

Determining Local and Broad-scale Movements of Peregrine Falcons (*Falco peregrinus*) from New Hampshire



Solar-powered transmitter on Fall Mtn. female Peregrine (left) by Dustin Riordan; Rattlesnake Mtn. Peregrine soars near Groton Wind Farm (right) by Chris Martin.

Final Report to the Nuttall Ornithological Club's Blake-Nuttall Fund

August 7, 2018

Chris Martin
Audubon Society of New Hampshire
84 Silk Farm Road
Concord, NH 03301
(603) 224-9909 ext. 317
Email: cmartin@nhaudubon.org





Rattlesnake Mtn. female Peregrine flying near her nest carrying her solar-powered transmitter. Photo by Lee Hansche.

Introduction

New England's Peregrine Falcon (*Falco peregrinus*, hereafter PEFA) population has made a remarkable recovery over the last three decades from DDT-induced population lows in the 1970s and 1980s (Green et al. 2006). Once a federally-listed as endangered, this raptor was removed from the federal Threatened and Endangered (T&E) List in 1999, and downgraded from state-endangered to state-threatened on New Hampshire's T&E List in 2008. While New England's regional PEFA population is now largely recovered (Faccio et al. 2013), wildlife managers have remained concerned about collision risks associated with wind energy turbines, cell towers, and other structures, as well as possible exposure to contemporary environmental toxins such as PBDEs (Chen et al. 2008), and other environmental hazards.

Conservation biologists from New Hampshire Audubon (NHA) and the New Hampshire Fish & Game Department (NHFG) and volunteer observers annually document PEFA territoriality and productivity at breeding sites, but these observations reveal little about what these birds do beyond the breeding season and when not associated with the nest area. Capturing hatch-year juveniles is comparatively easy, but high dispersal mortality often means that few data are gathered before the birds wearing transmitter die and a relatively costly device may be lost.

Since 2013, NHA biologists have collaborated with colleagues from Biodiversity Research Institute (BRI) and Stantec Consulting, Inc. (Stantec) in a multi-year satellite telemetry project to better understand both local and broad-scale movement patterns of PEFAs nesting in rural settings near the Groton Wind Farm located in Groton, NH (DeSorbo et al. 2018, Stantec Consulting et al. 2016). We partnered to refine a method for capturing flighted adults instead of pre-fledged juveniles, resulting in a much lower mortality rate and a much improved chance of generating multiple years of location data. While recently used in Canada (LaPointe et al. 2013)

and Russia (Sokolov et al. 2014), the techniques we used to catch and fit transmitters on falcons at their nest sites had not previously been used on PEFAs in the eastern U.S. While we have developed an effective method for capturing adult females with eggs or nestlings, we are still refining our techniques in order to efficiently capture adult males at nests.

Support from the Blake-Nuttall Fund in Fall 2016 supplemented a grant and additional in-kind funds from Stantec, enabling us to expand the geographic range of our research in 2017 to include PEFA nest sites not directly associated with the Groton Wind project. In 2017 we outfitted two additional PEFAs from more urban nesting locations with 9-12-gram solar-powered satellite transmitters. Location data from this collaborative effort has resulted in better understanding of PEFA home ranges, migration routes and timing, and winter behavior of the New Hampshire breeding population.

Methods

Adult female PEFAs were captured on their nests as close to estimated hatch date as possible. BRI climbers accessed nests from rappel, and incubating females were initially flushed from the nests by climbers. To minimize risk of egg breakage or chilling, real falcon eggs were removed from nests and placed in a padded plastic case to be kept warm, while wooden imitation eggs were placed in the center of a noose gin trap (Henny et al. 2000). The trap was anchored with weights and tent stakes and covered with nesting debris. If the female did not get captured upon returning to the nest and settling on the imitation eggs (Figure 1), climber rappelled down to flush the female, at which point the bird's talons often became entangled in the monofilament nooses. Once entangled, birds were immediately hand-captured by climbers and then lowered to a ground team for processing. Eggs were returned safely to the nest prior to releasing birds.

Each captured female PEFA was fitted with a standard lock-on USGS bird band (size 7A) on its right leg and a size 7 alphanumeric bi-colored band (black over green Type 12 band from ACraft, Edmonton, Alberta) on the left leg. Use of color bands has been coordinated with regional conservation partners throughout the PEFA population recovery (Faccio et al. 2013).

We instrumented female PEFAs with 9-12 g solar capacitor powered satellite transmitters manufactured by GeoTrak, Inc. (Apex, North Carolina, USA). Transmitters fixed locations during daylight hours as permitted by unit charge levels. Transmitters were programmed to fix 'Argos' (Advanced Research and Global Observation Satellite) or Doppler locations via the Argos satellite system. Argos satellites receive messages from transmitters and use changes in Doppler-shift frequency to calculate the approximate location of instrumented animals. The accuracy of location estimates improves with the number of messages received and other factors. Argos locations are assigned to location classes (LC), associated with an estimated error radius as follows: LC3 (≤ 250 m), LC2 (250 to < 500 m), LC1 (500 to < 1500 m) and LC0 (> 1500 m).



Figure 1. Adult female Peregrine incubates within noose trap hoop prior to capture in 2016. Photo by Adam Gravel.

Results and Discussion

Since May 2014, NHA, BRI, and Stantec have fitted 9-12-gram backpack-mounted solar-powered transmitters on a total of five adult female PEFAs (see details and maps below) by capturing them on their nests while they were incubating eggs (4 times) or brooding very young chicks (once). Two of these transmitter deployments (Portsmouth and Fall Mtn females) have occurred during the interval covered by Blake-Nuttall funding. A recent report produced by BRI (DeSorbo et al. 2018) describes in much greater detail outcomes of the 2017 tracking season. This report can be accessed at:

http://www.briloon.org/uploads/images/template/Stantec%202017%20Progress%20Report_v6%20finalized_submitted5.17.pdf .

In addition to documenting breeding season home ranges, we followed migration routes and timing for these PEFAs. We gathered data to determine whether falcons from varying nest sites engage in their Spring and Fall migrations within a narrow migration window or whether they exhibit broad variation in timing. We evaluated whether they follow similar migratory pathways, and whether they overwinter in roughly the same geographic areas or habitat types.

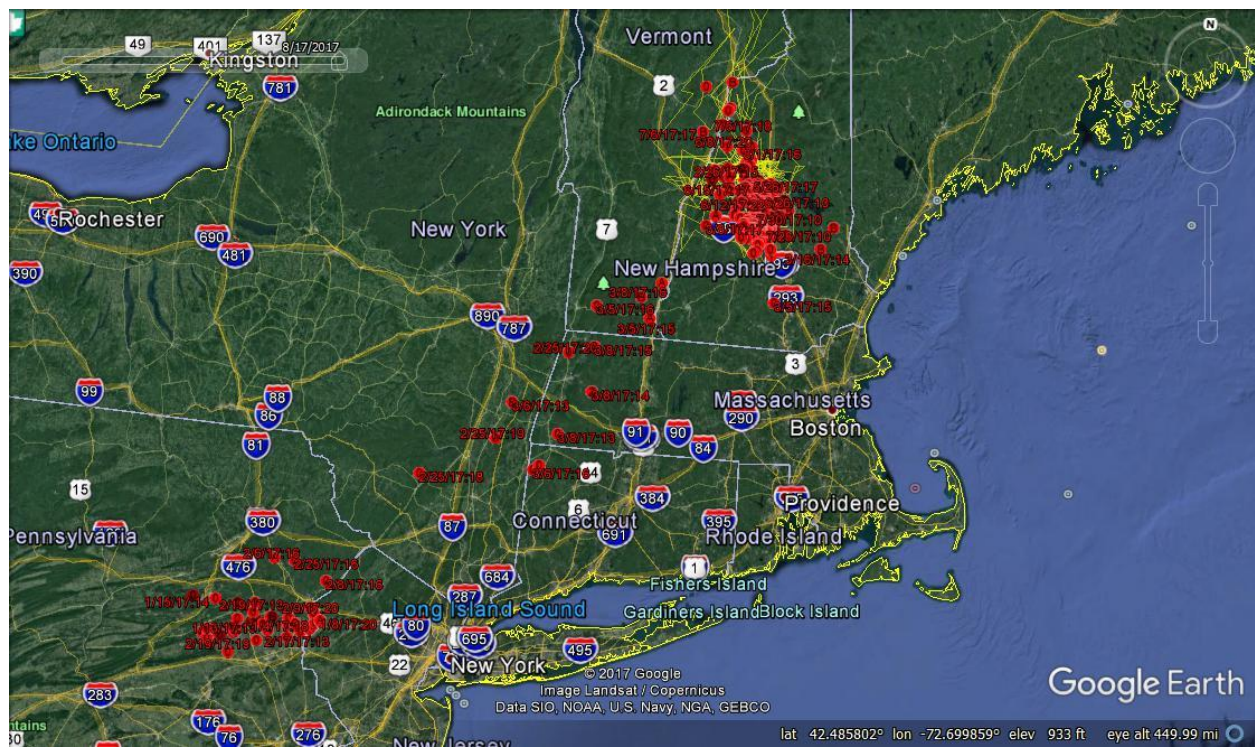
In March 2016 and February-March 2017, the northbound Bear Mtn female departed her eastern Pennsylvania wintering area, reached her New Hampshire breeding site in just a couple days, then turned around and returned to her wintering area once again, before heading back to New Hampshire about a week later. Also, in July 2017, the Rattlesnake Mtn female left New

Hampshire and traveled directly to her wintering area from the previous Winter, where she remains as of this writing.

Here are some specific details about the five PEFAs we've handled during this project:

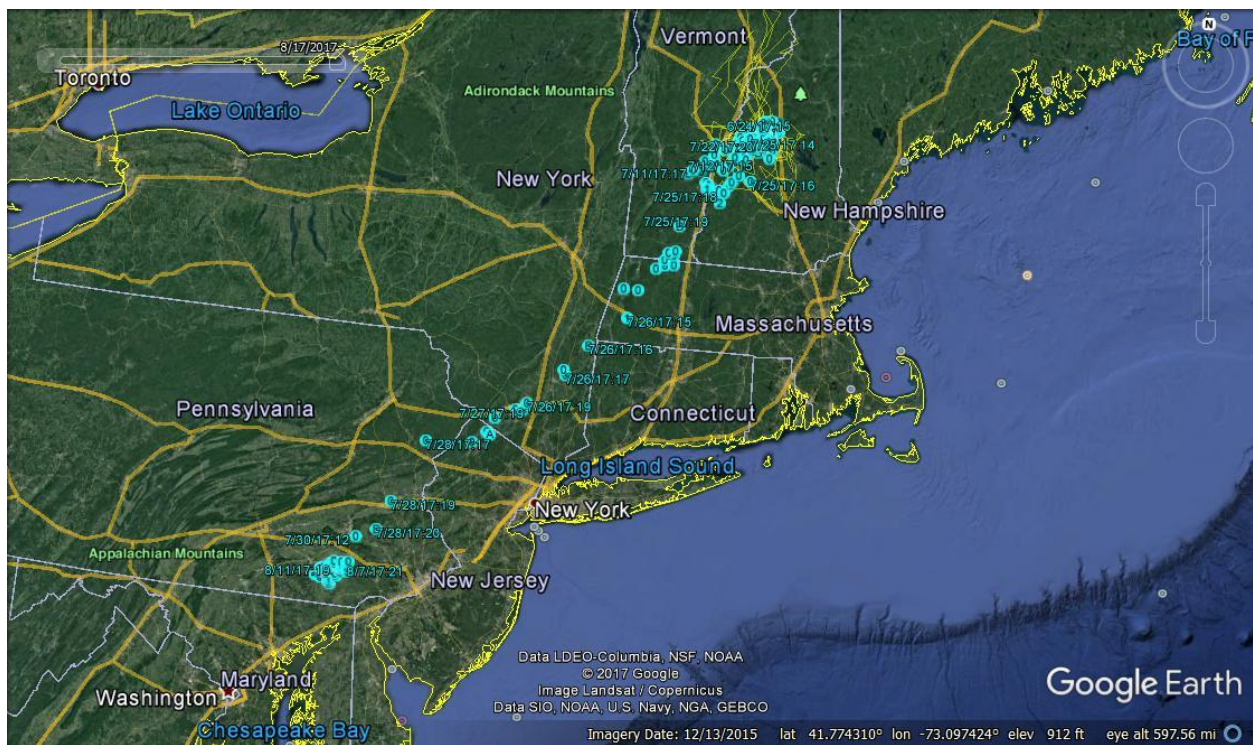
Bear Mtn adult female PEFA (1807-92011 right, black/green A/G left) captured on 5/12/2014, attached 12 gram PTT ID# 129176, held/warmed 5 unhatched eggs during capture and processing from 11:30am-4pm (Personnel - BRI: Chris Desorbo, Rick Gray, Bill Hanson; NHA: Chris Martin; Stantec: Adam Gravel). Our longest-transmitting bird, this individual has been transmitting location data for more than 51 months through mid-August 2018, including four Fall migrations and four Spring migrations. So far, she has utilized the same wintering area each Winter, travelling roughly 500 km between those locations. In Fall 2017, she moved to her overwintering site in eastern PA between 30 Oct and 4 Nov 2017. In Spring 2018, she switched to a new breeding territory located about 26 km west of Bear Mtn.

Figure 2. Bear Mtn female's location data from 1/1/2017 through 8/17/2017.



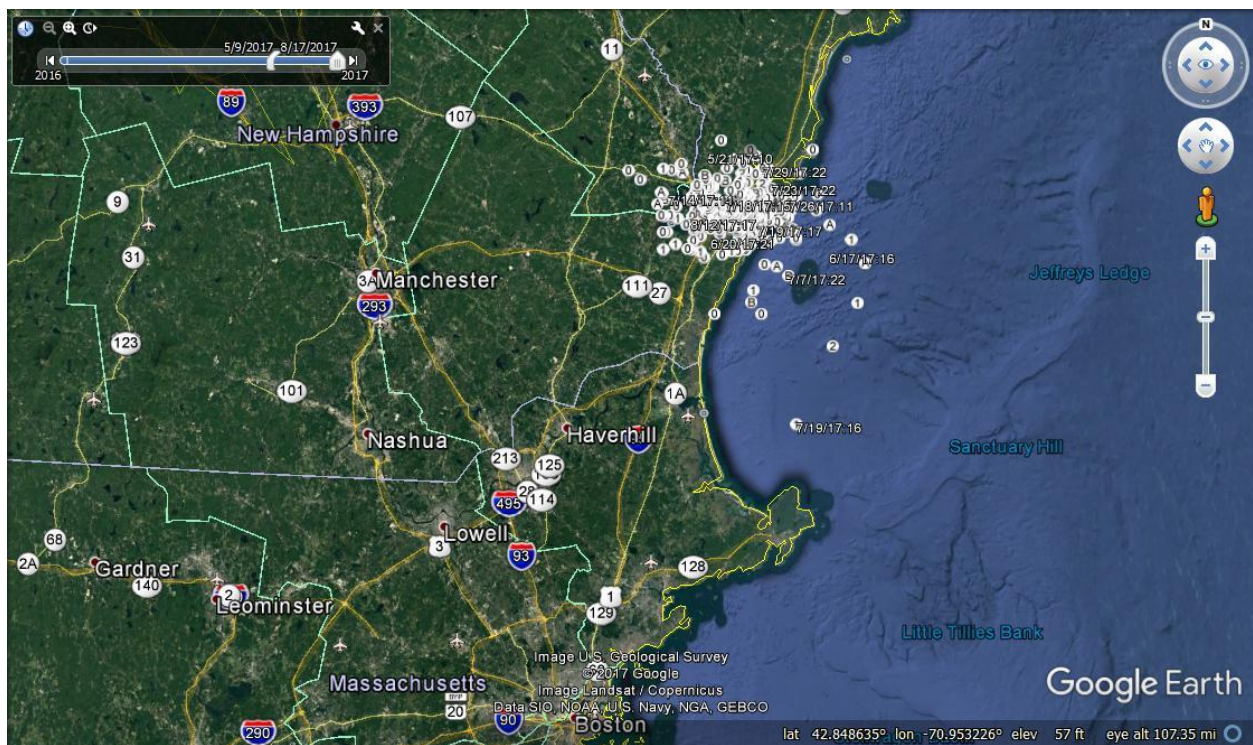
Rattlesnake Mtn adult female PEFA (1807-92013 right, black/green A/R left) captured on 4/28/2016, attached 12 gram PTT ID# 149264, held/warmed 4 unhatched eggs during capture and processing (Personnel - BRI: Chris Persico, Lauren Gilpatrick, Bill Hanson; NHA: Chris Martin; BRI volunteer Jamie McMillan). This individual has been transmitting location data for more than 27 months through mid-August 2018. So far, she has utilized the same wintering area in southern PA both Winters, travelling roughly 650 km between those locations. At the end of the 2017 breeding season, she departed unusually early, moving to her overwintering site between 25 July and 30 July 2017.

Figure 3. Rattlesnake Mtn female's location data from 4/1/2017 through 8/17/2017.



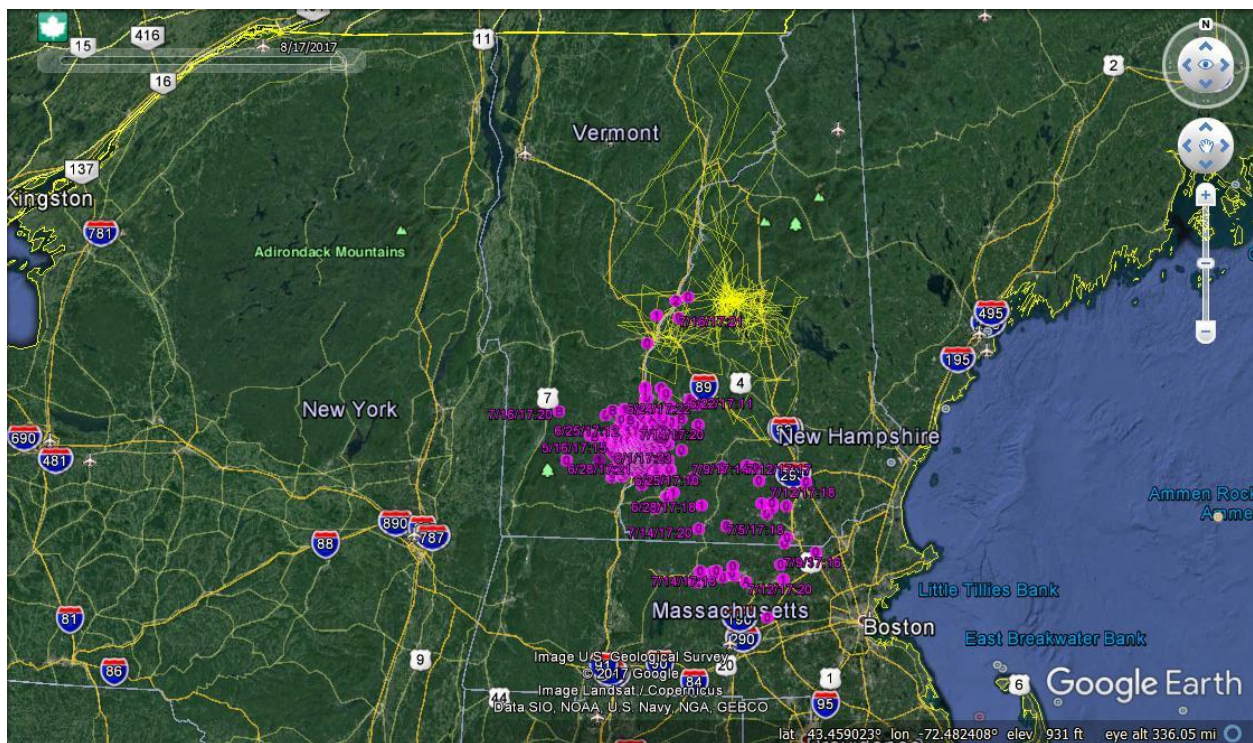
Portsmouth I-95 adult female PEFA (1807-92015 right, black/green A/W left) captured on 5/8/2017, attached 12 gram PTT ID# 129177, 1045g adult female, held/warmed 4 unhatched eggs during capture and processing, caught bird by hand as noose trap was being installed (Personnel - BRI: Chris Persico, Chris Desorbo, Lauren Gilpatrick; NHA: Chris Martin; Stantec: Adam Gravel; NH DOT: Gene Popien). This individual has been transmitting location data for more than 15 months through mid-August 2018. This is a near-ocean location with relatively moderate Winter conditions and abundant avian prey in the Winter months. This individual did not migrate, remaining on her breeding territory through the Winter of 2017-18.

Figure 4. Portsmouth I-95 female's location data from capture on 5/8/2017 through 8/17/2017.



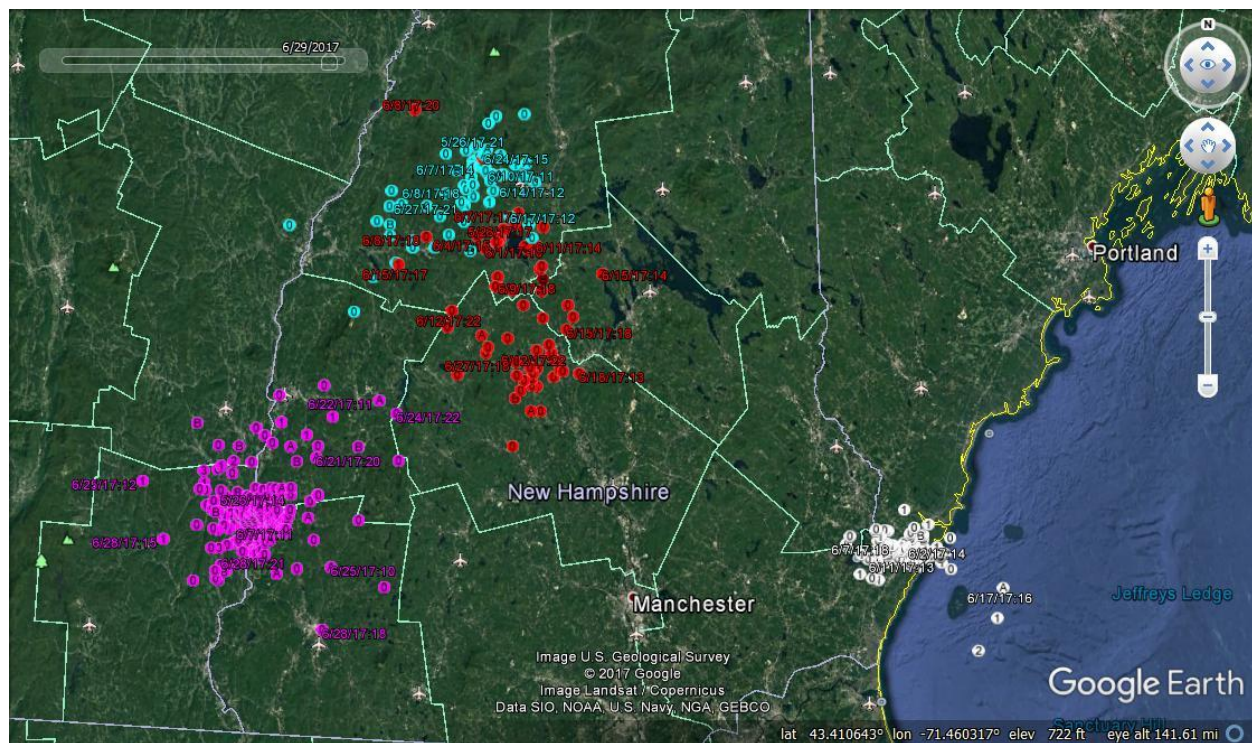
Fall Mtn adult female PEFA (1807-92017 right, black/green A/Y left) captured on 5/9/2017, attached 12 gram PTT ID# 149262, 1057g adult female, held/warmed 2 downy 1-wk old chicks during capture, tethered 2 more chicks in back of nest, held/warmed all 4 chicks during processing from 11am-2pm (BRI: Chris Persico, Chris Desorbo; NHA: Chris Martin; Stantec: Adam Gravel; BRI volunteer: Dustin Riordan). This individual has been transmitting location data for more than 15 months through mid-August 2018. She moved to her overwintering area along the CT-RI coastline between 10 Oct and 16 Oct 2017, travelling roughly 210 km between those locations.

Figure 5. Fall Mtn female's location data from capture on 5/9/2017 through 8/17/2017.



Rattlesnake Mtn 1-yr old female PEFA (1807-92012 right, black/green A/X left) captured on 5/13/2014, a molting 1-yr old bird, attached 12 gram PTT ID# 129175, held/warmed 2 unhatched eggs during capture and processing from 1:30-7:30pm (Personnel - BRI: Chris Desorbo, Rick Gray, Bill Hanson; NHA: Chris Martin; Stantec: Adam Gravel, Lindsey ?). This individual transmitted location data for more than 6 months, but stopped transmitting on 11/15/2014 and is presumed to have died. This bird unexpectedly made two brief trips to southern Quebec in the late Summer, each time returning to her breeding territory. During the Fall 2014 season, she spent some time in Vermont before disappearing, thus no 2017 map available for this individual.

Figure 6. All 4 NH female PEFAs locations during active breeding attempts in June 2017.
 Fall Mtn = purple, Rattlesnake Mtn = blue, Bear Mtn = red, Portsmouth I-95 = white.



Our collaborative tracking project continues to monitor locations and movements of a cross-section of New Hampshire's breeding female PEFAs, including two individuals from cliffs in the White Mountains (Bear Mtn and Rattlesnake Mtn), one bird from a fairly urbanized section of the largely agricultural Connecticut River valley (Fall Mtn), and one bird from a very urbanized area on the coast (Portsmouth I-95). We plan to share finding from this study with colleagues at the 2018 Hawk Migration Association of North America (HMANA) Conference in Detroit, MI in October 2018. Given durability of the transmitters and survival by the adult female peregrines, we anticipate learning a great deal more about the behavior and movement patterns of these birds in the months and years ahead. We gratefully acknowledge the contribution of the Blake-Nuttall Fund in supporting this research.

Literature Cited

- Chen, D., M. J. LaGuardia, E. Harvey, M. Amaral, K. Wohlfort, and R. Hale. 2008. Polybrominated diphenyl ethers in peregrine falcon (*Falco peregrinus*) eggs from the northeastern U.S. *Enviro. Sci. Tech.* 42:7594-7600.
- DeSorbo, C. R., C. Persico, B. Hanson and L. Gilpatrick. 2018. Home range, dispersal timing and migration routes of Peregrine Falcons in New Hampshire: Progress report for 2017 field season. BRI report # 2018-13, submitted to Stantec Consulting, Inc., Topsham, Maine. Biodiversity Research Institute, Portland, Maine. 7 pp.
- Faccio, S.D., M. Amaral, C.J. Martin, J.D. Lloyd, T.W. French, and A. Tur. 2013. Movement patterns, natal dispersal, and survival of peregrine falcons banded in New England. *J. Raptor Res.* 47:246-261.
- Green, M., T. Swem, M. Morin, R. Mesta, M. Klee, K Hollar, R. Hazelwood, P. Delphey, R. Currie, and M. Amaral. 2006. Monitoring results for breeding American peregrine falcons (*Falco peregrinus anatum*), 2003. U.S. Fish & Wildlife Service, No. BTP-R1005-2006.
- Henny, C. J., W. S. Seegar, M. A. Yates, T. L. Maechtle, S. A. Ganusevich, and M. R. Fuller. 2000. Contaminants and Wintering Areas of Peregrine Falcons, *Falco Peregrinus*, from the Kola Peninsula, Russia. Pages 871–878 in R. D. Chancellor and B. Meyburg, editors. *Raptors at Risk*. Hancock House, Blaine, WA, USA.
- Lapointe, J., L. Imbeau, J. A. Tremblay, C. Maisonneuve, and M. J. Mazerolle. 2013. Habitat use by female Peregrine Falcons (*Falco peregrinus*) in an agricultural landscape. *The Auk* 130:381–391.
- Sokolov, V., N. Lecompte, A. Sokolov, M. L. Rahman, and A. Dixon. 2014. Site fidelity and home range variation during the breeding season of peregrine falcons (*Falco peregrinus*) in Yamal, Russia. *Polar Biol.* 37:1621-1631.
- Stantec Consulting, BioDiversity Resarch Institute, and NH Audubon. 2016. Determining local and broad scale movement patterns of peregrine falcons in the Groton, New Hampshire region, 2013-2015. Final report under agency review. Stantec Consulting. 43pp., plus appendicies.