# The Natural Recolonization of Long Island, New York by the North American River Otter (*Lontra canadensis*)

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River otters photographed on the Nissequogue River. The one on the right is "periscoping," a behavior characteristic of this semi-aquatic species. (Joe Kelly photo)

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This report is dedicated to John de Cuevas

(October 6, 1930 – November 29, 2018)

An ardent and thoughtful conservationist who supported and encouraged

several generations of farmers and environmentalists on eastern Long Island.

It was an honor to know him as a friend, neighbor and colleague.

#### ABSTRACT

In 2018, an otter latrine survey was conducted to determine changes, if any, in the distribution of river otters (Lontra canadensis) on Long Island, New York, in the decade since the previous survey was completed in 2008, when the natural recolonization of the island by otters was first documented. The 2018 survey documented 77 otter latrines in 26 subwatersheds, up from 22 latrines found in seven subwatersheds in 2008. Seven of the new sites documented in 2018 were also surveyed several times in 2008, with no sign noted in 2008, providing additional evidence that Long Island's river otter population has expanded over the decade 2008 - 2018. The 2018 survey project included hosting a series of public workshops designed to train interested volunteers to assist in the fieldwork. Volunteers were instrumental in documenting nine of the new latrine sites representing six new subwatersheds. Using the latrine locations in 2008 and 2018 and the lower estimate of otters' linear home range size in coastal areas (20 km based on the published 20 – 40 linear km range), maps of otters' range on Long Island were approximated for 2008 and 2018. Otters have now occupied most of the island's north shore east of New York City and a significant portion of the Peconic River and Peconic Estuary on the east end. Although otters have expanded their range on Long Island between 2008 and 2018, no otter sign was found on the island's south shore watersheds, where much suitable habitat exists.

#### INTRODUCTION

The river otter (*Lontra canadensis*) once inhabited the rivers, lakes and estuaries throughout North America. Several factors (unregulated trapping, water pollution and habitat loss) caused a dramatic decline in otter populations in many areas and local extirpations in others, including Long Island, New York. We have no detailed description of the distribution of otters on the island at the time of its settlement by English and Dutch colonists in the 1600s, other than a brief mention that they were here (Denton, 1670). By the early 1800s, they were considered extirpated from Long Island (DeKay, 1842) and by 1900 they were considered extirpated from most of New York State outside of the Adirondacks (New York State Department of Environmental Conservation (a), undated).

Conservation laws enacted in the early 1900s enabled remnant otter populations to expand and re-colonize former habitat, and otter reintroduction programs helped accelerate that process. In New York State, a moratorium was placed on hunting and trapping otters for nine years (1936-1945). By the mid 1990s, although its status was secure in New York State as a whole, the otter was still missing from a large area of former range in west-central New York, and its status on Long Island was unknown (New York State Department of Environmental Conservation, 2005). Although they were slowly recolonizing west-central New York from healthy populations in the Adirondacks and Catskills, a reintroduction project (the New York State River Otter Project) was established in 1995 to accelerate this process by several decades. Over the years 1995 – 2000, 279 otters trapped elsewhere in the state were released at sites in west-central New York (Fig. 1). Initial monitoring results indicate that the project was a success (American Museum of Natural History, undated).



Figure 1. Estimated changes in the distribution of otters in New York State from 1900 - 2000. The black dots represent approximate release areas of 279 relocated otters over the years 1995 - 2000 (NYSDEC (a), undated).

The last survey of river otters on Long Island was done by Paul Connor as part of a general survey of Long Island's mammals over the years 1960-1963. No otters or otter sign were encountered at that time, although in his report Connor noted, "Many otter reports, especially certain recent ones and those from western Long Island, can perhaps best be explained as individuals which have come across Long Island Sound from Connecticut, where the species has been increasing in numbers." (Connor, 1971).

A semi-aquatic mammal and excellent swimmer capable of making long, open water crossings, river otters generally forage in shallow water and do not venture far offshore. A radio-telemetry study in Alaska documented maximum open water crossings of 6.5 km (4 miles) in length (Blundell et. al., 2002). This greatly limits their potential to disperse from nearby established populations on the mainland and reach suitable habitat on Long Island.

Since Connor's survey, there have been occasional sightings of otters on Long Island and several reports of them being killed by motor vehicles and accidentally caught in trap gear. This information was collected from wildlife agency staff, park managers, local naturalists, and nuisance trappers, and compiled in anticipation of initiating the first island-wide survey to determine the status and distribution of otters on Long Island.

Using topographic and aerial maps, 143 potential otter latrine sites were surveyed in the field during the winter (January - March) of 2008. Twenty-four otter latrine sites were documented and mapped. All were located adjacent to freshwater. These sites were revisited several times later in the year to ensure that each was a maintained latrine reflecting an established home range, and not a single use latrine created by a transient otter while dispersing and in search of a suitable site to establish a home range (Bottini, 2009). Two sites did not meet this criterion and were not included in a map of otters' 2008 home ranges (Fig. 3).

The 2008 study revealed that otter latrines were mainly clustered on the north shore of eastern Nassau County, where the largest latrine was located, and western Suffolk County. These sites were the closest suitable sites to the potential Long Island Sound crossing area (Fig. 2). There was an additional cluster approximately 40 miles to the east. It was speculated that the eastern sites may have been occupied by otters that reached eastern Long Island by way of the archipelago of islands extending southwest from Connecticut to Orient Point, including Fishers Island, Great and Little Gull Islands, and Plum Island (Bottini, 2009). This route has an open water crossing of 7.25 km (4.5 miles), which is very close to the published maximum open water crossing (6.5 km) listed for *Lontra canadensis* (Blundell et. al., 2002).

A subsequent remote camera study revealed that the eastern Long Island latrines were part of a home range occupied by a single otter, while the western latrines were visited regularly by groups of two to three otters. A 2013 survey of Fishers Island found that all available otter habitat on that small (10.6 square km) island was being utilized by otters, providing some evidence that the archipelago of islands (Fishers, Little Gull, Great Gull, Plum) may provide another conduit for recruitment of otters to Long Island (Bottini, 2013).

### STUDY AREA

Long Island is located in the southeastern corner of New York State, stretching 190 km (118 miles) between New York Harbor at its western end and Montauk Point at its easternmost tip, and has a maximum width of 37 km (23 miles). It borders Long Island Sound to the north and the Atlantic Ocean to the south. At 3,630 km<sup>2</sup> (1,401 square miles) in size, it is the largest island in the contiguous United States.

The island's coastline includes many bays and tidal creeks totaling several thousand linear miles of shoreline. These tidewaters are linked, as one moves inland, to freshwater creeks, ponds, marshes and swamps, including the island's five major rivers: the Nissequogue River (flowing north into Long Island Sound), the Carll's River, Carmans River and Connetquot River (all flowing south into the Great South Bay), and the island's longest river, the Peconic River (flowing east into Peconic Bay). These waters and associated wetlands provide excellent habitat and abundant fish, crayfish and crab prey for river otters.



Figure 2. Map of the study area showing potential crossing location for otters dispersing from the mainland to L.I.

The island's north shore has nine major bays that are all located on the western half of the island, and several long stretches (up to 13 km or 8 miles) of steep bluffs uninterrupted by tidal creeks or bays on the eastern half. The western two-thirds of the island's south shore borders a series of shallow bays that, in turn, are separated from the Atlantic Ocean by barrier beach islands. The eastern third of the island is dominated by a shallow estuary (the Peconic Estuary) punctuated with small islands and flanked on the north and south by narrow isthmuses called the North and South Forks.

Long Island is a very fragmented landscape. Its western third includes two urbanized boroughs of New York City (Brooklyn and Queens) and the intensely developed suburbs of Nassau and western Suffolk Counties, with little protected open space. This combination of factors – being an island and having dense development where it is closest to the mainland – poses a significant challenge for many terrestrial and semi-aquatic wildlife species that might otherwise naturally recolonize the island from robust populations elsewhere.

# **METHODS**

River otters are elusive, difficult to observe in the wild, and have large home ranges, making them difficult to census. The most commonly used census techniques for river otters are trapper surveys and harvest records, track surveys and latrine surveys. Since trapping otters is prohibited on Long Island, trapper surveys and harvest records are not feasible. Reliable track surveys depend on consistent snow cover, which Long Island lacks. Therefore, latrine surveys were chosen as the method to census for the presence or absence of otters on Long Island.

Otter latrines are sites where otters leave their scent and visible sign in the form of scat and small areas cleared of leaf litter called scrapes. They occasionally leave a clear or yellow-white, jelly-like, anal secretion. Otter latrine sites have the following physical characteristics that are helpful in focusing survey effort:

1) They are located within a few meters of the shoreline;

2) They are often located on points of land that jut into a waterway, at the confluence of tributary streams, and on small islands (Swimley et. al., 1998);

3) They are often located where otters must exit the water to get around a dam or other obstacle, and where otters exit one waterbody to travel overland to reach another, the exit point being on the shortest overland distance between the two waterbodies (Kulish, 1969);

4) Over time, otter scraping and rolling behavior at latrine sites denudes the vegetation, leaving an obvious scar that is often visible from quite a distance.

Areas selected for field surveys were determined based on the following:

1) latrine sites documented in the 2008 survey;

2) sites determined to have excellent latrine characteristics during the 2008 survey, but did not have otter sign at that time; and

3) roadkill, sighting and photographic evidence of otters (scat, tracks and live otters) obtained since the 2008 survey from park managers, field biologists, nuisance trappers, local naturalists and the general public.

With regard to the latter areas, in order to best focus survey effort and save time, aerial photographs and topographic maps were reviewed to pinpoint nearby potential latrine sites based on the latrine characteristics described above.

Field surveys for evidence of otter latrine sign were conducted from January 18, 2018, through January 16, 2019, during every month with the exception of August and September. Surveys were done by foot and kayak. A series of seven otter survey training workshops was held across Long Island during the spring and fall, and attended by a total of 66 volunteers. Survey reports from volunteers indicating presence of otters were verified with photographs or by field inspection by a qualified biologist.

All sites surveyed, both those having otter sign and those not having any sign, were identified and referenced with UTM coordinates using a Garmin GPS map76Cx unit. Site vegetation, number of scrapes, approximate number of scats, maximum distance of scat from water, and whether the water was fresh, salt or brackish, were also described on survey forms. Sites having otter sign were visited at least twice during the year to eliminate the possibility of including latrines made by transient otters that did not represent an established home range.

Based on the minimum home range size published for otters in coastal habitats (20 linear km of shoreline), their approximate range on Long Island was extrapolated from latrine points and mapped.

# RESULTS

172 potential latrine sites were surveyed between 1/18/2018 and 1/16/2019. Several sites, particularly dams, had more than one distinct latrine noted, but these were counted as one latrine site. 77 of the sites (45%) had otter sign. Sixty-six volunteers participated in seven otter survey workshops held in the field at various sites on Long Island and were instrumental in

documenting nine of the 77 (12%) new otter latrine sites in 2018. 54 (70%) latrines were found adjacent to freshwater, 13 (17%) were found on dams separating freshwater from tidal (brackish) water, and 10 (13%) were found adjacent to brackish water.

The number of latrines documented on the western half of the island more than doubled between 2008 and 2018 (from 10 to 23), and were found in six discrete subwatersheds, up from three in 2008. The eastern half of the island showed a more dramatic increase in the number of latrine sites (from 12 in 2008 to 54 in 2018) and a five-fold increase in the number of discrete subwatersheds occupied (from 4 to 20).



Figure 3. Location and number of otter latrines at each location, and estimated distribution of otters on Long Island, N.Y. in 2008. [Note: \* represents transient otter latrine]



Figure 4. Location and number of otter latrines at each location, and estimated distribution of otters on Long Island, N.Y. in 2018.

The size of the largest latrines increased between 2008 and 2018 from a maximum of 30 scats to a maximum of 80 scats. Only one site had 30 scats in 2008, while in 2018 there were four sites with 30 or more individual scats. The largest latrines also shifted from western Long Island to eastern Long Island.

|  | 2008         | 2018         |
|--|--------------|--------------|
| # of sites surveyed                                  | 143          | 172          |
| # of latrine sites                                   | 22           | 77           |
| # of subwatersheds with latrines                     | 7            | 26           |
| Size of largest 3 latrines (# scats)                 | 15 - 26 - 30 | 54 - 69 - 80 |
| Latrines adjacent to freshwater                      | 21 (95%)     | 54 (70%)     |
| Latrines adjacent to brackish water                  | 0            | 10 (13%)     |
| Latrines on dams separating fresh and brackish water | 1 (5%)       | 13 (17%)     |
| Latrines on western Long Island                      | 10 (45%)     | 23 (30%)     |
| Latrines on eastern Long Island                      | 12 (55%)     | 54 (70%)     |

Table 1. Comparisons of 2008 and 2018 survey results.

Seven sites representing seven discreet subwatersheds that had been surveyed several times each in 2008 with no otter sign noted, had otter scat in 2018.

Comparing the results from 2008 with that of 2018, the sizeable increase in the number of latrine sites, the number of subwatersheds occupied, and the number of scats noted, along with the seven sites surveyed in 2008 that did not have otter sign but did have otter sign in 2018, are all evidence that the Long Island river otter population has increased and expanded its distribution over the past decade.

Extrapolating minimum home range sizes for river otters in coastal areas (20 linear km of shoreline) from latrine points, it appears that all suitable otter habitat on Long Island's north shore east of New York City (the borough of Queens) is occupied by otters. The Peconic River and portions of the Peconic Estuary on eastern Long Island are also occupied by otters. Much suitable habitat along the island's south shore and on the south fork remain unoccupied by otters.

# DISCUSSION

Despite a number of formidable obstacles, including the island's highly fragmented and developed landscape, and its high potential for mortality from motor vehicle collisions, otters have shown a great degree of adaptability and resilience in recolonizing Long Island. Since their foothold on the north shores of Nassau County and western Suffolk documented in 2008, otters have recolonized most of the suitable habitat on Long Island's north shore and approximately half of the suitable habitat in the Peconic Estuary on the east end. They have also exhibited a remarkable ability to locate and colonize small, isolated ponds and freshwater marshes separated from other otter-occupied watersheds by major roads and intensely developed landscapes.

The apparent eastward shift in the otter's distribution on Long Island, as evident in the locations and sizes (number of estimated scats) of latrines in 2008 as compared to 2018, may be a function of the less developed landscape on the island's east end.

The study found a disproportionate number of latrine sites adjacent to freshwater as compared to the much more abundant brackish creeks and bays where abundant food resources are found. This may reflect the fact that tidal influence on the latter in Long Island's relatively flat landscape significantly restricts the number of suitable upland areas within close proximity (<4 m) of permanent water. At low tide, the upland area is often well beyond the otter latrine's average one to three meter distance from the water's edge. No otter latrines were found in the intertidal zone.

Dams accounted for 17% of the latrine sites. Only one of the fifteen dams had a paved road on top of it, and that road was part of a park complex and only open to authorized park vehicles. All the other dams were earthen berms. No latrine sites were found on dams with public roads traversing them.

Workshops to train interested citizens to assist in the survey effort were successful. Trainees are also interested in monitoring potential otter latrine sites in areas currently not occupied by otters, and their participation will be useful in tracking future expansion of the Long Island otter population. In this study as well as the 2008 survey, both natural resource staff and the general public provided valuable information that was very helpful in directing the survey effort. Workshops were also useful in educating the general public about otters through press coverage and requests for presentations about the project from schools and civic organizations.

There is no evidence of otters on the island's south shore, where much suitable habitat exists. Yet latrines mapped in 2018 near Lake Ronkonkoma in the center of Long Island are very close to (within three km of) the headwaters of one of the largest rivers on the island's south shore. It is anticipated that otters will soon establish home ranges along the south shore's estuaries and many freshwater creeks.

This study has shown that otter latrine surveys, assisted by roadkill and sighting locations, knowledge of otter latrine site characteristics, and topographic and aerial maps, are a useful and efficient tool for determining the presence and distribution of river otters. Replicated over a decade timespan, latrine surveys are also useful gauges of changes in distribution and relative population size. This methodology offers a general outlook on the status of otters in a given region, with increases in distribution an indication that the regional population is increasing, and decreases in distribution an indication that the regional population is decreasing. However, latrine surveys do not provide reliable estimates of population size to answer the most often asked question from the general public: how many otters are there on Long Island?

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I could not have done this project alone. Many people assisted in the extensive fieldwork that surveying Long Island required, and the help came in many forms: reporting sightings, otter sign, roadkills, submitting photographs and videos, and contributing "dirt time" surveying for latrines.

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They say a picture is worth a thousand words, and with that in mind I turned to Karen Leu, GIS Specialist with the Long Island Chapter of The Nature Conservancy, for help in creating several maps that best portrayed what this several thousand word document attempted to portray. Her maps did that just perfectly!

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# Otter 2018 Latrine Sites

|    |                                    |                 |                          |                |                       |            |          | Н                        |   |
|----|------------------------------------|-----------------|--------------------------|----------------|-----------------------|------------|----------|--------------------------|---|
| 1  | SITE                               | ESTUARY         | WATERSHED                | TOWN           | UTM COORDINATES       | DATE       | SURVEYOR | R OTTER SIGN             | FIELD NOTES   |
| 2  | Frank Melville Park dam            | LI Sound        | Conscience Bay-Port Jeff | Brookhaven     | 18T 0658552 4534584   | 1/23/2018  | MB       | Scat (1) & trail         | Otter photos by KW and MB.  |
| 3  | Staudingers Pond (length of dam)   | Peconic Estuary | Northwest Harbor         | East Hampton   | 18T 0730835 4541600 + | 1/20/2018  | MB       | SCAT (69) & scrapes      | Several latrines (up to 5) along dam; first used 10/2015.             |
| 4  | Scoy Pond N. side access           | Peconic Estuary | Northwest Harbor         | East Hampton   | 18T 0732903 4545203   | 2/27/2018  | MB       | SCAT (5) & scrape        |   |
| 5  | Barnes Meadow (bay-lagoon x-over)  | Peconic Estuary | Northwest Harbor         | East Hampton   | 18T 0731657 4544152   | 2/27/2018  | MB       | SCAT (3)                 | Top of steep embankment; no trail noted.                              |
| 6  | Scoy Pond south side point         | Peconic Estuary | Northwest Harbor         | East Hampton   | 18T 0732990 4545107   | 2/27/2018  | MB       | SCAT (1) & scrape        | Follow faint path to pond.  |
| 7  | St. Johns Pond: W side #2          | LI Sound        | Cold Spring Harbor       | Huntington     | 18T 0629613 4523736   | 4/29/2018  | KDikun   | SCAT (6+) & scrapes.     |   |
| 8  | St. Johns Pond: dam                | LI Sound        | Cold Spring Harbor       | Huntington     | 18T 0629571 4524063 + | 12/29/2018 | MB       | SCAT (54)& scrapes/jelly | Several latrines (up to 3); all E of spillway.                        |
| 9  | St. Johns Pond: W side #1          | LI Sound        | Cold Spring Harbor       | Huntington     | 18T 0629590 4523748   | 4/29/2018  | KDikun   | SCAT (3)                 | Goose nest nearby.  |
| 10 | St. Johns Pond: W side #3          | LI Sound        | Cold Spring Harbor       | Huntington     | 18T 0629615 4523704   | 4/29/2018  | KDikun   | SCAT (1)                 |   |
| 11 | Fuchs Pond Preserve: N. Pond       | LI Sound        | Crab Meadow              | Huntington     | 18T 0640536 4530825   | 5/30/2018  | MB       | SCATS (5) & scrapes      | Berm between pond and brook.  |
| 12 | Fuchs Pond Preserve: S. Pond       | LI Sound        | Crab Meadow              | Huntington     | 18T 0640468 4530663   | 5/30/2018  | MB       | SCATS (3) & scrapes      | Series of FW ponds and marsh.   |
| 13 | Makamah Preserve: dam              | LI Sound        | Crab Meadow              | Huntington     | 18T 0642081 4530839   | 5/29/2018  | MB       | SCATS (2) & scrape       | N side of dam near culvert.   |
| 14 | Makamah Park Preserve              | LI Sound        | Crab Meadow              | Huntington     | 18T 0642042 4531072   | 5/29/2018  | MB       | SCAT (1) & couch         | 1.3m diam. area 6m from marsh @ edge of forest.                       |
| 15 | Nissequogue headwater: sump        | LI Sound        | Nissequogue River        | Islip          | 18T 0650342 4520638   | 12/29/2018 | MB       | SCAT (3) &trail&scrapes  | Pond side of cyclone fencing; N end.                                  |
| 16 | Nissequogue headwaters: tar road   | LI Sound        | Nissequogue River        | Islip          | 18T 0650148 4520067   | 12/29/2018 | MB       | SCAT (1) & scrape        | On E (pond) side of roadbed.  |
| 17 | Lower Francis Pond: Pt S of outlet | LI Sound        | Oyster Bay Harbor        | Oyster Bay     | 18T 0620781 4525502   | 12/28/2018 | MB       | SCAT (2) & scrapes       | Downstream of both dams.  |
| 18 | Pond S. of Upper Francis           | LI Sound        | Oyster Bay Harbor        | Oyster Bay     | 18T 0620612 4524995   | 3/31/2018  | MB       | SCAT (<6) & scrapes      |   |
| 19 | Upper Francis Pond (W. shore)      | LI Sound        | Oyster Bay Harbor        | Oyster Bay     | 18T 0620719 4525092   | 3/31/2018  | MB       | SCAT (<6) & scrapes      | Largest latrine on L.I. in 2008 survey; not used as much since.       |
| 20 | Beaverdam Lake (rink point)        | LI Sound        | Oyster Bay Harbor        | Oyster Bay     | 18T 0620834 4526785   | 3/31/2018  | MB       | SCAT (<3)                |   |
| 21 | Upper Francis Pond dam             | LI Sound        | Oyster Bay Harbor        | Oyster Bay     | 18T 0620806 4525348   | 3/31/2018  | MB       | SCAT (<3)                |   |
| 22 | Baiting Hollow BSA Pond: S end     | LI Sound        | Baiting Hollow           | Riverhead      | 18T 0687647 4536655   | 3/18/2018  | MB       | SCAT (5)                 | Grass area near wooden bulkhead and ramp.                             |
| 23 | Baiting Hollow BSA Pond: east side | LI Sound        | Baiting Hollow           | Riverhead      | 18T 0687675 4536724   | 3/18/2018  | MB       | SCAT (4)                 | Adjacent to bulkhead near swim area.                                  |
| 24 | Baiting Hollow BSA Pond: dam       | LI Sound        | Baiting Hollow           | Riverhead      | 18T 0687574 4536926 + | 3/18/2018  | MB       | SCAT (16)                | Several latrines along dam.   |
| 25 | Swan Lake: SW Shore: spillway      | Peconic Estuary | Peconic River            | Riverhead      | 18T 0685674 4530000   | 3/15/2018  | MB       | SCATS (2) & scrape       | Near concrete water control structure; other latrines along berm/dam. |
| 26 | Osborn Ave: E side pond; W corner  | Peconic Estuary | Peconic River            | Riverhead      | 18T 0694255 4533694   | 4/17/2018  | MB       | SCAT (9) & scrape        | 15m from Osborn Ave.; exit to West Pond?                              |
| 27 | Peconic River: Forge Pond          | Peconic Estuary | Peconic River            | Riverhead      | 18T 0690860 4530948   | 5/6/2018   | MB       | SCAT (8) & scrapes       | Long (8m) latrine area.   |
| 28 | Osborn Ave: W side N. pond Knoll   | Peconic Estuary | Peconic River            | Riverhead      | 18T 0694255 4533525   | 4/17/2018  | MB       | SCAT (8)                 | High steep-sided pitch pine knoll.                                    |
| 29 | Osborn Ave: E side pond; SE corner | Peconic Estuary | Peconic River            | Riverhead      | 18T 0694431 4533690   | 4/17/2018  | MB       | SCAT (6) & scrape        |   |
| 30 | Osborn Ave: W side N pond S end    | Peconic Estuary | Peconic River            | Riverhead      | 18T 0694314 4533520   | 4/17/2018  | MB       | SCAT (6)                 | Very low area; swale leads to pond to S; xing area?                   |
| 31 | Osborn Ave: W side N pond N end    | Peconic Estuary | Peconic River            | Riverhead      | 18T 0694191 4533556   | 4/17/2018  | MB       | SCAT (3) fresh           | Slight point at north end within view of house.                       |
| 32 | Osborn Ave: E side pond; NW corner | Peconic Estuary | Peconic River            | Riverhead      | 18T 0694260 4533729   | 4/17/2018  | MB       | SCAT (3)                 |   |
| 33 | Osborn Ave: E side pond; NE corner | Peconic Estuary | Peconic River            | Riverhead      | 18T 0694380 4533751   | 4/17/2018  | MB       | SCAT (2)                 |   |
| 34 | Peconic River: Browns Bog          | Peconic Estuary | Peconic River            | Riverhead      | 18T 0689321 4530335   | 5/6/2018   | MB       | SCAT (16) & scrapes      | On berm near Peconic Herb Farm.                                       |
| 35 | Wading River Pond (length of dam)  | LI Sound        | Wading River             | Riverhead      | 18T 0680534 4536020 + | 3/15/2018  | MB       | SCAT (80)                | Several latrines along dam; private property.                         |
| 36 | Kempf TNC Preserve                 | LI Sound        | Wading River             | Riverhead      | 18T 0680402 4536372   | 5/1/2018   | MB       | SCAT (2) & scrapes       | Off W loop trail.   |
| 37 | Plum Pond, Mashomack               | Peconic Estuary | Shelter Island Sound     | Shelter Island | 18T 0728397 4547754   | 2/28/2018  | MB       | SCAT (2) & scrapes       | north shore.  |
| 38 | Log Cabin Creek, Mashomack         | Peconic Estuary | Shelter Island Sound     | Shelter Island | 18T 0726803 4547645   | 12/4/2018  | MB       | SCAT (2) & scrapes       | Point E of observation blind.   |
| 39 | Bass Creek, Mashomack              | Peconic Estuary | Shelter Island Sound     | Shelter Island | 18T 0727662 4547483   | 12/4/2018  | MB       | SCAT (2)                 | Scat was on top of storm debris at marsh edge of faint road.          |
| 40 | Sanctuary Pond, Mashomack          | Peconic Estuary | Shelter Island Sound     | Shelter Island | 18T 0727240 4547504   | 12/4/2018  | MB       | SCAT (2)                 | trail to point on SW. side of pond.                                   |
| 41 | Lily Pond CP: N site               | N/A             | Lake Ronkonkoma          | Smithtown      | 18T 0657830 4522409   | 12/29/2018 | MB       | SCAT (8) & scrapes       | Scat noted near here winter 2015/2016.                                |
| 42 | Lily Pond CP: N end of maze        | N/A             | Lake Ronkonkoma          | Smithtown      | 18T 0657762 4522111   | 12/29/2018 | MB       | SCAT (2)                 | New site  |
| 43 | Sunken Meadow S. P. south bridge   | LI Sound        | Nissequogue River        | Smithtown      | 18T 0645451 4529703   | 1/23/2018  | MB       | SCAT (3) & scrapes       |   |
| 44 | Stump Pond point north of inlet    | LI Sound        | Nissequogue River        | Smithtown      | 18T 0649795 4521325   | 4/21/2018  | MB       | SCAT (3) & scrapes       |   |

| 45 | Bill Richards Town Park: spillway   | LI Sound        | Nissequogue River    | Smithtown   | 18T 0649959 4521078 | 3/15/2018  | MB    | SCAT (2)                  | park cleared vegetation at another 2008 latrine site.             |
|----|-------------------------------------|-----------------|----------------------|-------------|---------------------|------------|-------|---------------------------|---|
| 46 | Sunken Meadow S. P. footbridge pt.  | LI Sound        | Nissequogue River    | Smithtown   | 18T 0647254 4530093 | 1/23/2018  | MB    | SCAT (10) & scrapes       | red cedar grove on pt W. of pedestrian bridge (N. side of water). |
| 47 | Sunken Meadow S. P. north bridge    | LI Sound        | Nissequogue River    | Smithtown   | 18T 0645616 4529871 | 1/23/2018  | MB    | SCAT (10)                 |   |
| 48 | Hubbard Creek CP: Mill Creek dam    | Peconic Estuary | Peconic Bay          | Southampton | 18T 0703877 4530198 | 3/18/2018  | MB    | SCAT (4) & scrapes        | Also 4/28/2018 scat (10) & jelly.                                 |
| 49 | FW pond S of 24 & W of 105          | Peconic Estuary | Peconic River        | Southampton | 18T 0698559 4530968 | 1/9/2019   | MB    | SCAT (1) & scrapes        | Access via overgrown road from 105 to SE shore.                   |
| 50 | Red Cedar Pt. Rd. TNC Preserve dam  | Peconic Estuary | Red Creek Pond       | Southampton | 18T 0705638 4531650 | 3/18/2018  | MB    | SCAT (1)                  | checked berm /dam separating salt marsh from FW.                  |
| 51 | Little Long Pond: SE corner         | Peconic Estuary | Sag Harbor Coves     | Southampton | 18T 0727559 4539532 | 6/14/2018  | MB    | SCAT (7) & scrapes        | On faint path to pond from hiking trail.                          |
| 52 | Long Pond: SW corner                | Peconic Estuary | Sag Harbor Coves     | Southampton | 18T 0727508 4539220 | 6/14/2018  | MB    | SCAT (5) & scrapes        | On faint path to pond from hiking trail.                          |
| 53 | Long Pond: west side                | Peconic Estuary | Sag Harbor Coves     | Southampton | 18T 0727749 4539443 | 6/14/2018  | MB    | SCAT (3) & rolls in sand  | Noted 6/8/2018 by CV.   |
| 54 | Long Pond: access at SE corner      | Peconic Estuary | Sag Harbor Coves     | Southampton | 18T 0727851 4539115 | 6/14/2018  | MB    | SCAT (1) & scrapes        | Access @ trail from powerline.                                    |
| 55 | Long Pond: E. side/is. near cypress | Peconic Estuary | Sag Harbor Coves     | Southampton | 18T 0728015 4539370 | 10/20/2018 | MB    | SCAT (1)                  | Access by kayak.  |
| 56 | Long Pond: SE corner hummock        | Peconic Estuary | Sag Harbor Coves     | Southampton | 18T 0727920 4539253 | 10/20/2018 | MB    | SCAT (1)                  | Access by kayak.  |
| 57 | Long Pond: SW cove pt.              | Peconic Estuary | Sag Harbor Coves     | Southampton | 18T 0727625 4539317 | 10/20/2018 | MB    | SCAT (1)                  |   |
| 58 | Sage Blvd.: edge of cove            | Peconic Estuary | Brickyard Cove       | Southold    | 18T 0719264 4551195 | 11/24/2018 | MB    | SCAT (1) & scrape         | Game trail from cove to road.                                     |
| 59 | Wickham Creek: SW corner            | Peconic Estuary | Cutchogue Harbor     | Southold    | 18T 0712536 4541966 | 1/16/2019  | MW&JM | SCAT (4) & trail          | On dike near culvert.   |
| 60 | Orient Beach S.P.: Little Bay dam   | Peconic Estuary | Hallock Bay          | Southold    | 18T 0730965 4558849 | 4/7/2018   | MB    | SCAT & scrapes            | dike at north end of Little Bay.                                  |
| 61 | Narrow River dam: culvert           | Peconic Estuary | Hallock Bay          | Southold    | 18T 0728192 4558672 | 11/11/2018 | MB    | SCAT (8) & trail          | Berm with culvert across river; 1st noted 9/2015 by Byron Young.  |
| 62 | Narrow River berm: N-S section      | Peconic Estuary | Hallock Bay          | Southold    | 18T 0728231 4558578 | 11/11/2018 | MB    | SCAT (3) & scrapes        | N-S berm section; x-over from W side marsh to ditch on E side.    |
| 63 | Laurel Lake: SE Pt.                 | N/A             | N/A                  | Southold    | 18T 0705675 4539256 | 11/14/2018 | MB    | SCAT (8) & scrapes; trail | Wooded knoll on point.  |
| 64 | Arshamomaque Preserve: Couch        | Peconic Estuary | Pipes Cove           | Southold    | 18T 0718911 4552155 | 6/9/2018   | MB    | SCAT (lots)               | Resting areas (4) in cattail; flushed 2 otters here 6/3/2015.     |
| 65 | Sill Property Pond                  | Peconic Estuary | Pipes Cove           | Southold    | 18T 0719653 4552288 | 5/5/2018   | MB    | SCAT (9)                  | east side of pond.  |
| 66 | Moores Dreen outlet: large hummock  | Peconic Estuary | Pipes Cove           | Southold    | 18T 0719899 4552147 | 5/5/2018   | MB    | SCAT (6) & scrapes        | adjacent to tidal embayment; accessed by kayak.                   |
| 67 | Sage Blvd.: pond's S berm, E end.   | Peconic Estuary | Pipes Cove           | Southold    | 18T 0719285 4551232 | 11/14/2018 | MB    | SCAT (5) & scrapes/slide  | 3m wide berm separating 2 linear FW ponds,                        |
| 68 | Sage Blvd.: pond's S berm, W end.   | Peconic Estuary | Pipes Cove           | Southold    | 18T 0719238 4551259 | 11/17/2018 | MB    | SCAT (4) & trail          | Berm between small and larger linear ponds.                       |
| 69 | Sage Blvd.: N side of pond @ W end  | Peconic Estuary | Pipes Cove           | Southold    | 18T 0719181 4551312 | 11/17/2018 | MB    | SCAT (35) & scrapes       | Steep-sided berm between pond and marsh.                          |
| 70 | Sage Blvd.: Abandoned RR spur       | Peconic Estuary | Pipes Cove           | Southold    | 18T 0719253 4551396 | 11/17/2018 | MB    | SCAT (3) & trail          | X-over culvert/RR embankment from FW marsh to salt marsh.         |
| 71 | Sage Blvd.: S. shore of small pond  | Peconic Estuary | Pipes Cove           | Southold    | 18T 0719269 4551209 | 11/24/2018 | MB    | SCAT (3) & scrape         | x-over: cove to FW.   |
| 72 | Arshamomaque Preserve: Red Maple    | Peconic Estuary | Pipes Cove           | Southold    | 18T 0718980 4552181 | 5/5/2018   | MB    | SCAT (20) & scrapes (5)   | Under large red maple in SE corner of pond.                       |
| 73 | Moores Dreen: below Moores Lane     | Peconic Estuary | Pipes Cove           | Southold    | 18T 0720236 4553732 | 11/24/2018 | MB    | SCAT (2)                  | Very atypical site.   |
| 74 | Sage Blvd.: N side of pond          | Peconic Estuary | Pipes Cove           | Southold    | 18T 0719246 4551304 | 11/17/2018 | MB    | SCAT (16) & scrapes       |   |
| 75 | Arshamomaque Preserve KNOLL         | Peconic Estuary | Pipes Cove           | Southold    | 18T 0718921 4552173 | 5/5/2018   | MB    | SCAT (14) & scrapes       |   |
| 76 | Moores Dreen: 200m N of 25          | Peconic Estuary | Pipes Cove           | Southold    | 18T 0719864 4552911 | 5/5/2018   | MB    | SCAT (10) & scrapes (8)   | Skipper Horton Park and dreen north of Rte. 25                    |
| 77 | Clay Pit Pond: x-over to lagoon     | Peconic Estuary | Shelter Island Sound | Southold    | 18T 0718721 4551059 | 11/14/2018 | MB    | SCAT (6) & scrapes        | Near lagoon at west end of pond.                                  |
| 78 | Clay Pit Pond: outlet               | Peconic Estuary | Shelter Island Sound | Southold    | 18T 0718697 4551007 | 11/14/2018 | MB    | SCAT (3) & scrapes        | Outlet is at west end of pond close to LIRR tracks.               |