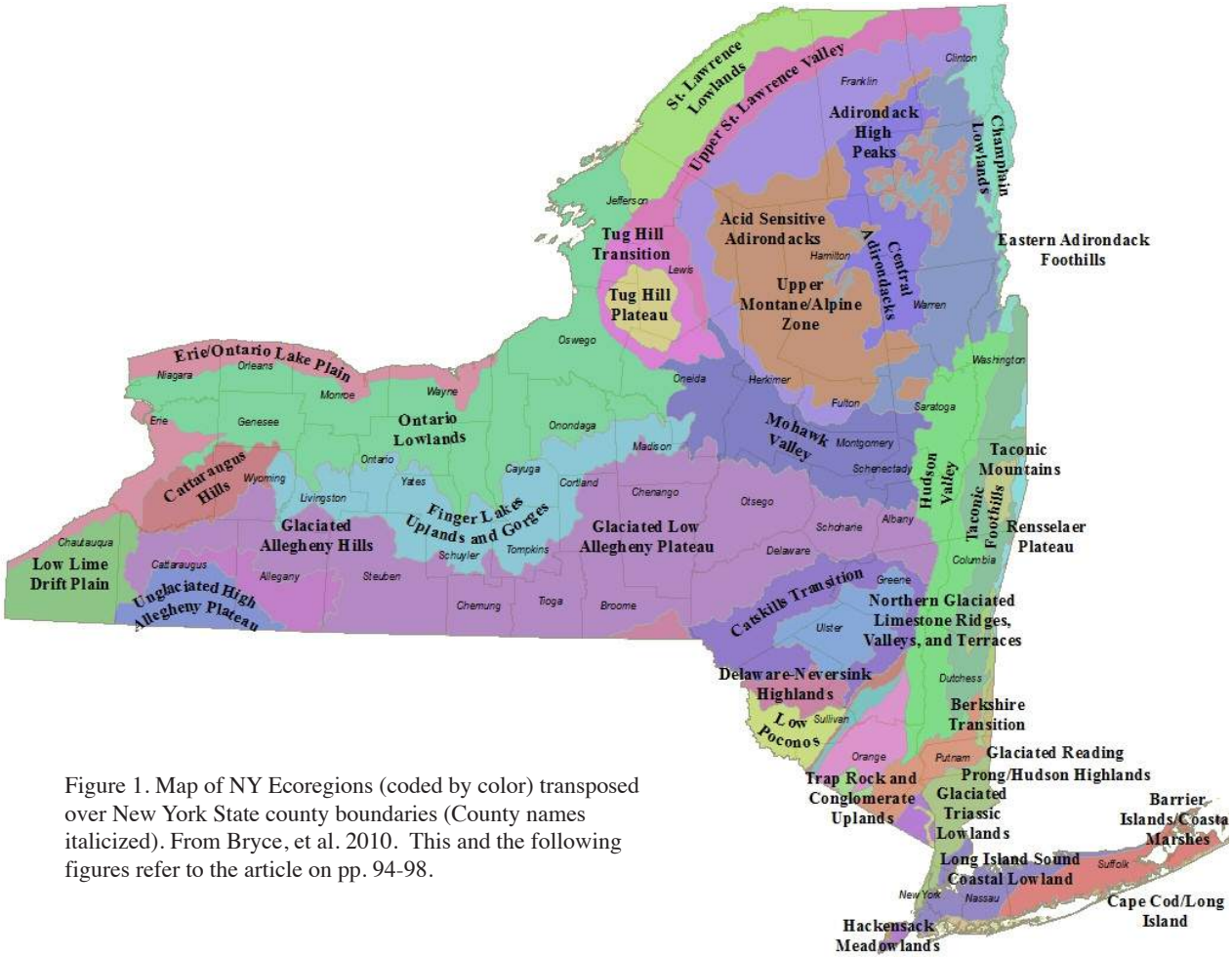

Figure 1. Map of NY Ecoregions (coded by color) transposed over New York State county boundaries (County names italicized). From Bryce, et al. 2010. This and the following figures refer to the article on pp. 94-98.

Figures 2 & 3. Bethlehem Steel nest site, Lackawanna, NY, April 2017. Photos courtesy of NYSDEC.

Figure 4: Railroad bridge over the Erie Canal in Pittsford, NY. Photo courtesy of Sarah Piecuch, NYSDOT.

Figure 5 (Top): Common Raven nest inside NYSDOT Salt Barn. Sodus, NY, 23 May 2017. View from approximately 500 feet away. Photo: Sarah Piecuch, NYSDOT.
Figure 6 (Bottom): Juvenile Common Ravens getting ready to fledge, 2 June 2017. Photo courtesy of Scott Robinson, NYSDOT.

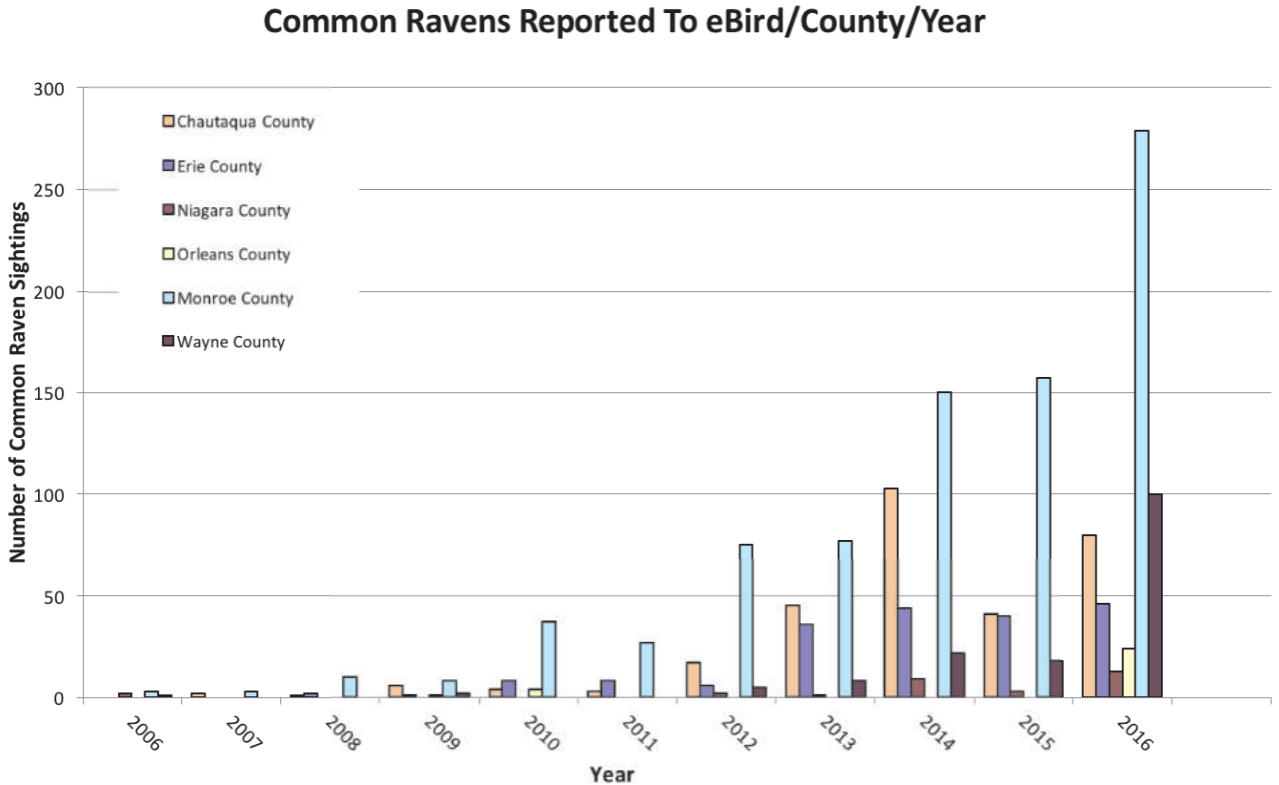

Figure 7. Number of Common Raven sightings reported to the eBird database for the Erie/Ontario Lake Plain counties from 2006-2016 (eBird Basic Dataset).