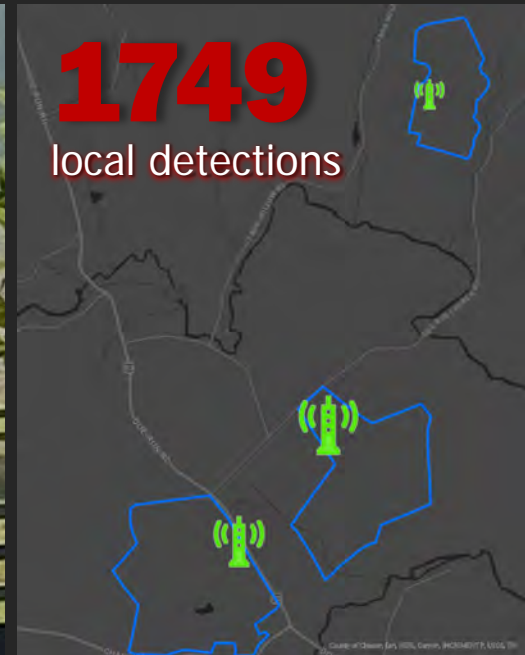
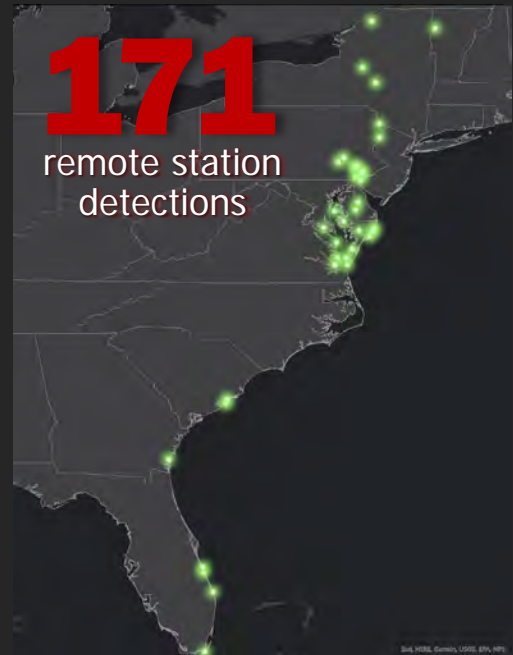
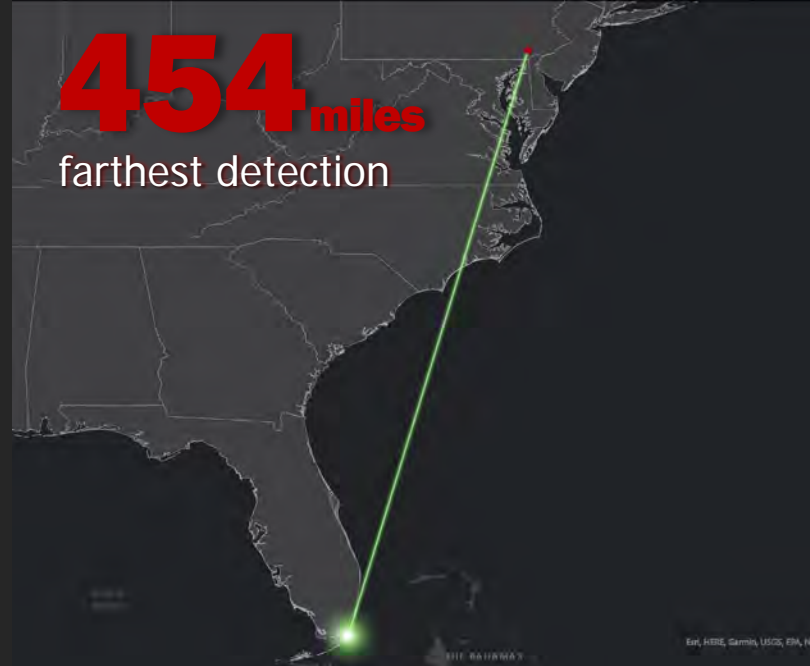


Bobbies by the Numbers

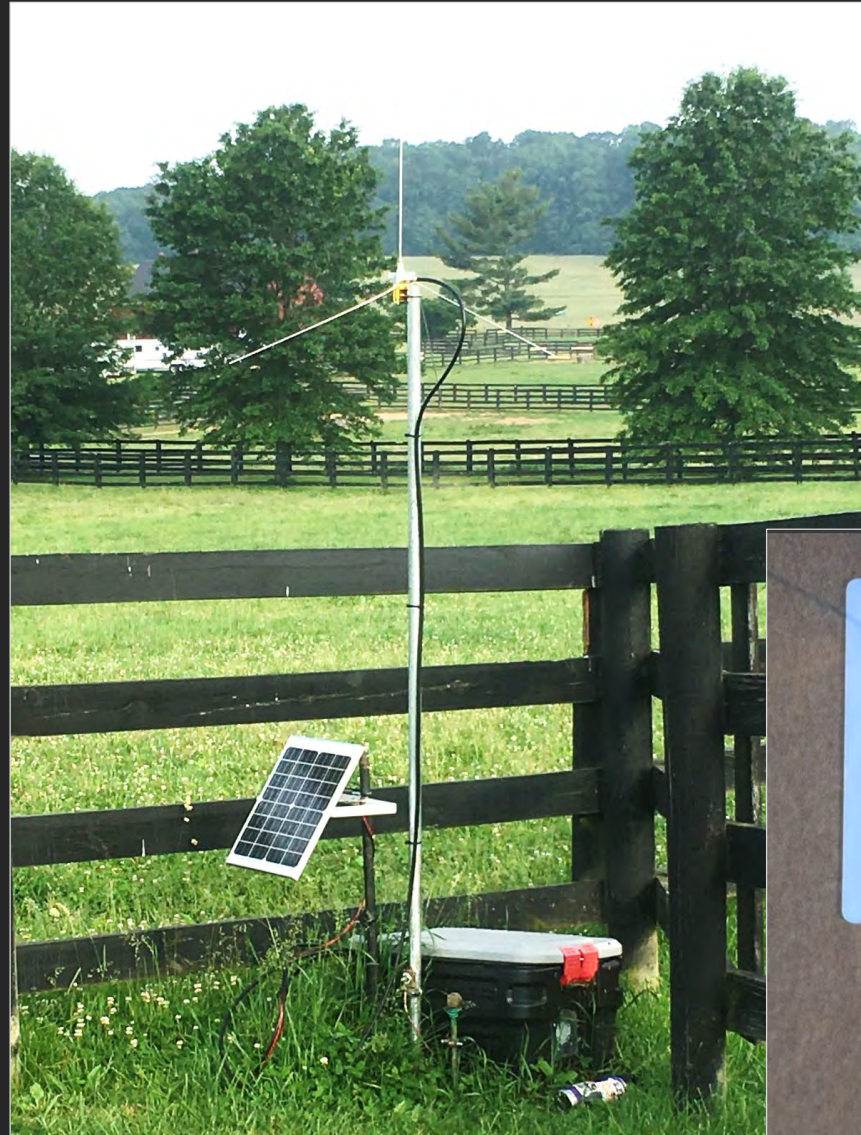


Nanotags and Motus Stations

20 Bobolinks received a nanotag—12 males and 8 females. Each nanotag sends out a pulse every 20 seconds that can be detected when the bird is in the vicinity of a Motus station.

All birds were tagged from May 17 to May 27 with the exception of one female tagged on June 17.

In addition to the international network of Motus towers, sensor stations were installed in the Doe Run area at Buck Run Farm, Buck & Doe Farm, and Old Schoolhouse Farm.



Left: Sensor station installed at Buck & Doe Farm.

Below: One of the nanotags to be placed on a Bobolink from the Doe Run area





Factors Influencing Individual Detection Rates

Activity Level

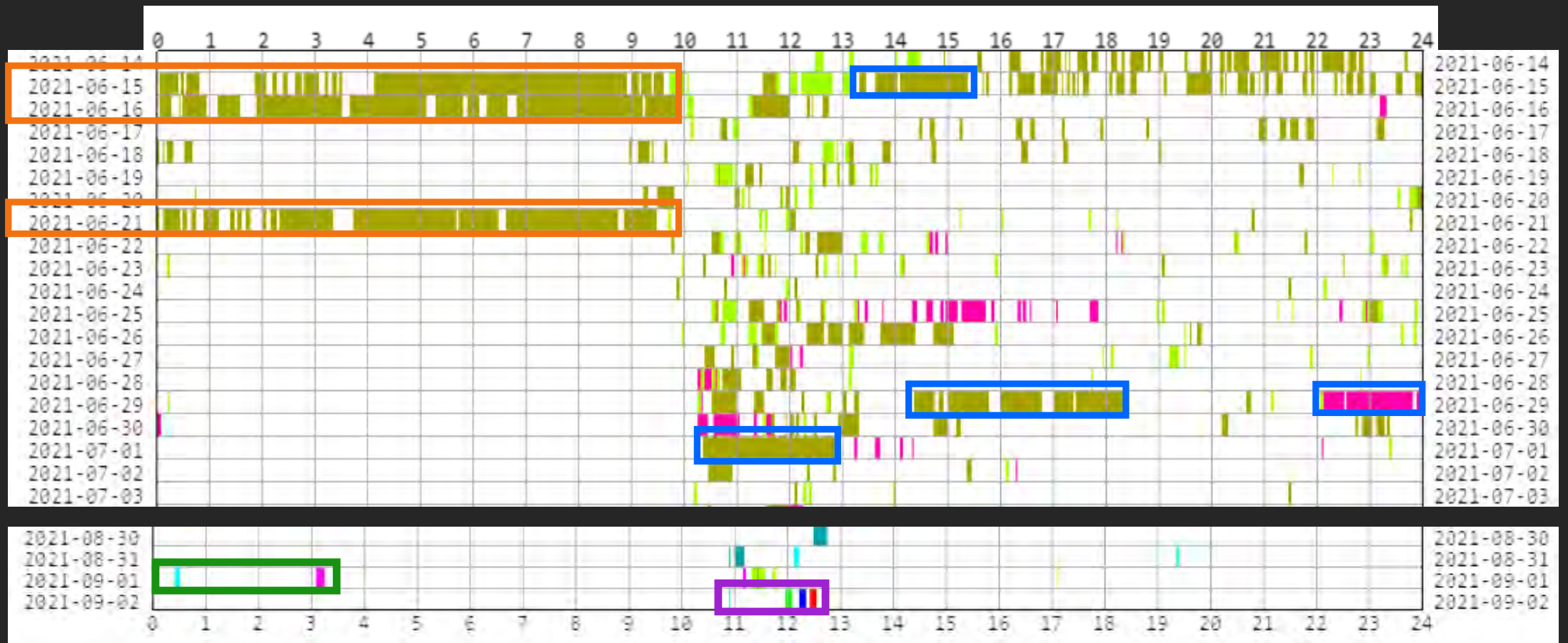
A bird flying around a field will be detected more frequently than a bird that is inactive for long periods of time. For example, a male defending his territory will have more detections than a female sitting on her nest low in the grass.

Sustained Use of Fields

A bird spending longer periods of time in an area is more likely to be detected than a bird that is just passing by.



- Several of our birds had almost continuous detections in Doe Run area fields, indicating sustained activity in a particular field over a period of time.
- Other birds that moved between fields had multiple detections at individual fields, but the detections were shorter in duration.
- As the birds moved out of the area, they had brief detections as they passed towers during a longer flight.



In the sample timeline data above, the bird had almost continuous detections on June 15, 16 and 21 from 12:00 am until 9:30 am (see orange boxes). On most of the other days, the bird was moving between fields at Old Schoolhouse Farm (brown), Buck Run Farm (green), and Buck & Doe Farm (pink). On those days, there were periods of sustained presence at Old Schoolhouse Farm and Buck & Doe Farm indicated by the solid bars of color (see blue boxes). Later in the season, this bird was flying by towers during migration indicated by different color bars that are sometimes far apart when passing towers in different regions (see green box) and sometimes close together when passing towers in close proximity (see purple box).

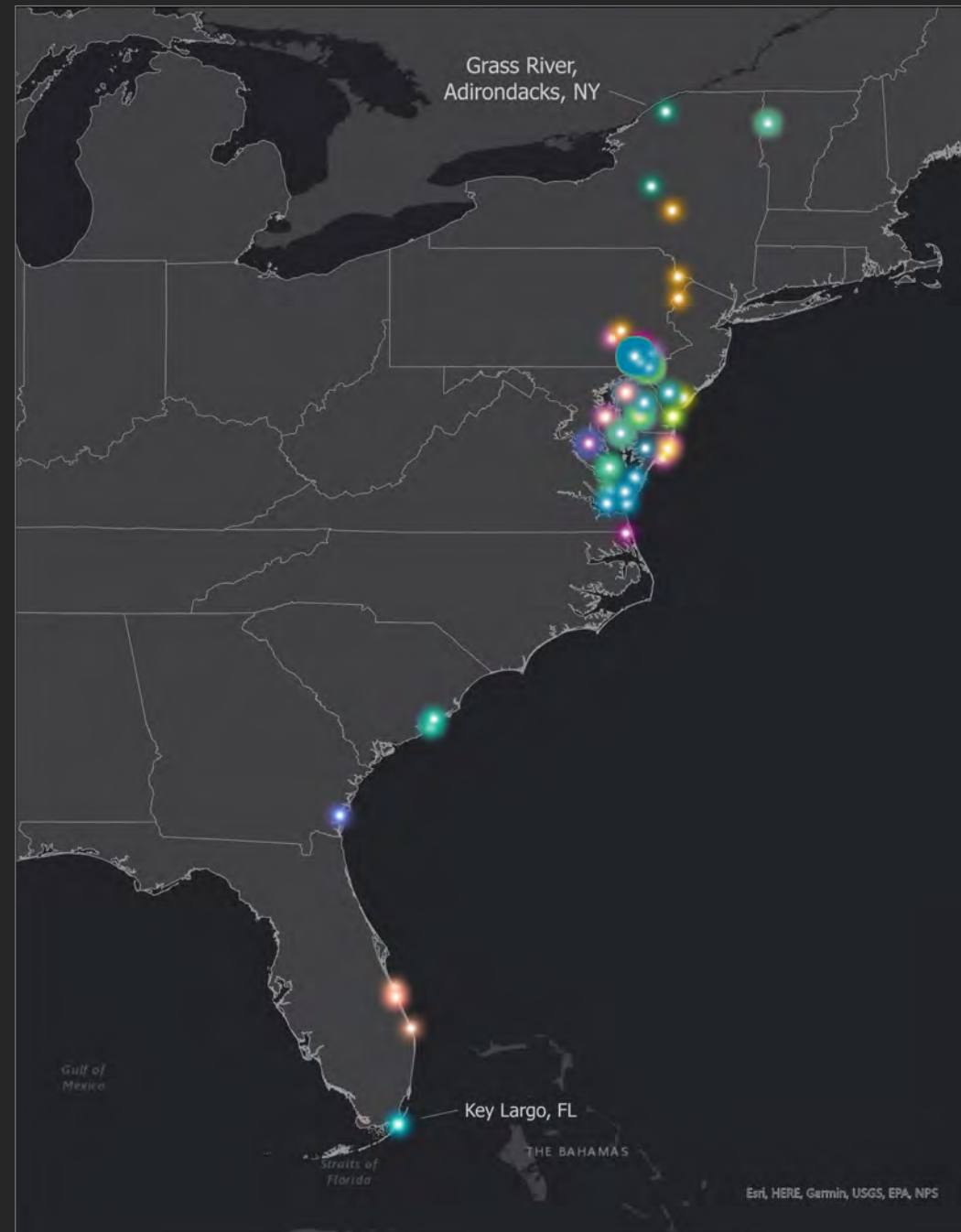
All Bobolink Detection Locations May 18 – Sept 27

Farthest Northern Detection

A female was detected at the Grass River in the Adirondack Mountains of NY on May 26.

Farthest Southern Detection

Two males were detected in Key Largo, FL. The first was detected on Sept 3, and the second detection was on Sept 11.



Flight Note

Shelburne Farms, VT was our second farthest northern detection. It is also the site of a 20-year Bobolink study led by Noah Perlut. We are collaborating with Noah and Amber Roth, who is studying Bobolinks in Maine, to analyze the migratory patterns of 3 Bobolink populations.

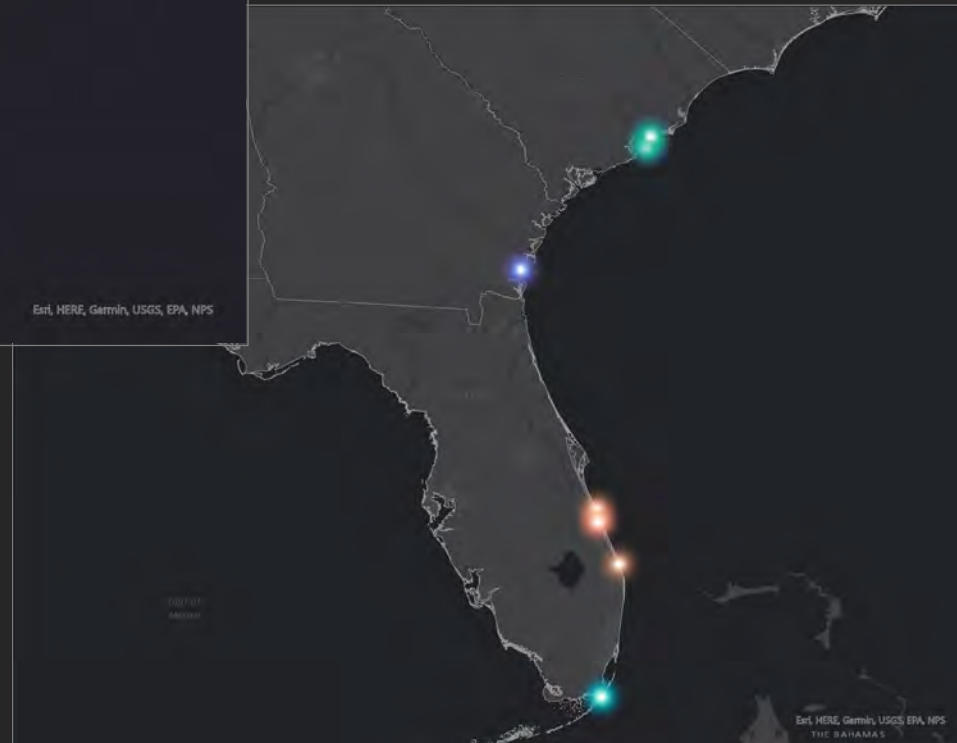
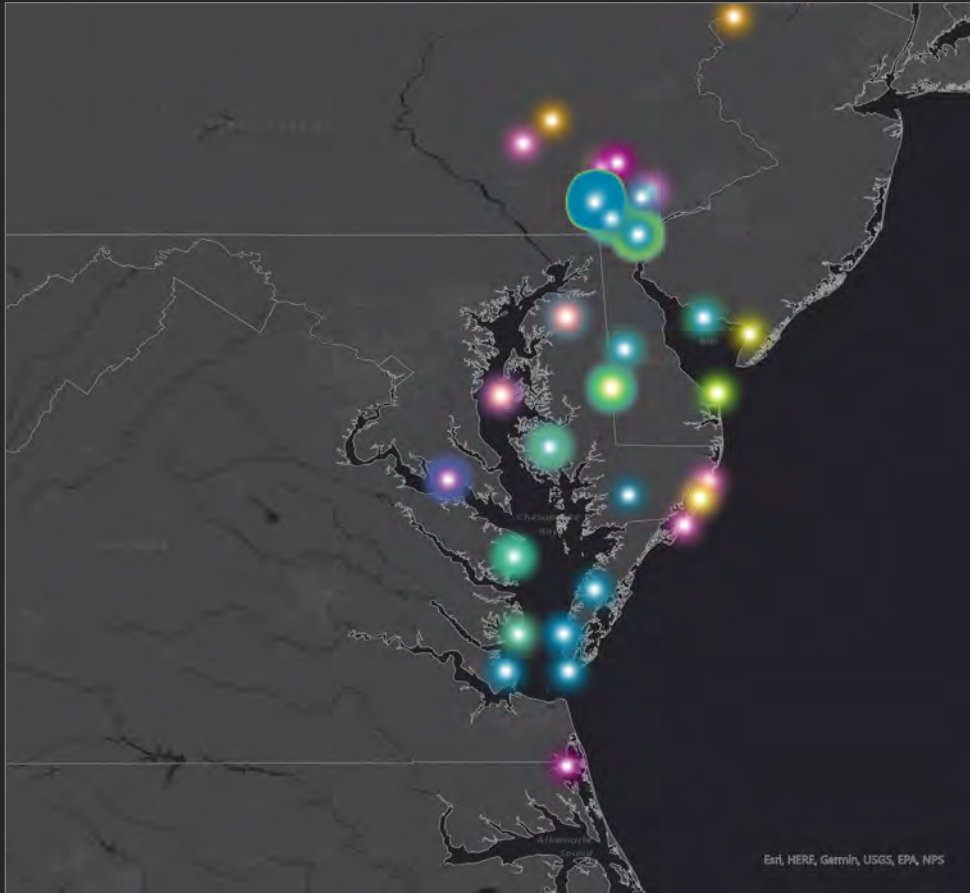
Five birds were detected at Shelburne Farm

- June 11 – a male and female were detected during peak breeding season
- July 4 – a female was detected around the time fields in the Doe Run area were being mowed
- late July – 2 males were detected during the pre-migration staging period

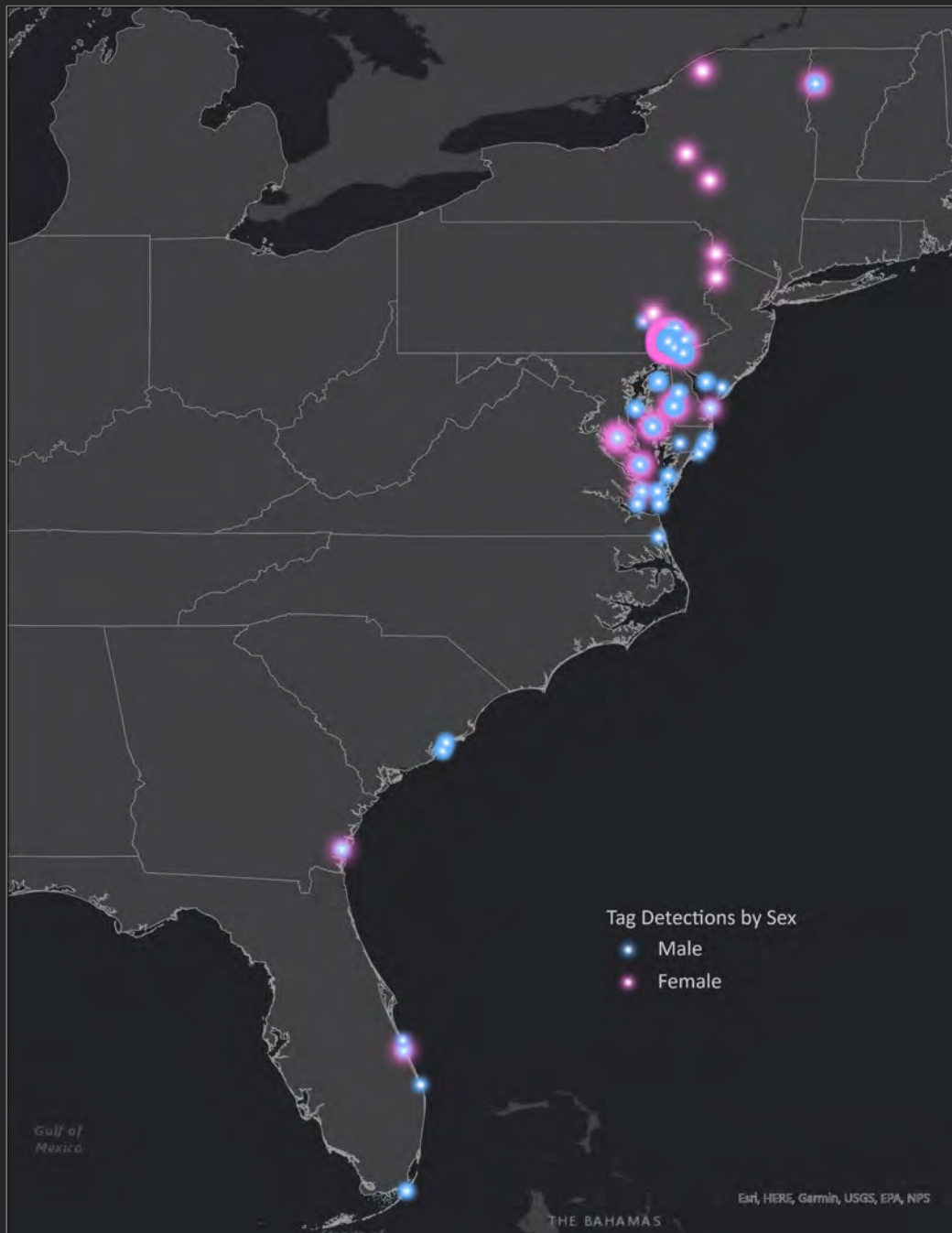


Crossing Paths

The Chesapeake Bay Area was an important stopover during early migration. Ten birds—2 females and 8 males—spent time at various locations along the bay in Maryland and Virginia.



Some of those birds moved on to coastal areas from South Carolina to Florida. Other birds skipped the Chesapeake Bay and were detected only in southern coastal areas.



Males vs. Females

The number of male detections far outweighed the number of female detections. This may reflect the fact that fewer females were tagged, and females were likely to have been less active during nesting.

Nevertheless, it is interesting to note some differences between males and females in our study:

- 3 females flew north during breeding vs. 1 male who went north in that period
- 2 females were detected in the Chesapeake Bay area vs. 7 males in the same area and along the Eastern Shore of Maryland and Virginia
- 1 female was detected south of the Chesapeake vs. 6 males detected in southern states

Individual Bobolink Movement



"Blossom" (tag #224)



Activity in Doe Run Area

June 17

Female tagged at Old Schoolhouse Farm – "Blossom" (tag #224)

June 17 – 28

She was detected almost daily at Old Schoolhouse Farm

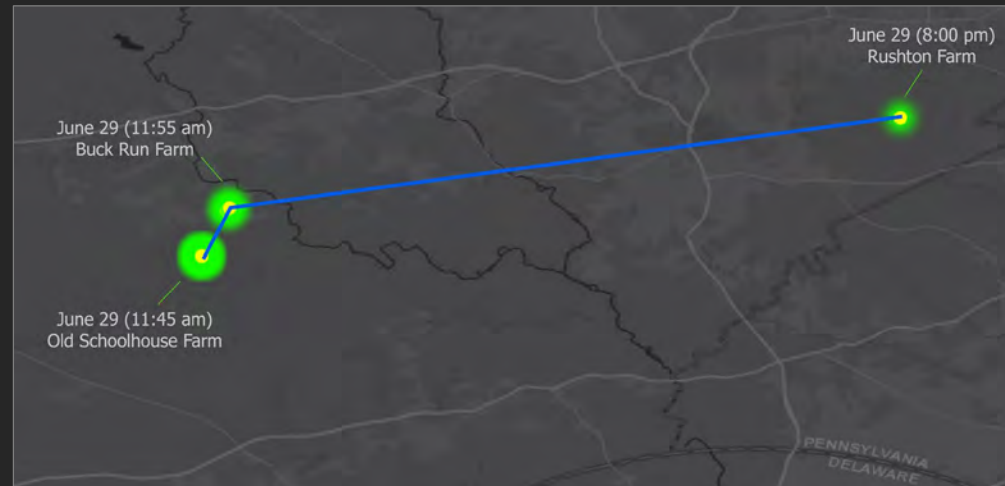
June 30 and July 8

Single detections at Old Schoolhouse Farm

July 16

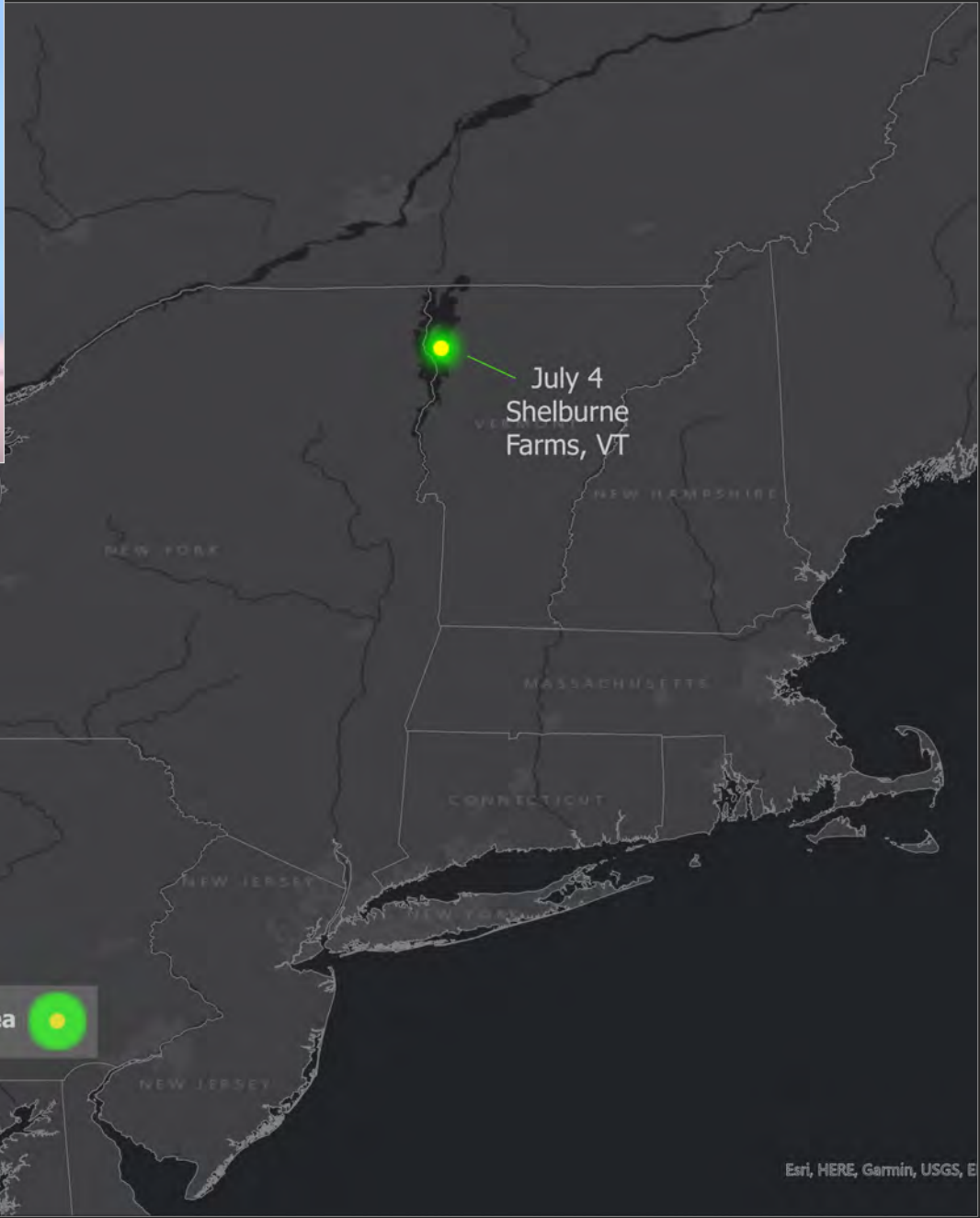
Blossom's last detection at Buck Run Farm

Blossom's only detection outside of the Doe Run area occurred on June 29. She left Old Schoolhouse Farm, briefly stopped at Buck Run Farm, then went on to Rushton Farm.





"Bess" (tag #225)



Activity in Doe Run Area

May 20

Female tagged at Old Schoolhouse Farm – "Bess" (tag #225)

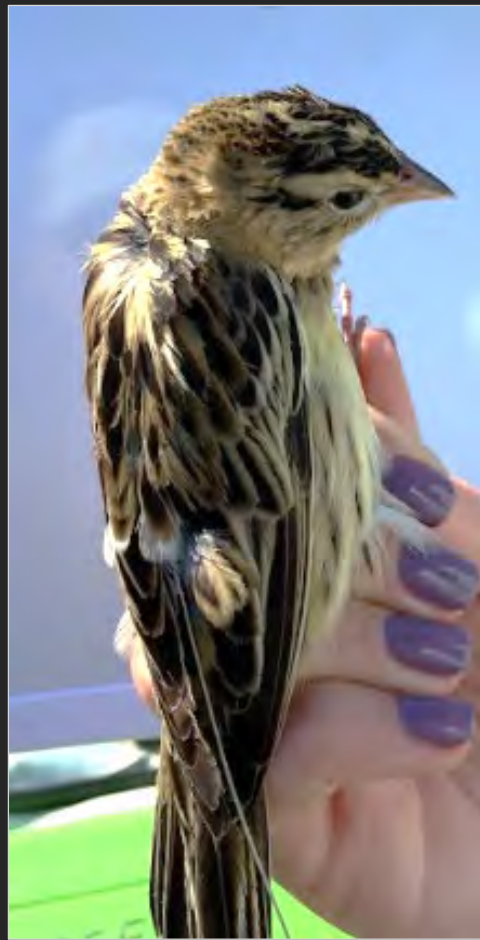
June 5 - July 19

25 detections at Old Schoolhouse Farm

Bess was loyal to her field. All local detections occurred in the field where she was tagged.

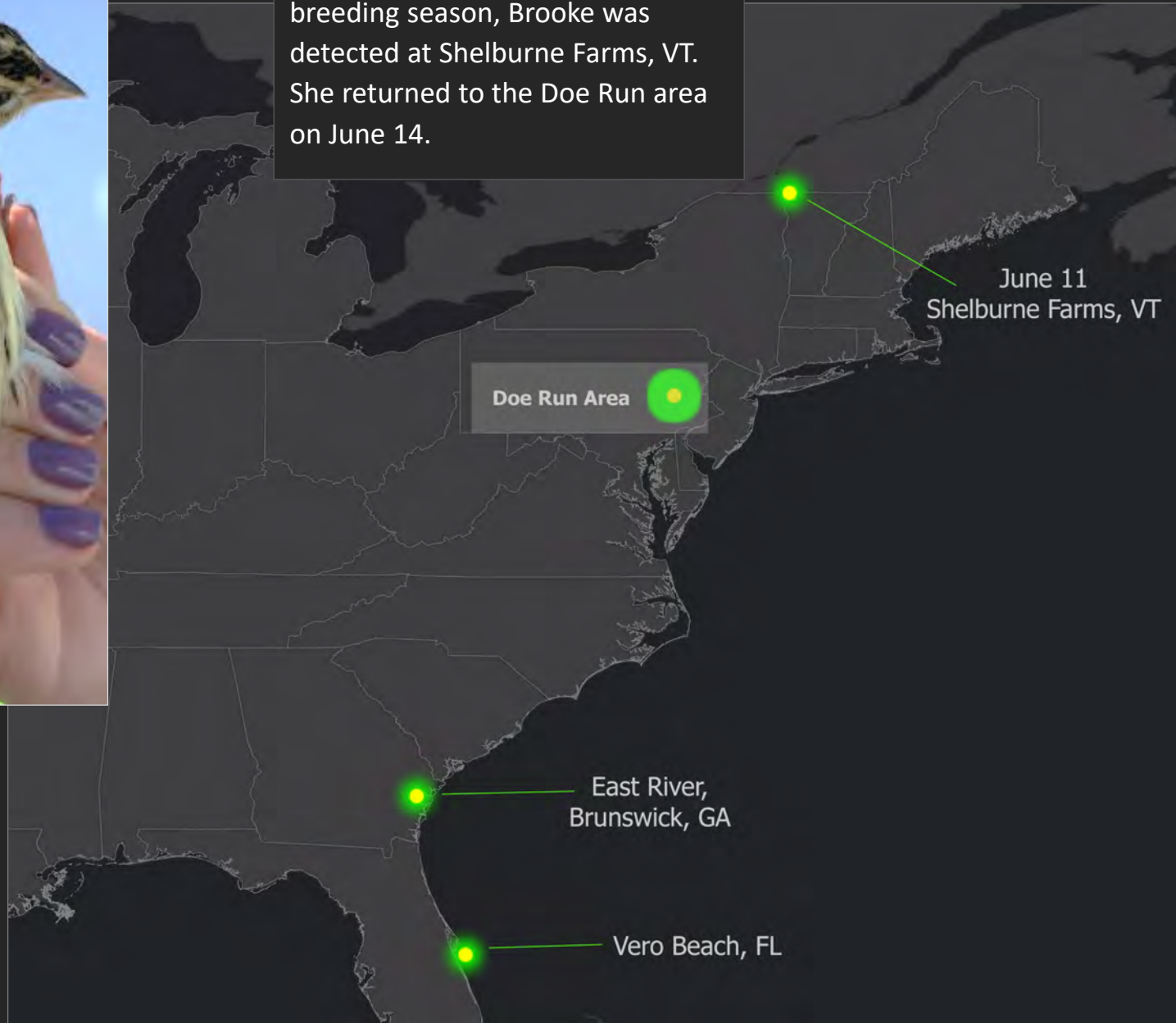
July 4

Bess had a single detection outside of the Doe Run Area at Shelburne Farm, VT.



“Brooke” (tag #220)

On June 11, during the peak of breeding season, Brooke was detected at Shelburne Farms, VT. She returned to the Doe Run area on June 14.



Activity in Doe Run Area

May 27

Female tagged at Buck & Doe Farm – “Brooke” (tag #220)

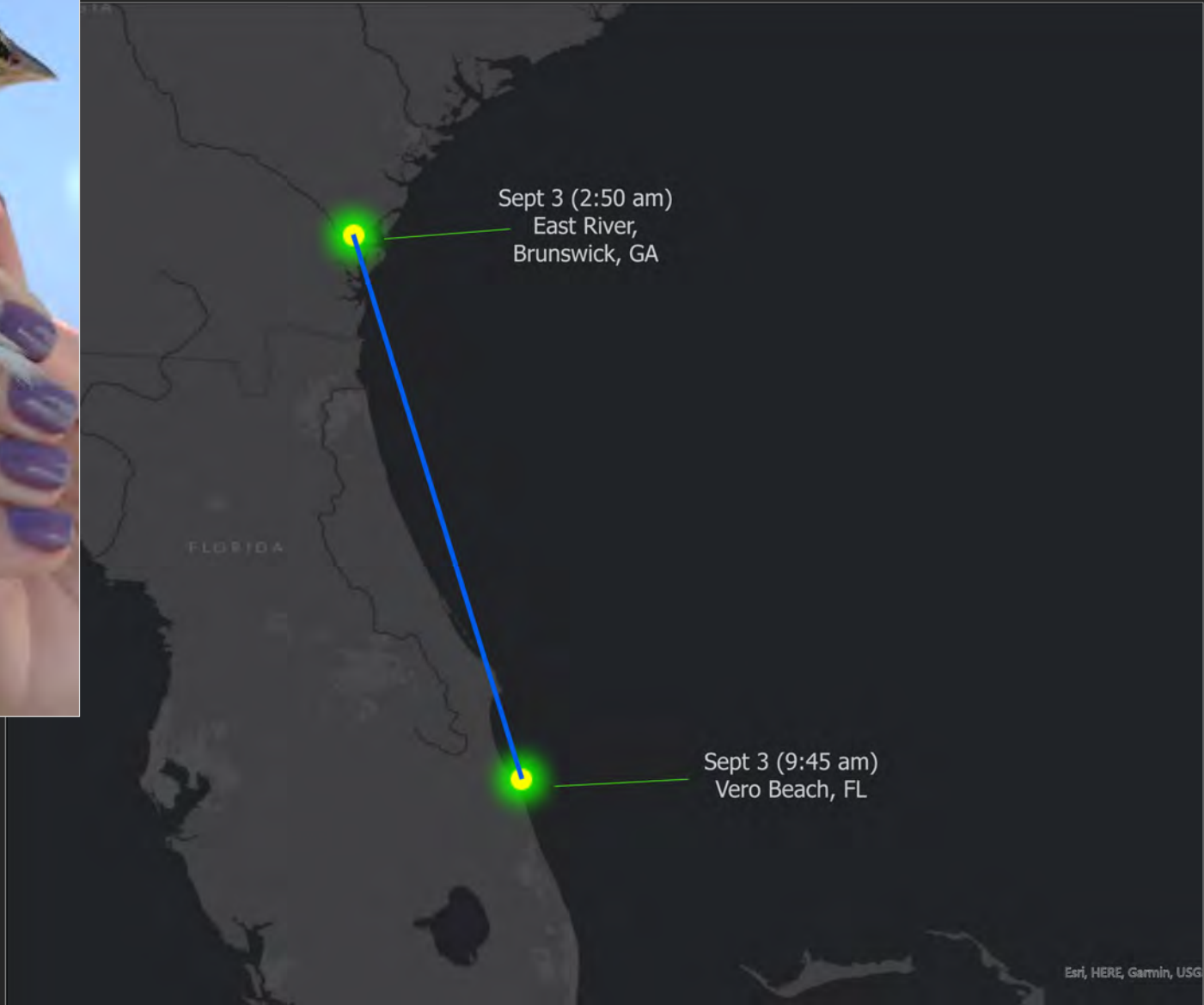
May 29 – Aug 22

41 local detections among Buck & Doe, Buck Run, and Old Schoolhouse Farms

Her detections were sporadic. Brooke’s greatest number of detections occurred from July 5 – 7, as mowing was occurring.



“Brooke” (tag #220)



Phase II – Migration Movement

On Sept 3, part of Brooke’s migration route was captured. She flew from Georgia to Florida, traveling 250 miles in about 19 hours.



"Ben" (tag #239)



Activity in Doe Run Area

May 17

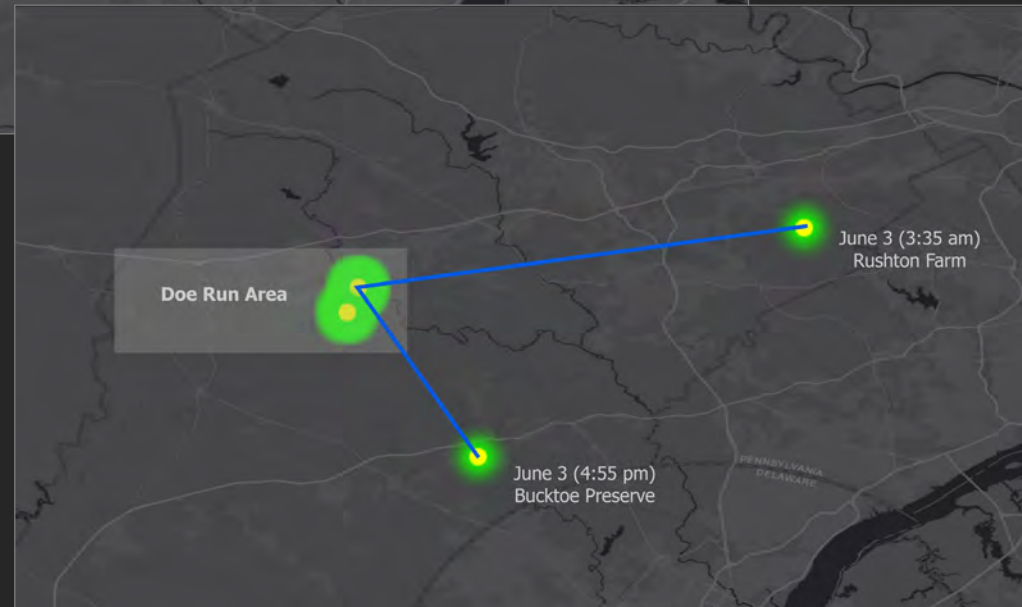
Male tagged at Buck & Doe Farm – "Ben" (tag #239)

May 17 – June 15

46 local detections between Buck & Doe and Buck Run Farms

He split his time fairly evenly between the two farms.

Ben made one trip outside of the Doe Run area before detections stopped. On June 3, he flew to Rushton Farm, returned to Buck Run Farm, and then flew over to Bucktoe Preserve.





"Bruce" (tag #226)



Activity in Doe Run Area

May 17

Male tagged at Buck & Doe Farm –
"Bruce" (tag #226)

May 20 – Aug 17

120 detections at Buck & Doe,
Buck Run, and Old Schoolhouse
Farms

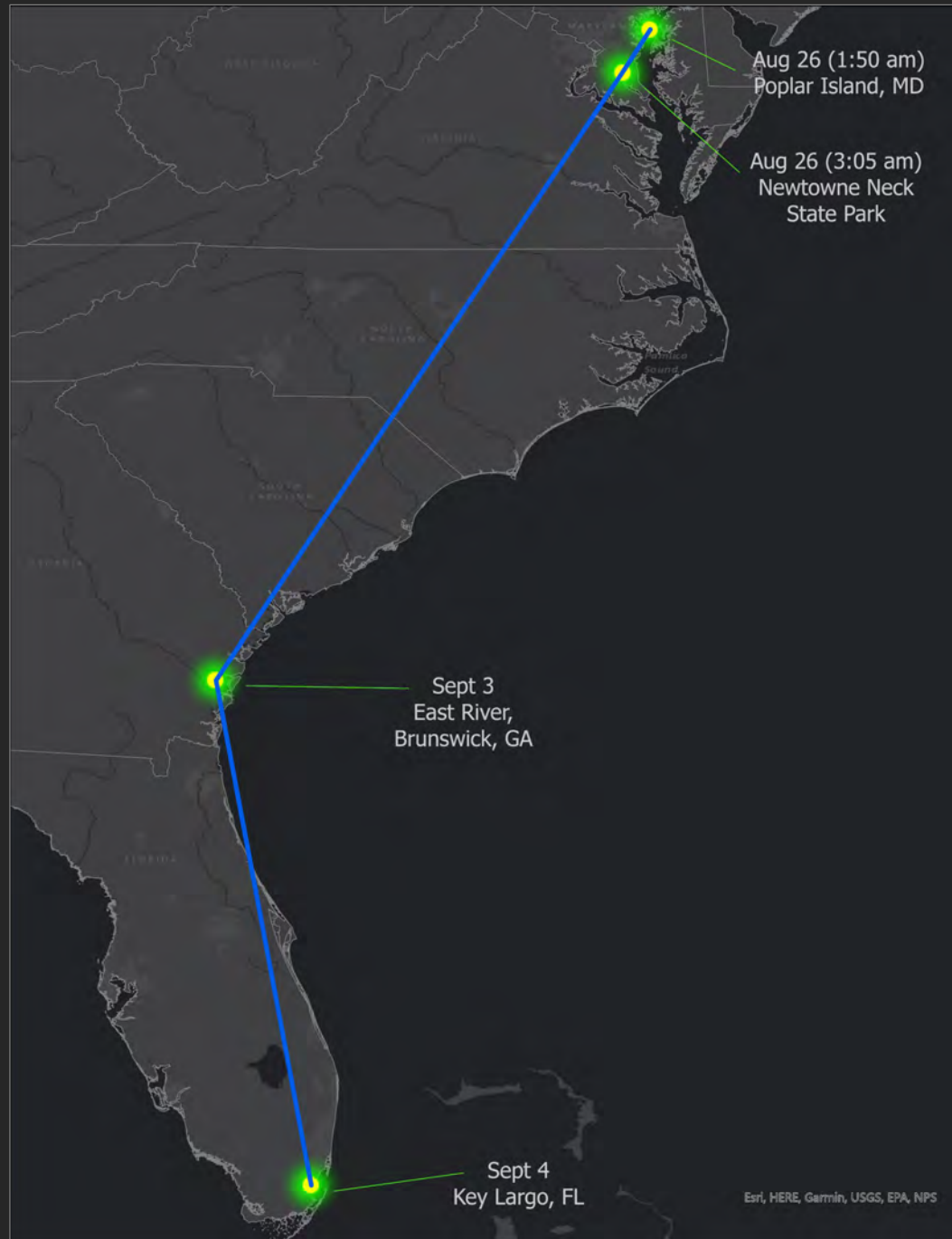
From May 27 to July 6, he was
typically detected at both Buck Run
and Buck & Doe farms during the
day.

From the morning of July 6 until
Aug 8, he was detected almost
continuously at Buck Run Farm.

Activity died off until a 5-day
period between Aug 13 – 17 when
Bruce was again detected
frequently at Buck Run Farm.



"Bruce" (tag #226)



Phase II – Migration Movement

Aug 26 marked the beginning of Bruce's southern migration. Within 10 days he had flown over 1000 miles to Key Largo, FL



"Boyd" (tag #236)



Activity in Doe Run Area

May 20

Male tagged at Old Schoolhouse Farm – "Boyd" (tag #236)

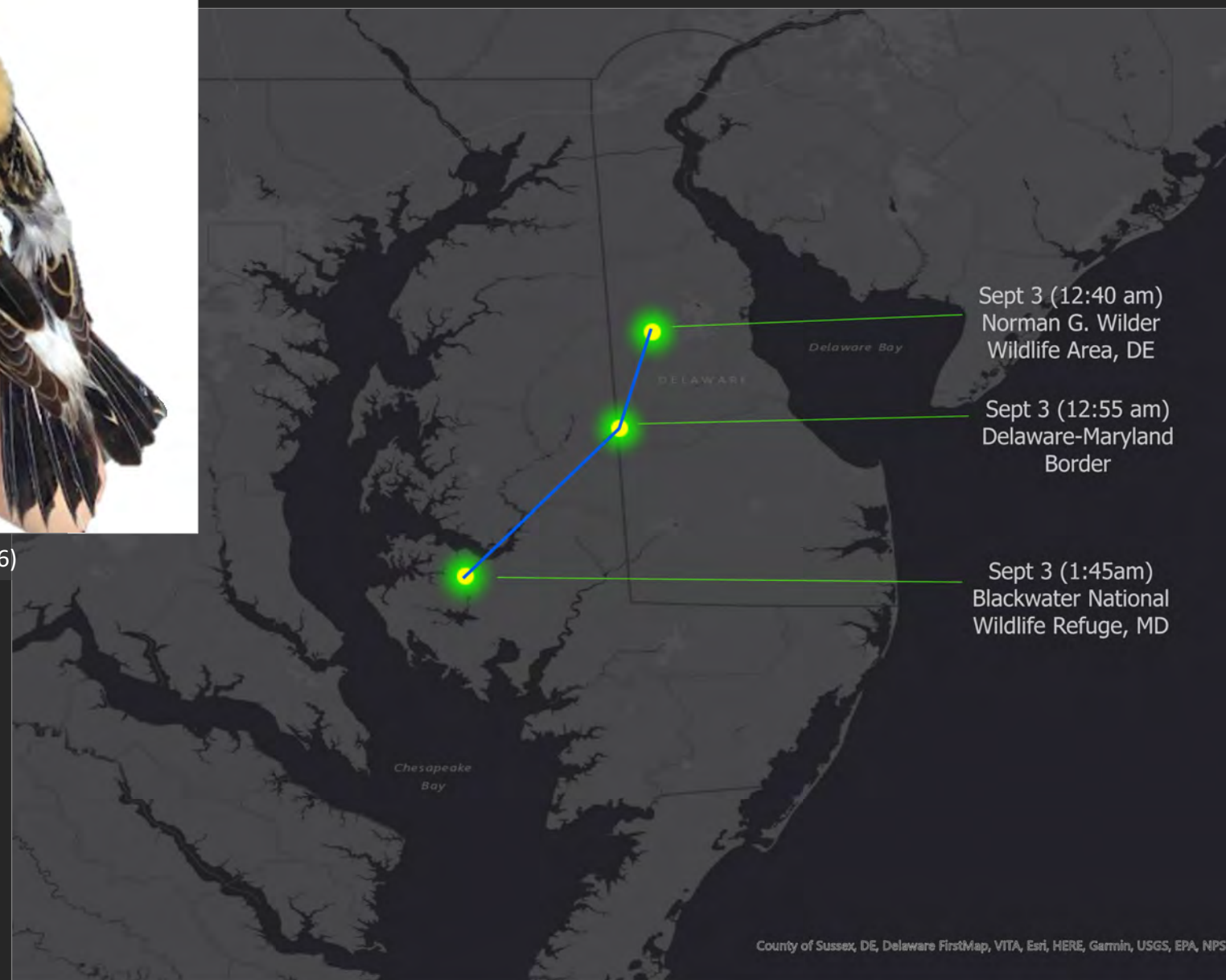
June 2 – Aug 15

97 local detections among Buck & Doe, Buck Run, and Old Schoolhouse Farms

From June 7 to July 5, he was detected almost exclusively at Old Schoolhouse Farm with almost continuous detections on the majority of those days.

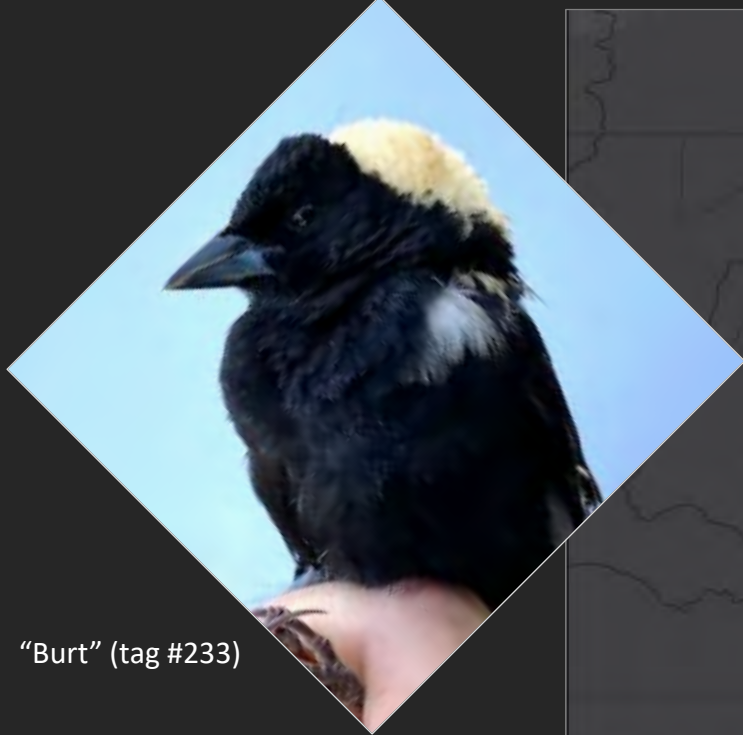


"Boyd" (tag #236)



Phase II – Migration Movement

After 18 days of no detections, Boyd was detected early in the morning of Sept 3 flying towards the Chesapeake Bay.



“Burt” (tag #233)



Activity in Doe Run Area

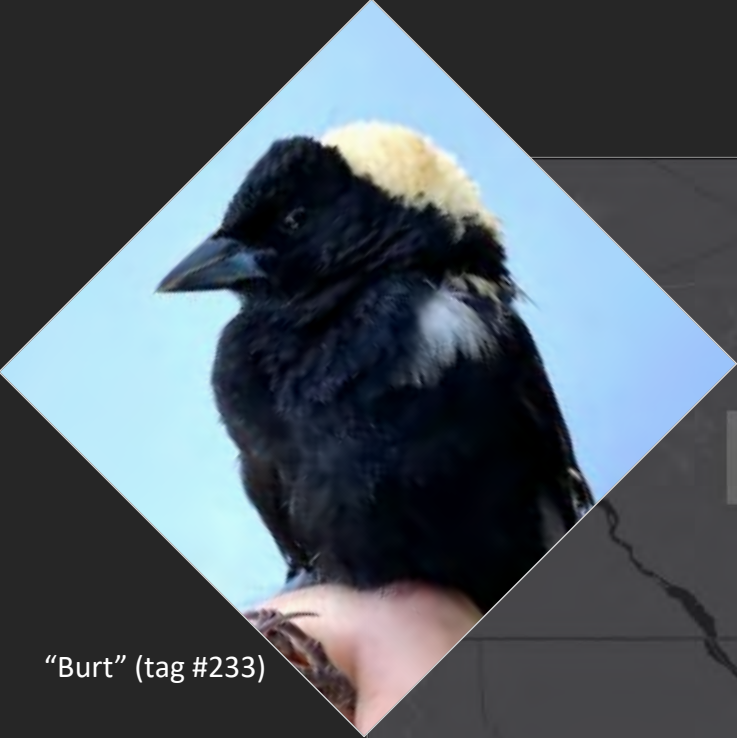
May 27

Male tagged at Buck & Doe Farm – “Burt” (tag #233)

May 20 – Aug 12

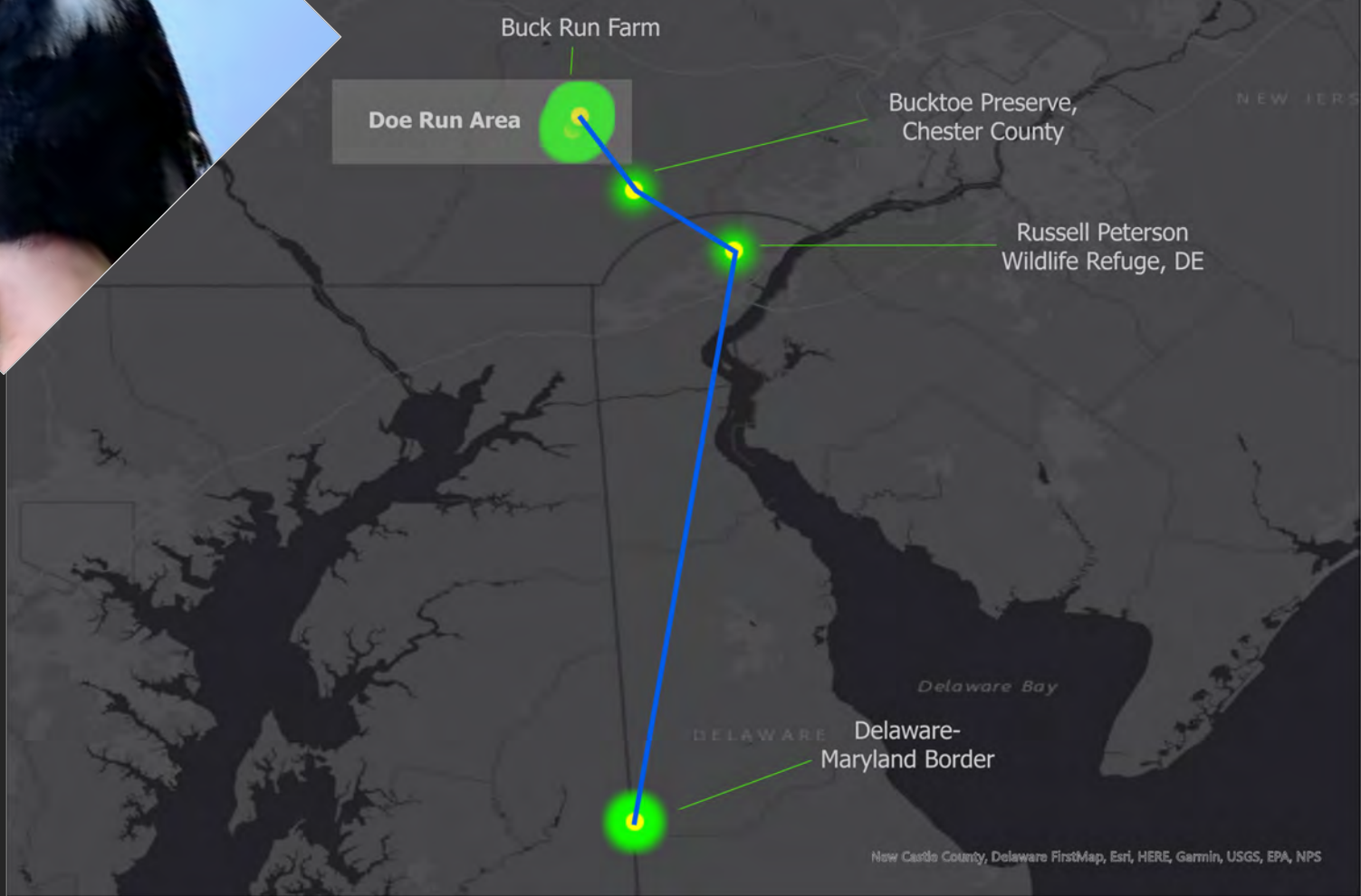
131 local detections among Buck & Doe, Buck Run, and Old Schoolhouse Farms

Detections at Buck Run Farm were almost continuous between July 21 and Aug 11.



“Burt” (tag #233)

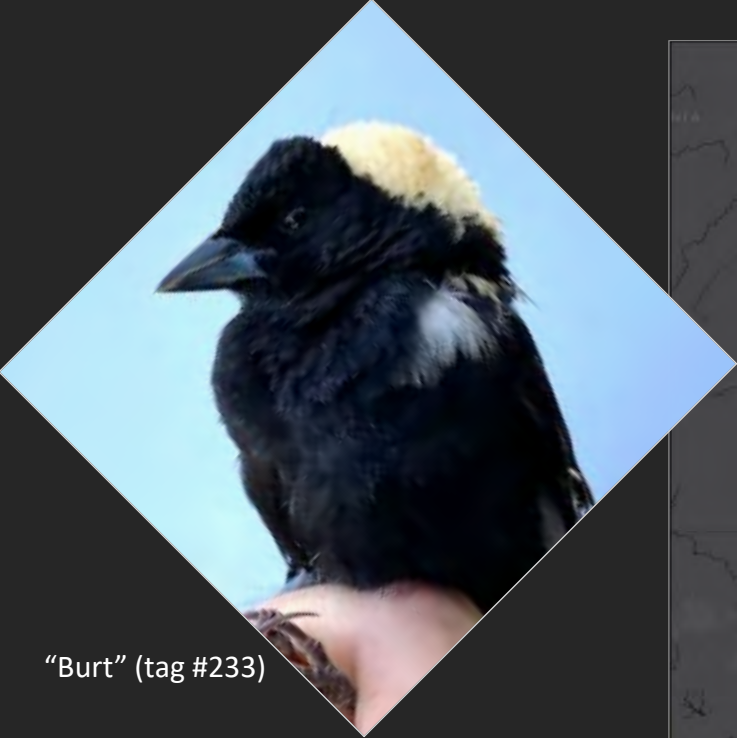
Aug	12	Buck Run (12:15 pm)
		Bucktoe Preserve (12:35 pm)
		RP Wildlife Refuge (12:45 pm)
	13	DE-MD Border



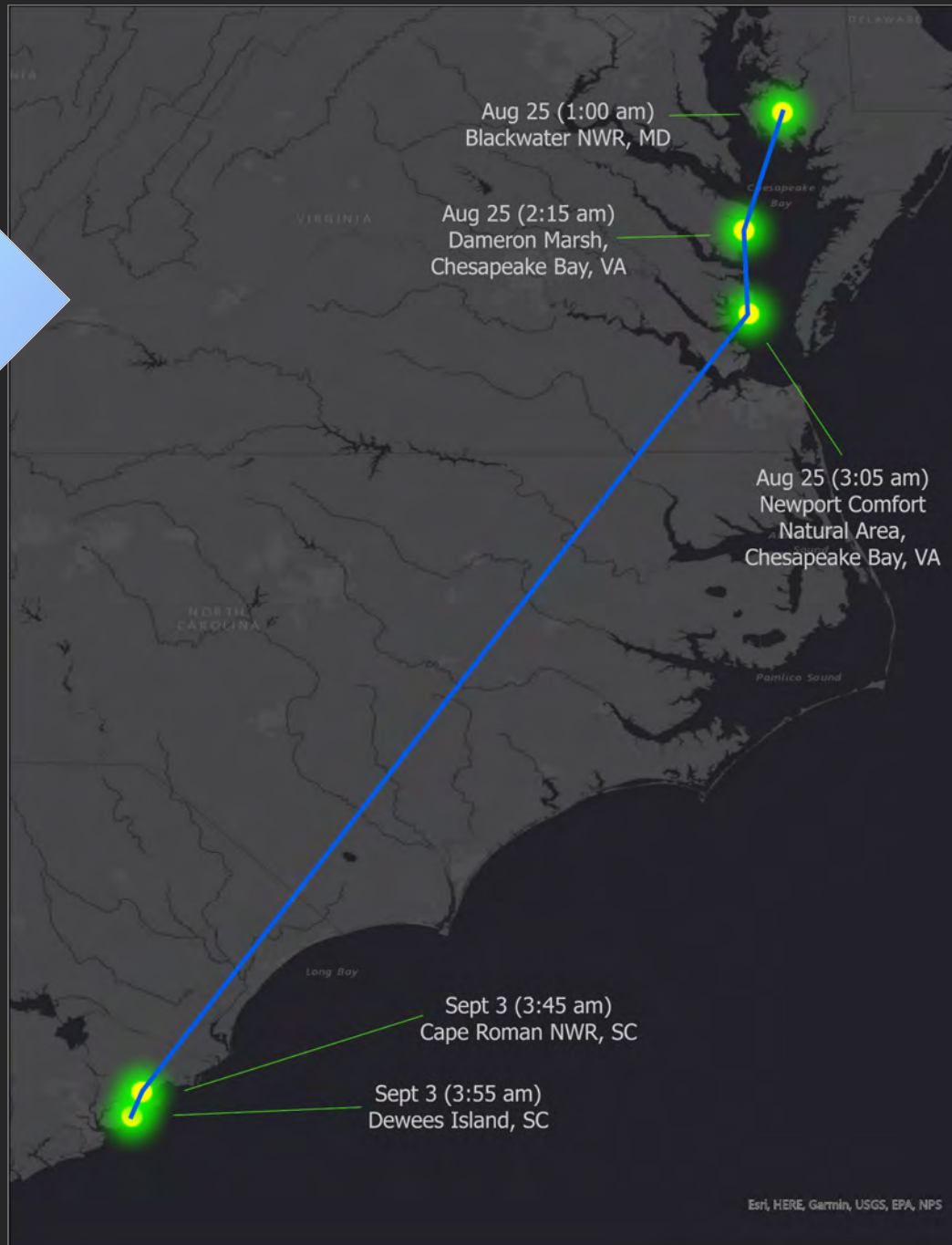
Phase II – Post-Breeding Movement

On Aug 12, Burt left the Doe Run area for the season. He spent the next 10 days, Aug 13 – 23, in an agricultural area along the DE - MD border.

New Castle County, Delaware FirstMap, Esri, HERE, Garmin, USGS, EPA, NPS



"Burt" (tag #233)

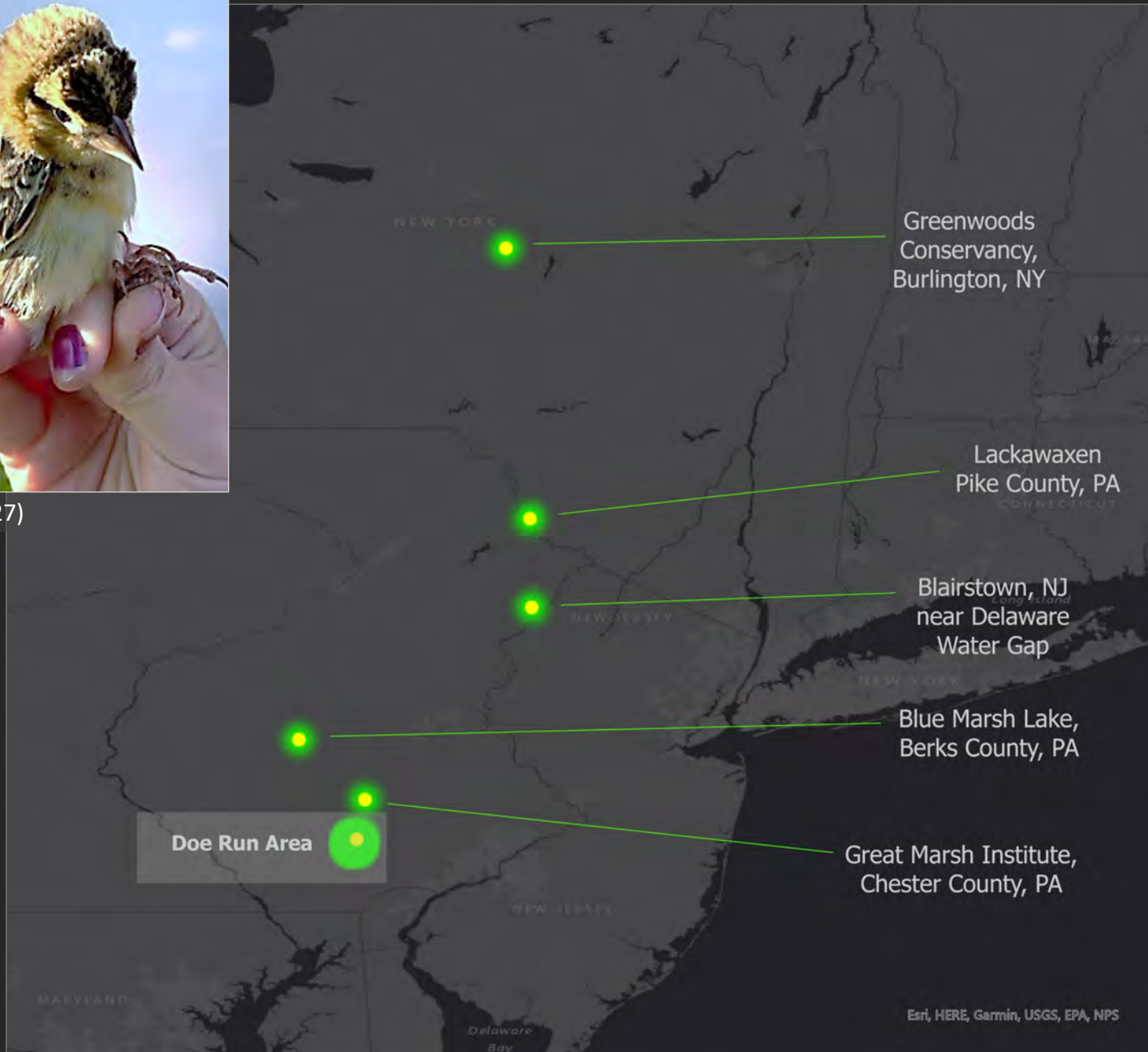


Phase III – Migration Movement

Burt's migration began on Aug 25. Over the course of 8 days, he made his way south along the East Coast, arriving at Dewees Island, SC on Sept 3.



“Beatrice” (tag #227)



Activity in Doe Run Area

May 20

Female tagged at Old Schoolhouse Farm – “Beatrice” (tag #227)

June 4 – Aug 1

44 detections at Buck & Doe, Buck Run, and Old Schoolhouse Farms

From June 9 until July 4, she spent the vast majority of her time at Old Schoolhouse Farm.

After July 4, Beatrice’s detections became more sporadic, except for a period between July 14 – 15 and again on July 18 when she returned to Old Schoolhouse Farm and was detected almost continuously.



"Beatrice" (tag #227)

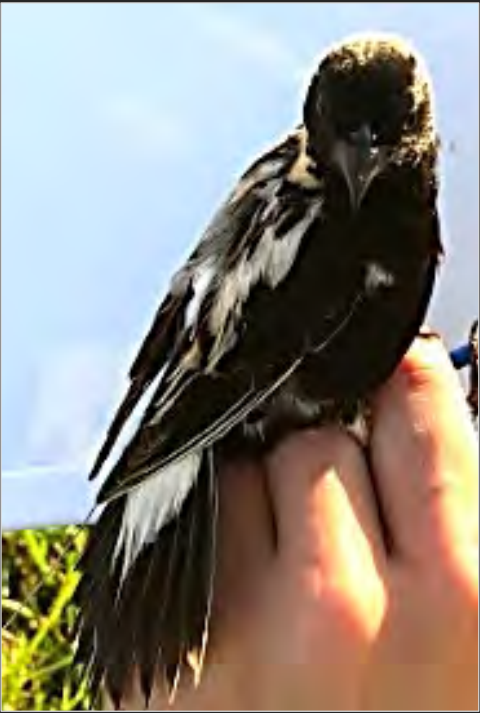


- June 8 Old Schoolhouse Farm (2:15 am)
- Great Marsh Institute (2:40 am)
- Blue Marsh Lake (3:15 am)
- Greenwood Conservancy (7:30 am)
- 9 Lackawaxen, PA (8:35 am)
- Blairstown, NJ (10:10 am)
- Old Schoolhouse Farm (2:20 pm)

36-Hour Journey North

This early-morning journey began on June 8 and ended the next afternoon.

Beatrice traveled over 400 miles round-trip during peak breeding time.



"Baxter" (tag #230)



Activity in Doe Run Area

May 27

Male tagged at Buck & Doe Farm –
"Baxter" (tag #230)

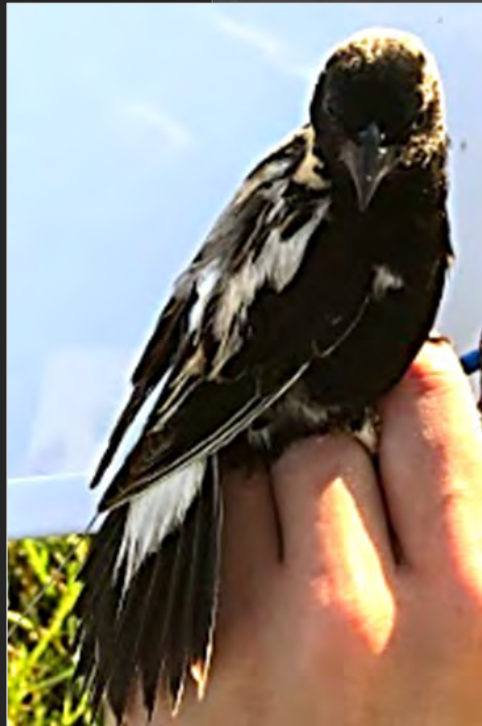
May 28 – Sept 3

127 local detections among Buck & Doe, Buck Run, and Old Schoolhouse Farms

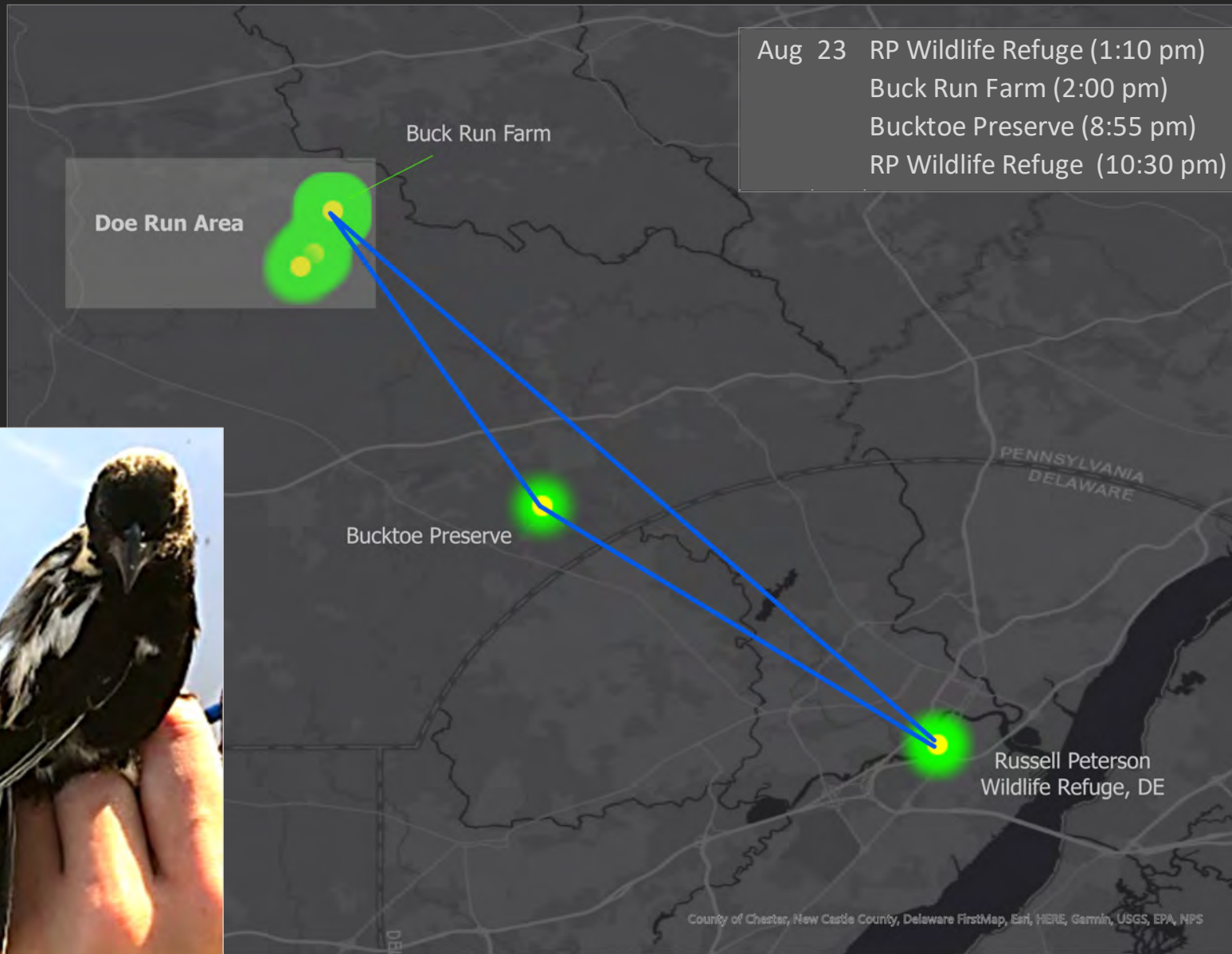
He was frequently detected at Buck & Doe Farm in early and late June and rarely detected during this time at Old Schoolhouse Farm

From July 14 – Aug 15 he was detected almost continuously at Buck Run Farm

But that's only part of Baxter's story...



"Baxter" (tag #230)

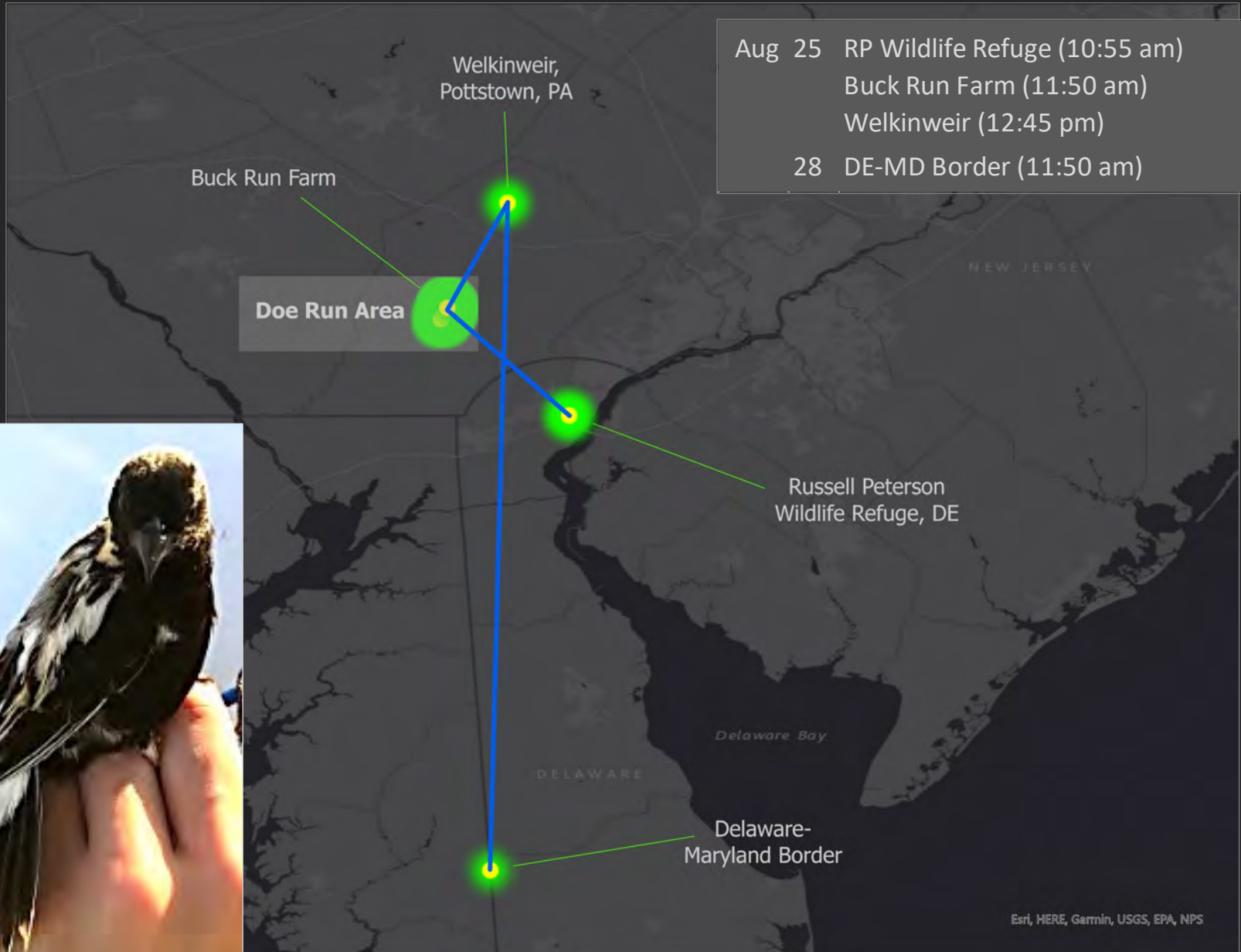


Phase II – Post-Breeding Movement

On Aug 23, Baxter traveled among local habitats within a 20 mile radius. He spent most of the afternoon in the Doe Run Area before returning to Delaware. In total, he covered 40 miles on his meanderings.



"Baxter" (tag #230)



Phase II – Post-Breeding Movement

Between Aug 25 and Aug 28, Baxter moved through a larger region (95 mile radius). He began in Delaware and moved north throughout that day. Two days later he was detected at the DE-MD border.



"Baxter" (tag #230)

Aug 30 RP Wildlife Refuge (5:15 am)
Buck Run Farm (10:45 am)
Welkinweir (12:45 pm)
Great Marsh Institute (11:15 am)
Bucktoe Preserve (11:50 pm)
31 RP Wildlife Refuge (2:05 pm)

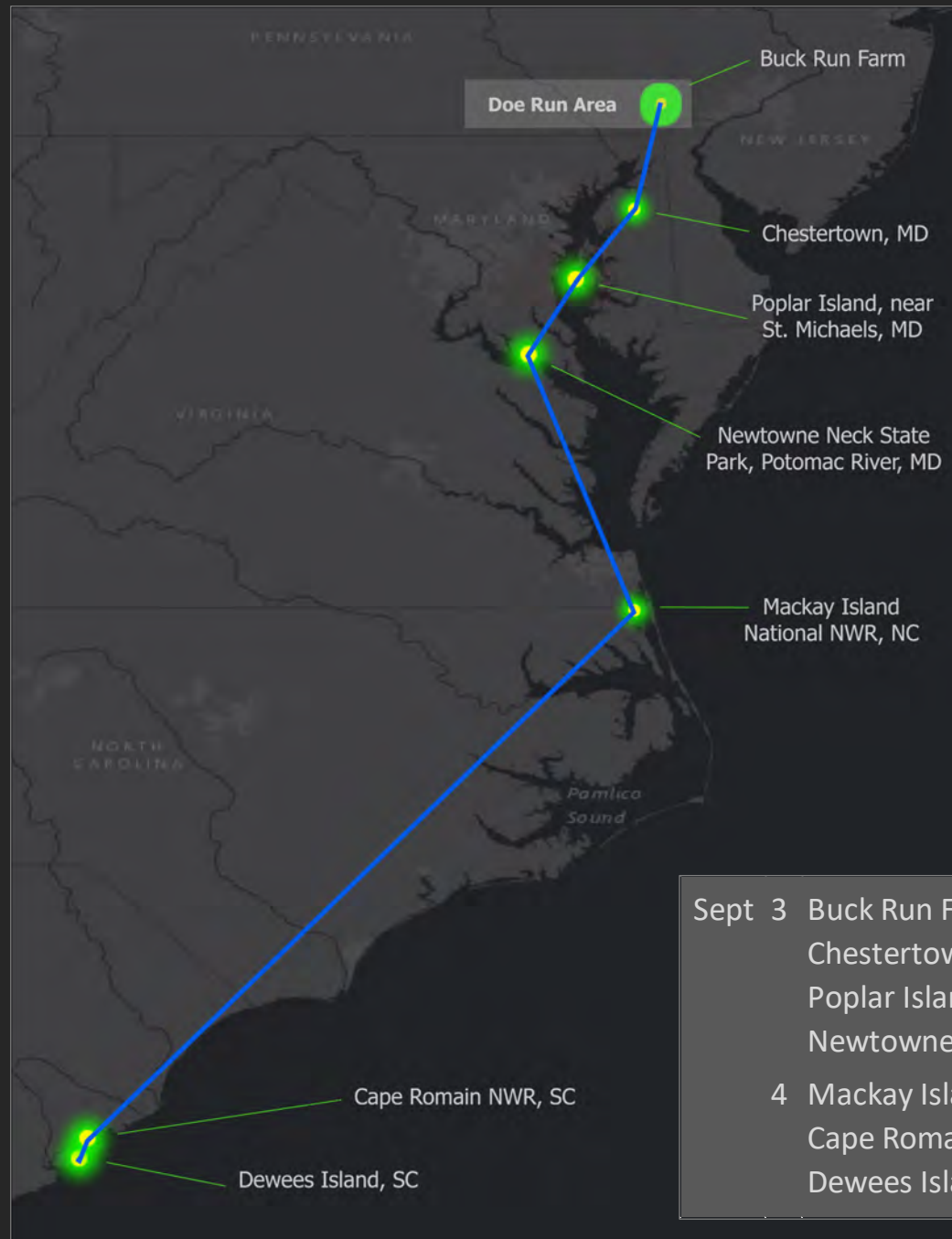


Phase II – Post-Breeding Movement

On Aug 30, Baxter was on the move again in a more localized area. He took a circuitous route, following a pattern similar to his travels two days earlier and adding a long stop-over in Pottstown. In all, he traveled over 80 miles in a 16.5 hour period.



"Baxter" (tag #230)

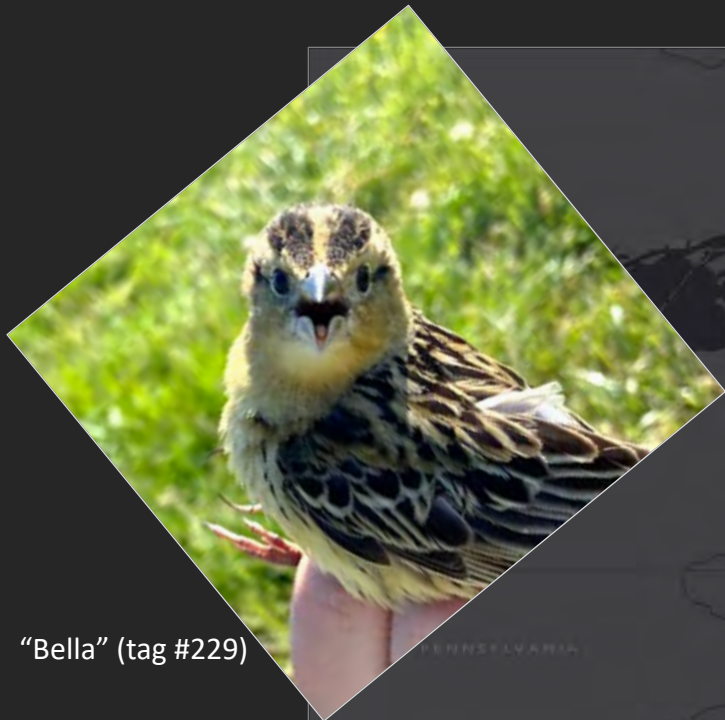


Phase III – Migration Movement

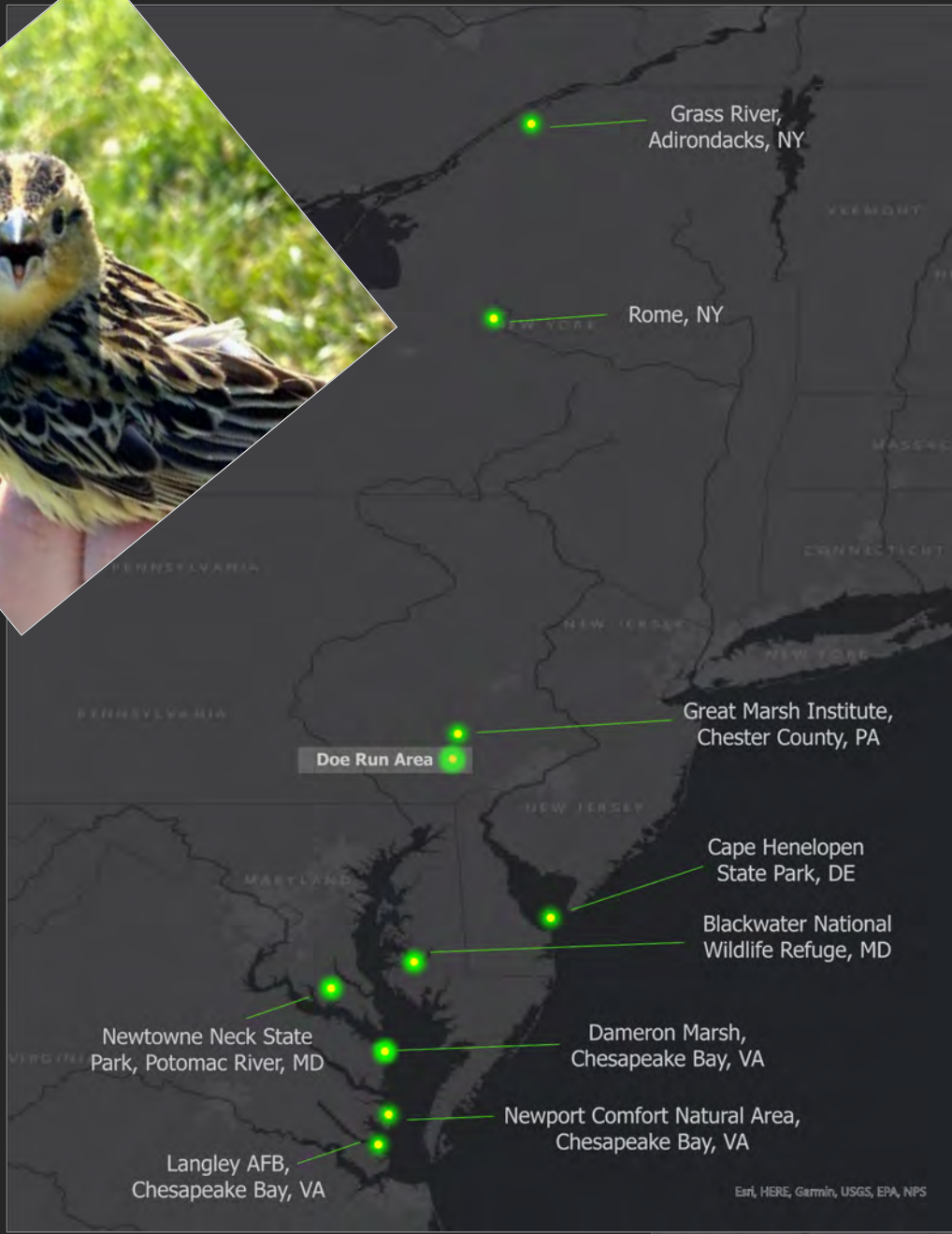
Baxter left the Doe Run area for the season on Sept 3. Over the course of 2 days, he traveled over 600 miles along the East Coast to Dewees Island, SC.

Sept 3 Buck Run Farm (12:05 am)
Chestertown (1:15 am)
Poplar Island (2:00 am)
Newtowne Neck (2:50 am)

4 Mackay Island (12:00 am)
Cape Romain NWR (12:00 pm)
Dewees Island (12:10 am)



"Bella" (tag #229)



Activity in Doe Run Area *and Beyond*

May 19

Female tagged at Buck & Doe Farm – “Bella” (tag #229)

May 21 – May 26

5 detections at Buck Run Farm before departing to northern habitat

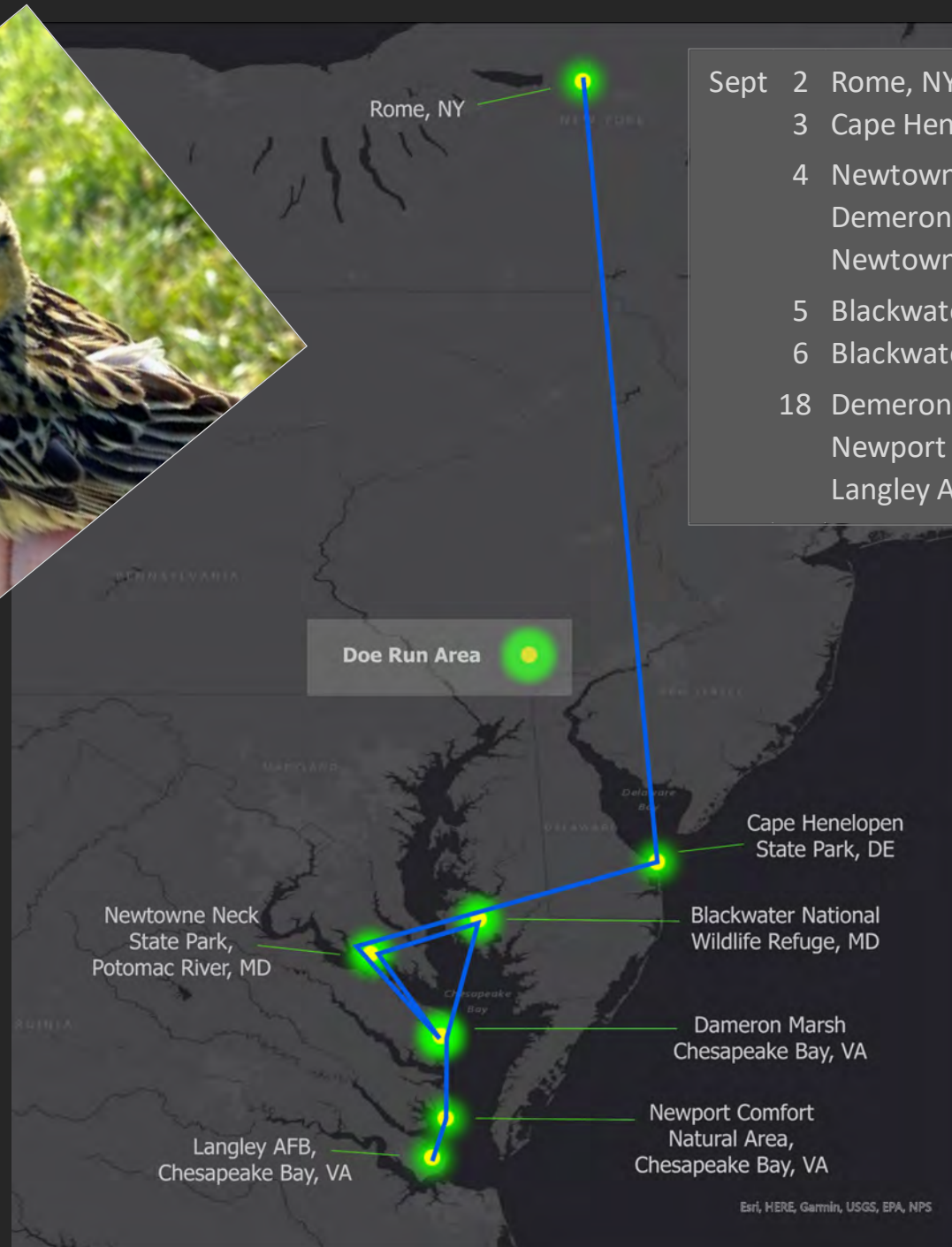


Soon after being tagged, she flew north to the Adirondacks in NY (blue line) on May 26. She was not detected again until Aug 1.

It is likely Bella spent the breeding season in a more northern territory.



"Bella" (tag #229)



- Sept 2 Rome, NY
- 3 Cape Henlopen SP
- 4 Newtowne Neck (12:50 am)
Demeron Marsh (2:00 pm)
Newtowne Neck (10:05 pm)
- 5 Blackwater Refuge
- 6 Blackwater Refuge
- 18 Demeron Marsh (12:55 am)
Newport Comfort (1:50 am)
Langley AFB (2:00 am)

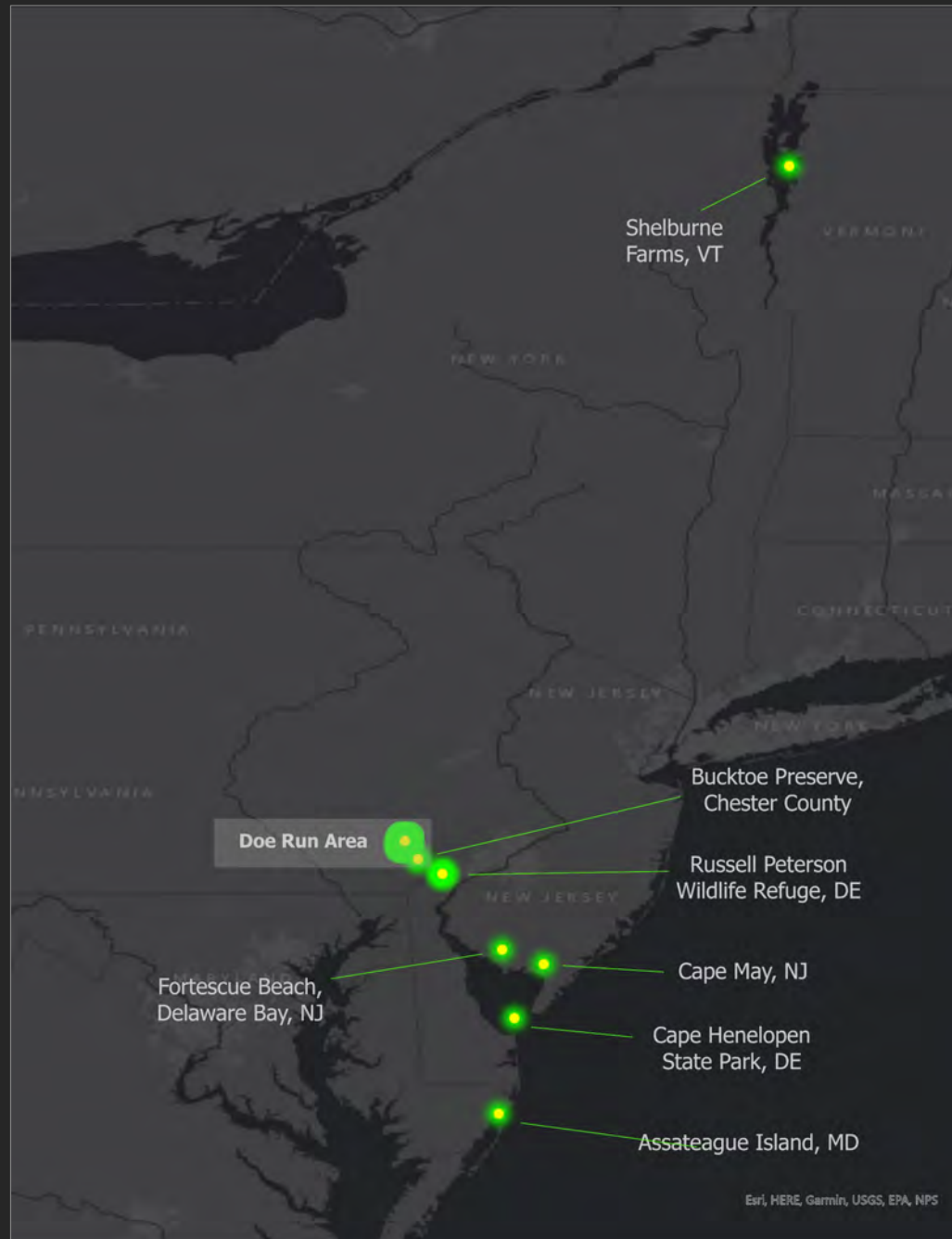
Phase II – Migration Movement

Bella briefly returned to the Doe Run area. Between Aug 1 – Aug 3, she was detected 2 times at Buck Run Farm.

Detections ceased until Sept 2 when she was detected in Rome, NY. From there, her movement was southward, but not direct. Bella traveled to the Delaware Bay and then around the Chesapeake Bay area for several days before heading south.



“Byron” (tag #235)



Activity in Doe Run Area

May 20

Male tagged at Old Schoolhouse Farm – “Byron” (tag #235)

May 22 – Aug 18

134 local detections among Buck & Doe, Buck Run, and Old Schoolhouse Farms

From May 22 until June 7, detections were split between Buck & Doe and Old Schoolhouse Farms.

From May 22 until July 2, he was detected almost exclusively at Old Schoolhouse Farm with frequent detections throughout the day.

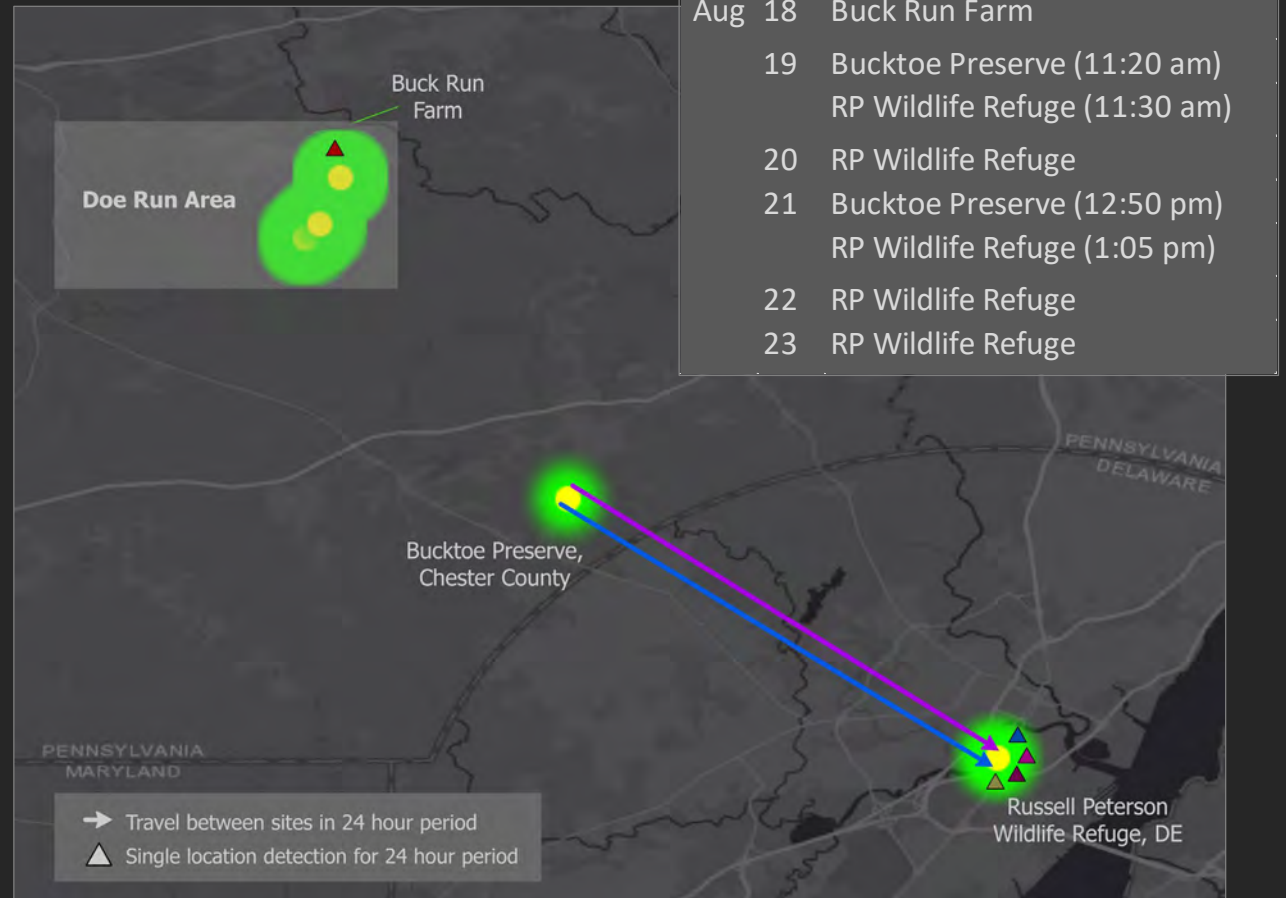
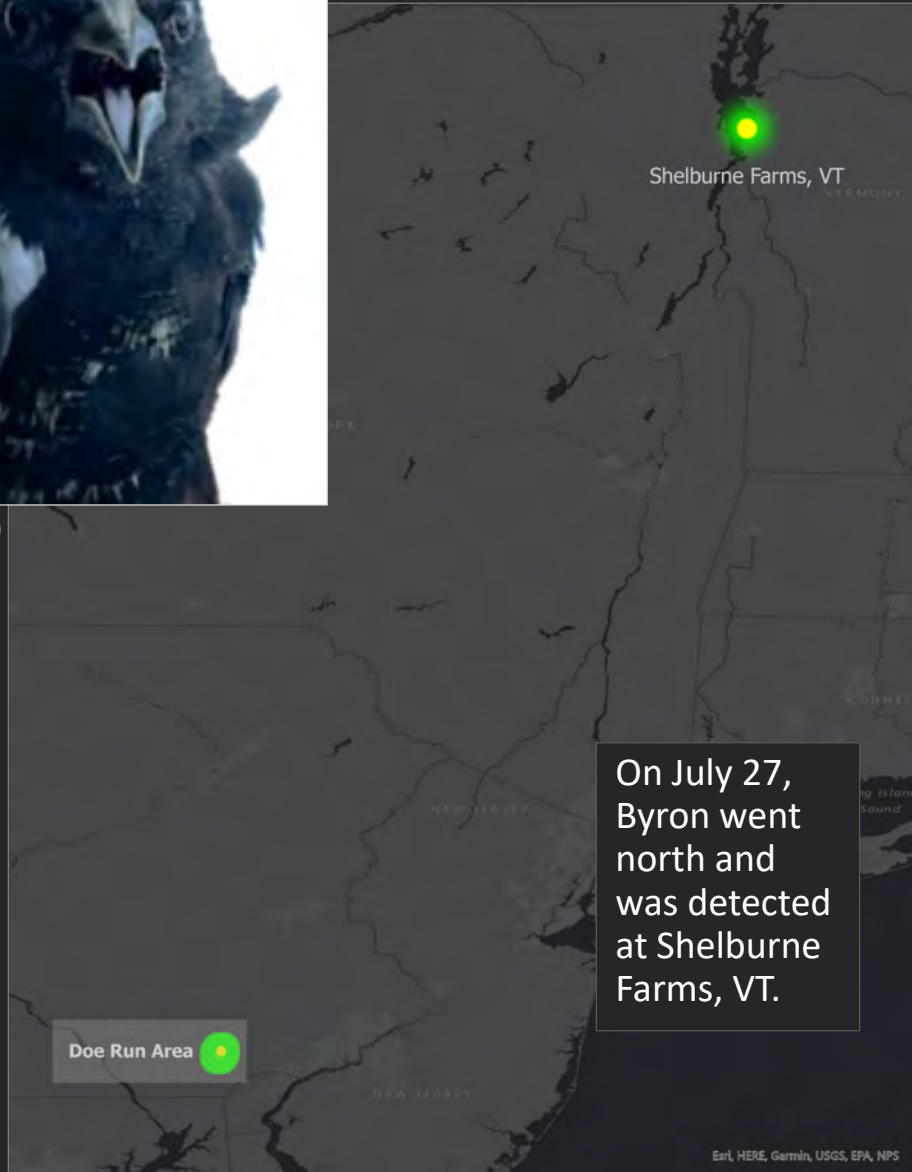
From July 7 until Aug 15 Byron spent the vast majority of his time at Buck Run Farm, which was marked by almost continuous detections during that time.



“Byron” (tag #235)

Movement Beyond Doe Run Area

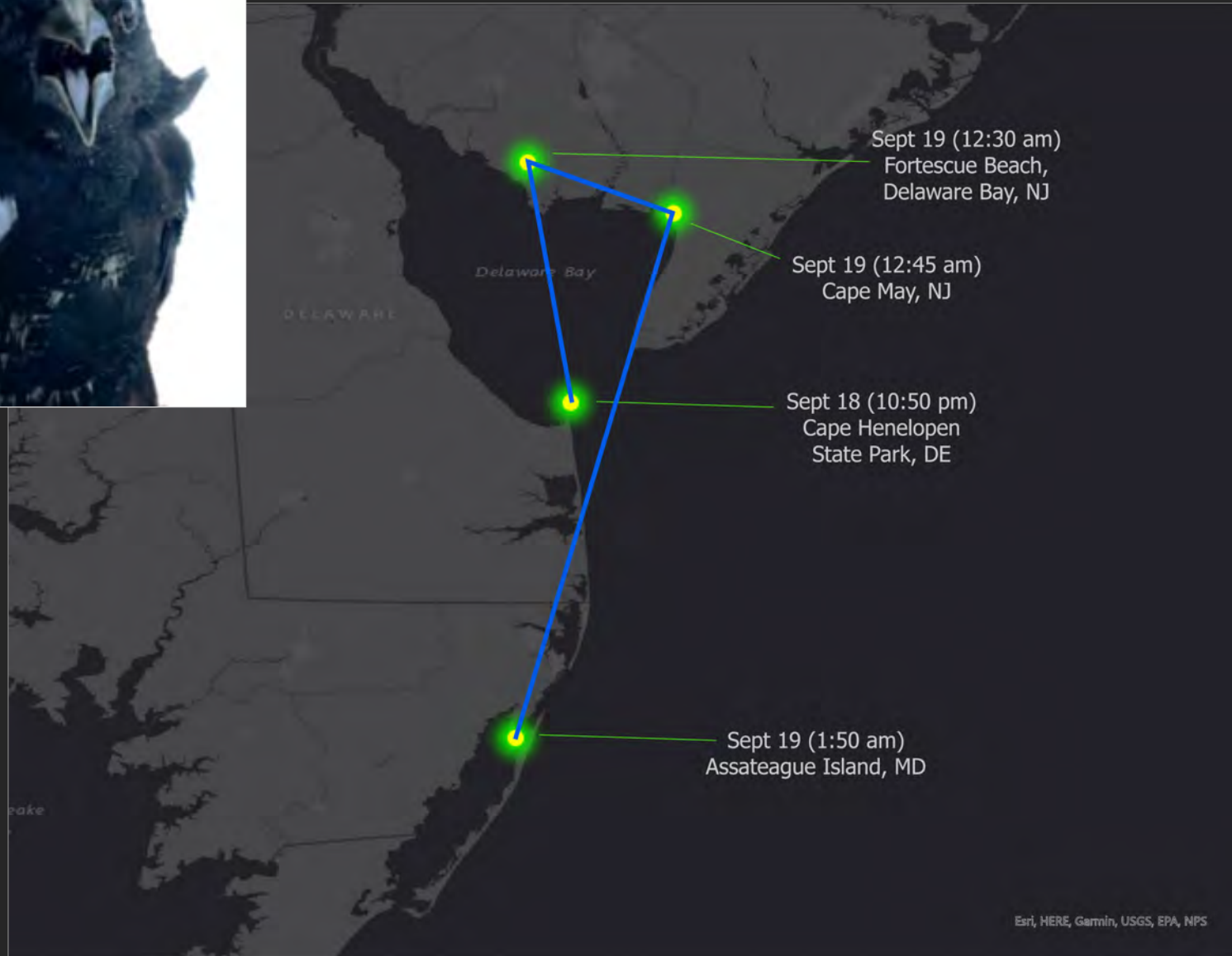
Byron left the Doe Run Area on Aug 18 but continued to move around the local area for another 5 days. There were no more detections after Aug 23 until he was detected on Sept 18 at Cape Henlopen State Park, DE.



Lines represents a single day's movement. Triangles indicate Byron remained in a single location for 24 hours.



"Byron" (tag #235)



Phase III – Migration Movement

Byron was detected around the Delaware Bay before he set off on his southern migration. On Sept 18 he left Cape Henlopen late at night. In the early hours of Sept 19, he flew around the bay before making his way south to Assateague Island, MD.



"Beau" (tag #221)



Activity in Doe Run Area

May 26

Male tagged at Buck Run Farm – "Beau" (tag #221)

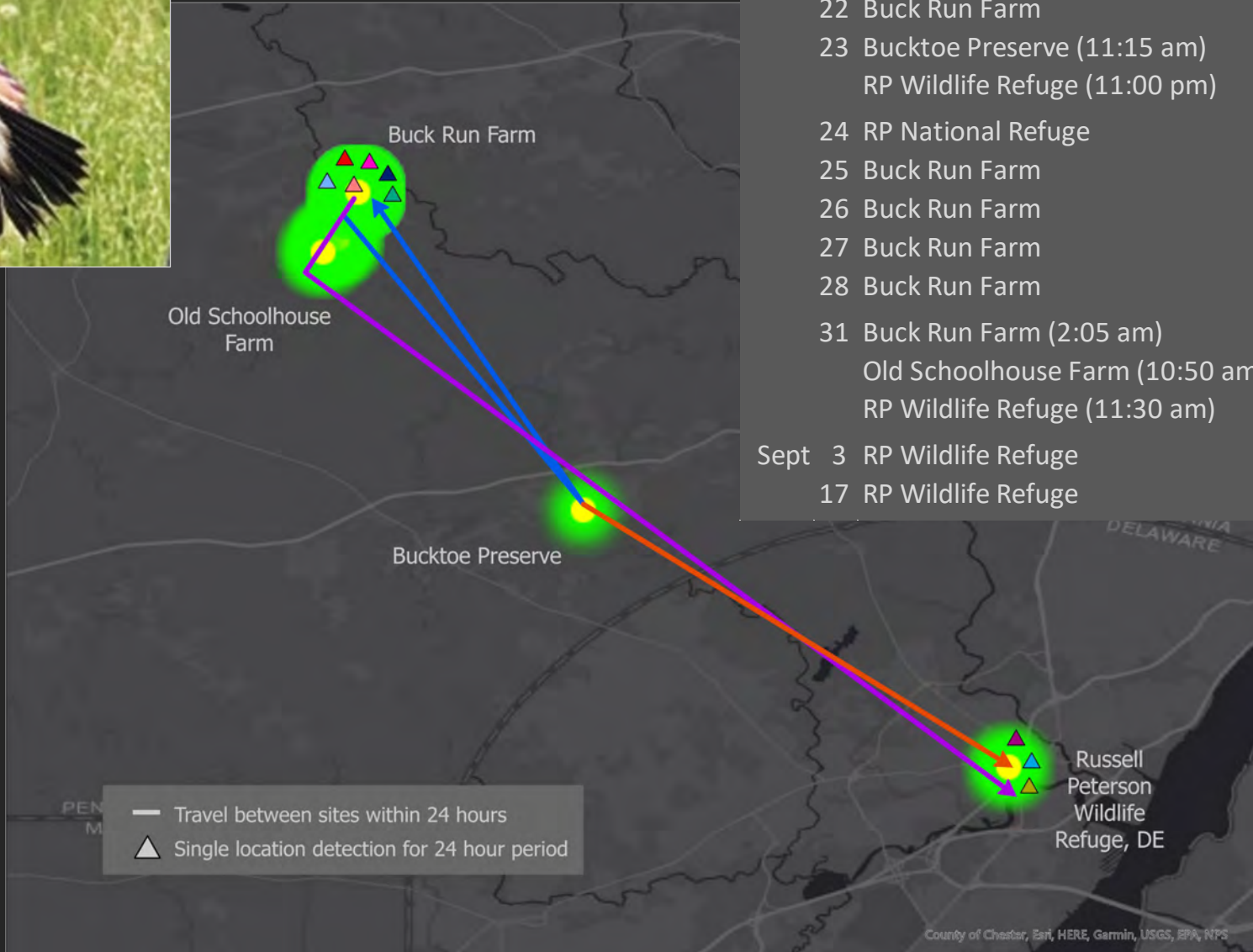
May 26 - Aug 20

117 local detections at Buck & Doe, Buck Run, and Old Schoolhouse Farms

The majority of Beau's detections were at Buck Run Farm. From May 25 to Aug 22, he was detected almost continuously at Buck Run Farm.



"Beau" (tag #221)



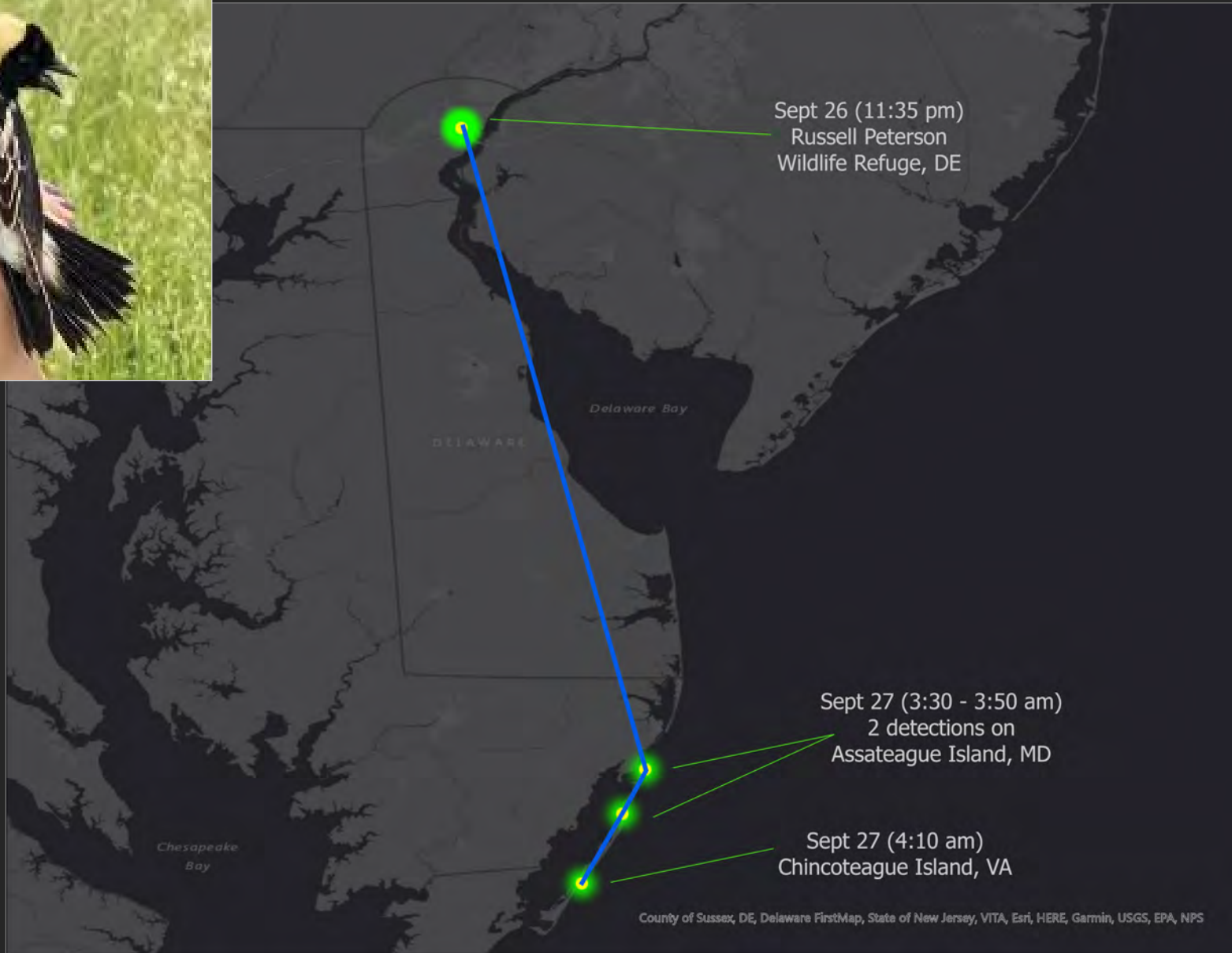
- Aug 20 Buck Run Farm (11:20 am)
Bucktoe Preserve (1:45 pm)
Buck Run Farm (11:15 pm)
- 21 Buck Run Farm
- 22 Buck Run Farm
- 23 Bucktoe Preserve (11:15 am)
RP Wildlife Refuge (11:00 pm)
- 24 RP National Refuge
- 25 Buck Run Farm
- 26 Buck Run Farm
- 27 Buck Run Farm
- 28 Buck Run Farm
- 31 Buck Run Farm (2:05 am)
Old Schoolhouse Farm (10:50 am)
RP Wildlife Refuge (11:30 am)
- Sept 3 RP Wildlife Refuge
- 17 RP Wildlife Refuge

Phase II – Post-Breeding Movement

Beginning on Aug 20, Beau moved between the Doe Run area, Bucktoe, and Russell Peterson Wildlife Refuge, DE for 28 days. On some days, he would move between sites (represented by each line on the map). On other days he would remain at the same site for a 24-hour period (represented by the triangles on the map).



"Beu" (tag #221)

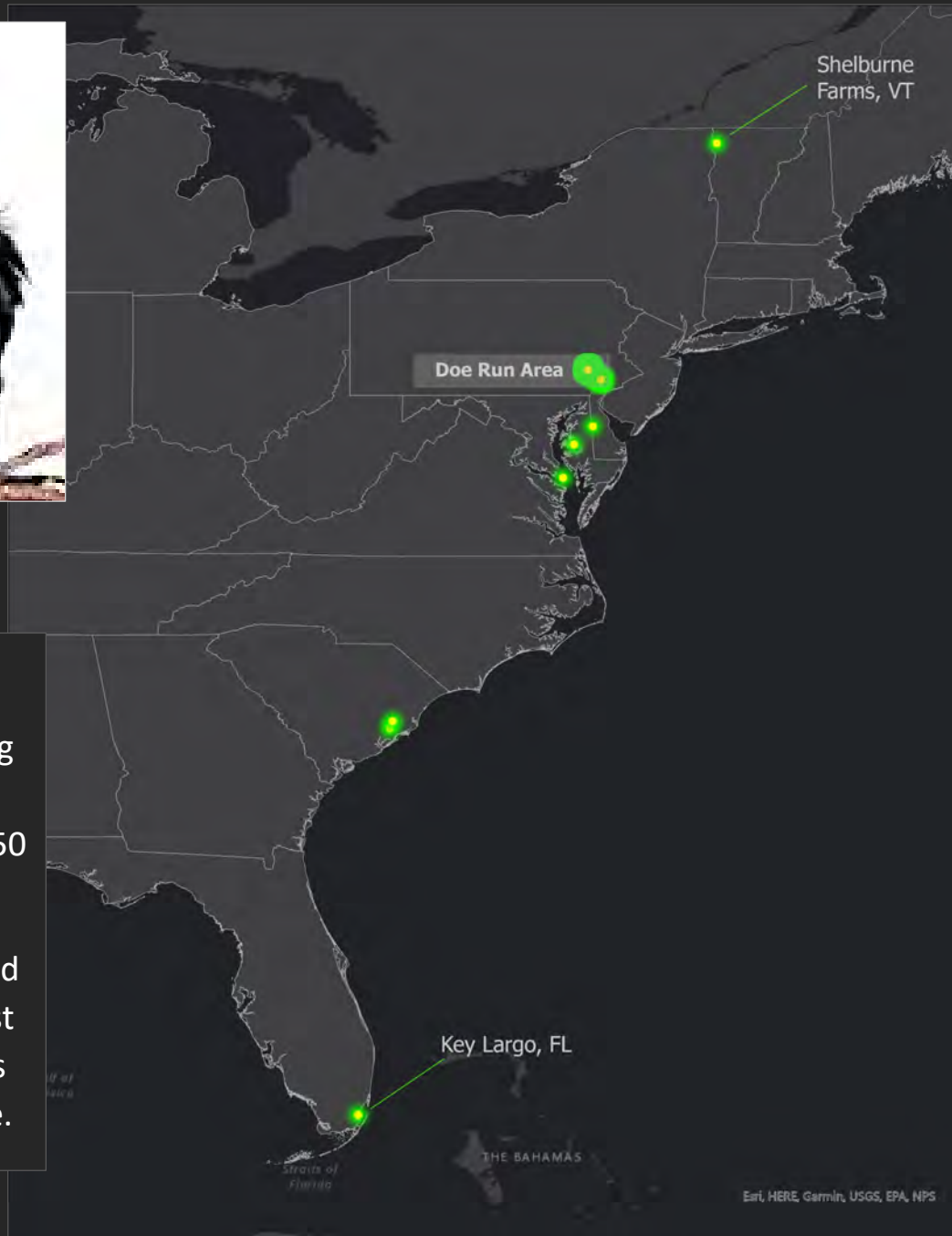


Phase III – Migration Movement

On Aug 26, Beau began migrating south. He traveled 125 miles in less than 5 hours and was last detected at Chincoteague Island on Sept 27.



"Bernard" (tag #231)



Activity in Doe Run Area and Beyond

May 21

Male tagged at Buck & Doe Farm –
"Bernard" (tag #231)

May 21 – Aug 30

66 local detections among Buck & Doe,
Buck Run, and Old Schoolhouse Farms

From May 27 – June 29, he was
detected most frequently at Buck &
Doe Farm, sometimes continuously.

From June 30 until Aug 8, Bernard was
detected almost continuously at Buck
Run Farm with 2 exceptions. July 1 – 3
he returned briefly to Buck & Doe
Farm. Then again on July 4 – 5 he spent
almost 24 hours there.

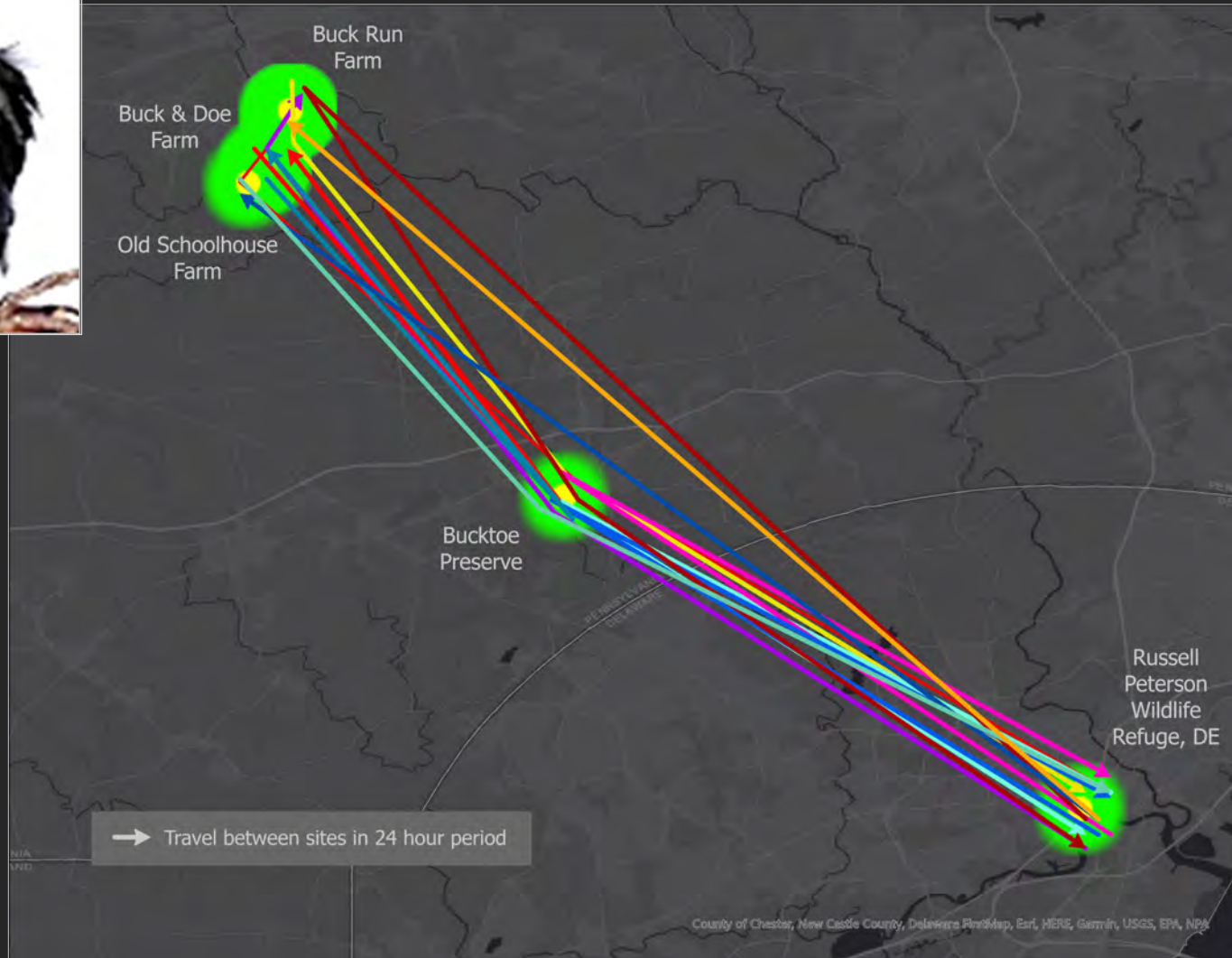
Farthest Flyer Award

On June 11, during breeding
season, he was detected at
Shelburne Farms, almost 350
miles to the north.

On Sept 11, he was detected
in Key Largo, FL, the farthest
point south any of our birds
have been detected to date.



"Bernard" (tag #231)



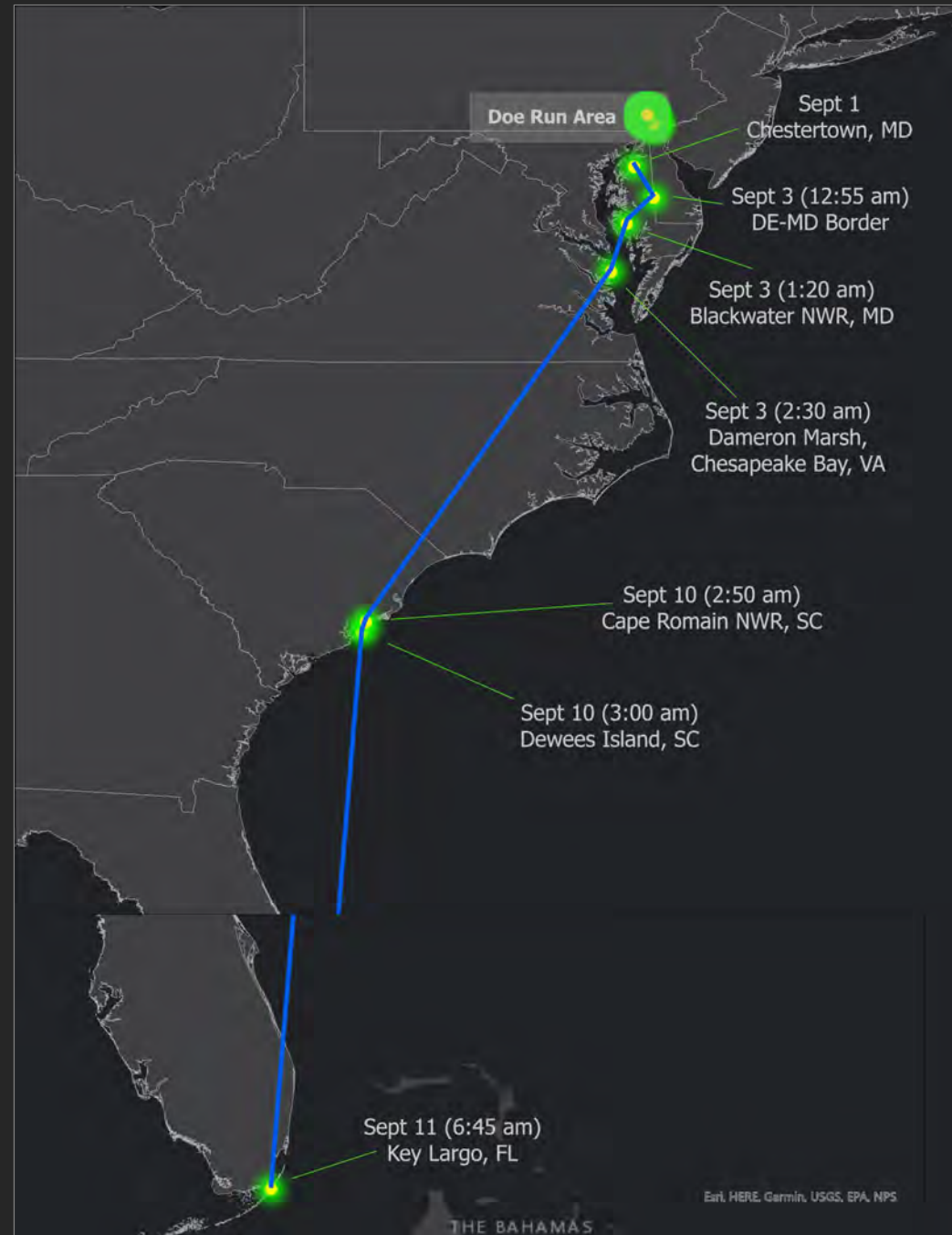
Phase II – Post-Breeding Movement

From Aug 16 – Aug 30, Bernard moved almost daily within a 20 mile radius among Doe Run area fields, Bucktoe Preserve, and the Russell Peterson Wildlife Refuge, DE. Each line on the map represents his movement within a 24 hour period.

He spent his nights in the Doe Run area or at the wildlife refuge. During the day, he often made multiple stops.



"Bernard" (tag #231)

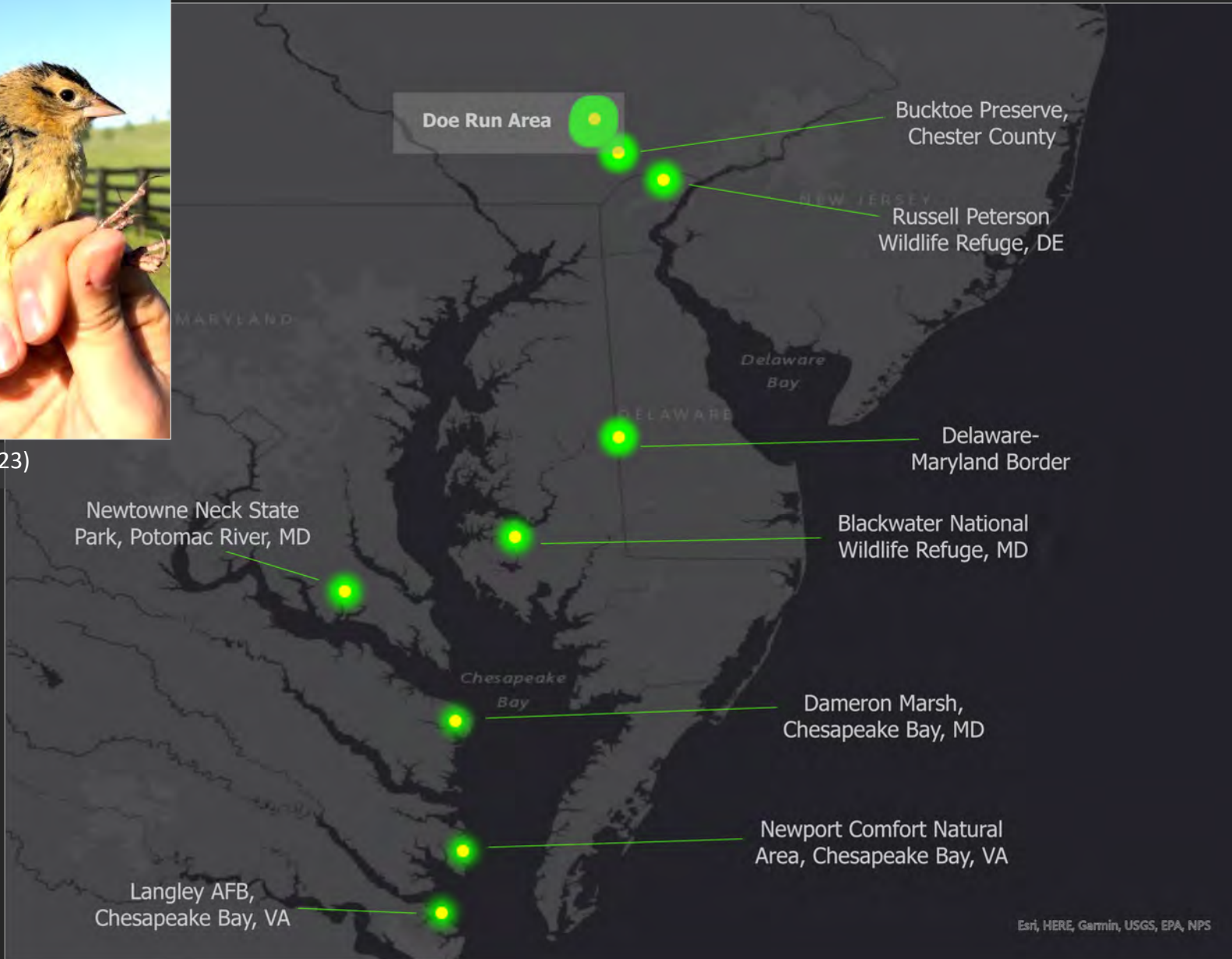


Phase III – Migration Movement

Bernard began migrating on Sept 3. Over 9 days, he traveled along the East Coast covering about 1000 miles. He was last detected in Key Largo, FL on Sept 11.



"Basil" (tag #223)



Activity in Doe Run Area

May 21

Female tagged at Buck & Doe Farm – “Basil” (tag #223)

May 21 – Aug 13

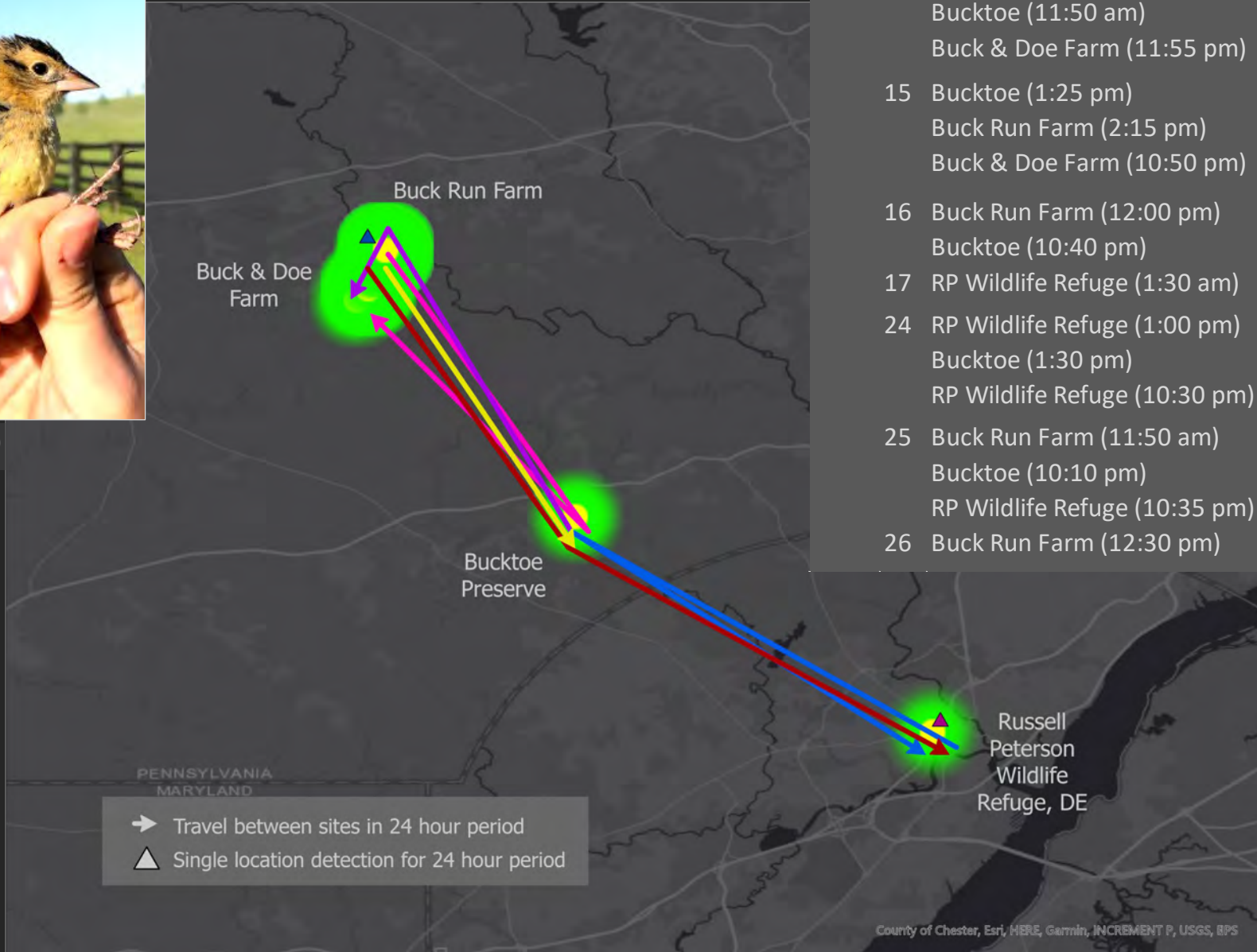
132 local detections among Buck & Doe, Buck Run, and Old Schoolhouse Farms

From May 21 until July 4, she spent the majority of her time at Buck & Doe Farm.

From July 4 until Aug 14, Basil was detected almost continuously at Buck Run Farm.



"Basil" (tag #223)



Lines represents a single day's movement. Triangles indicate Basil remained in a single location for 24 hours.

Phase II – Post-Breeding Movement

In mid-August, Basil began using habitats across a 20 mile area.

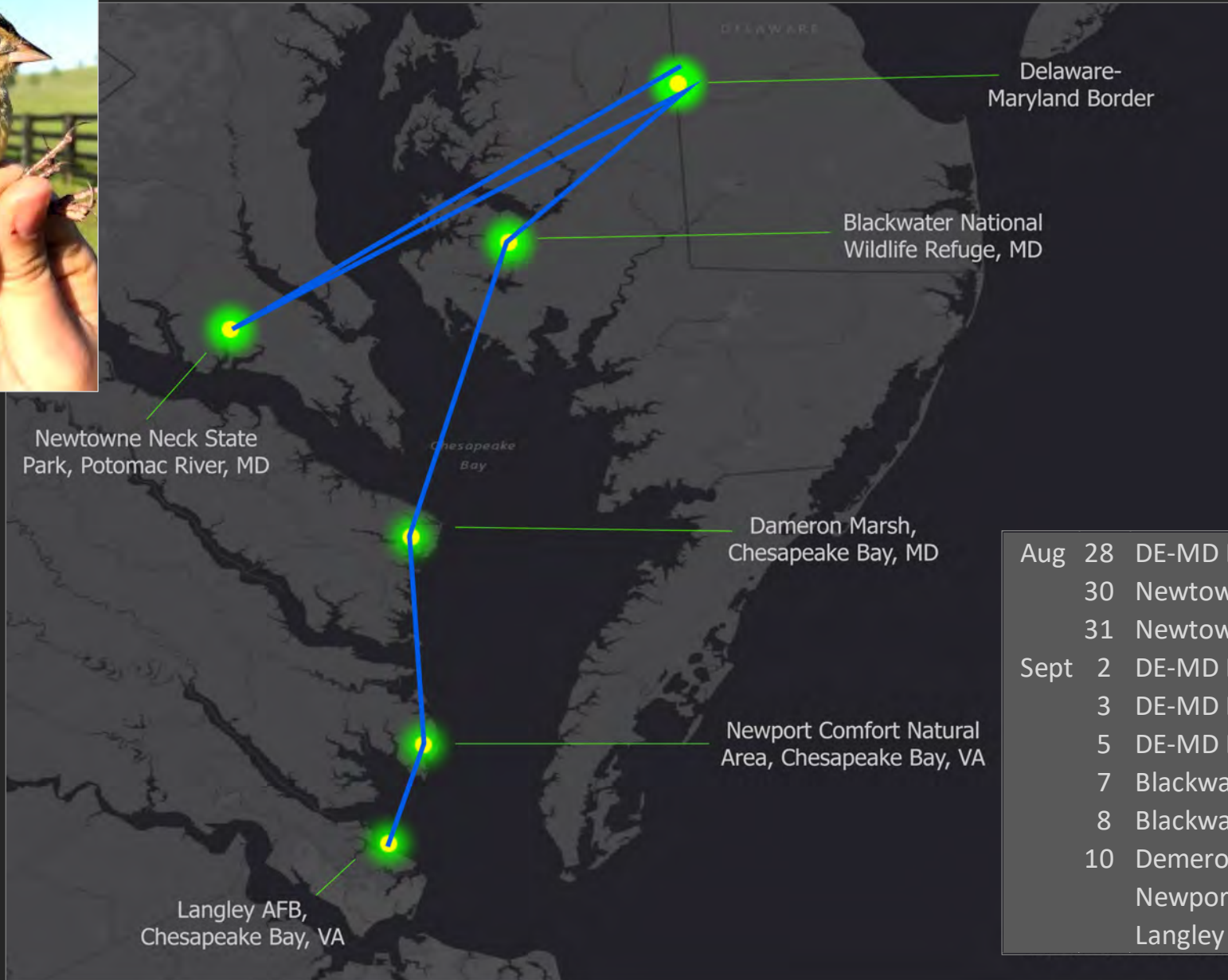
Then there were no detections for 6 days.

On Aug 24, she was detected again at the Russell Peterson Wildlife Refuge, DE and began moving around that area over the next 2 days.

Basil was last detected in the Doe Run area on Aug 26.



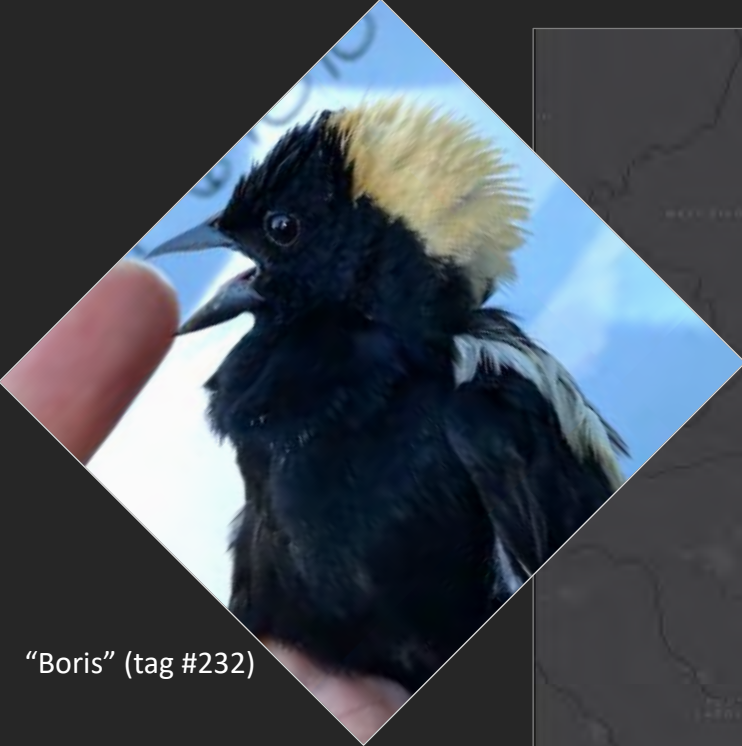
"Basil" (tag #223)



Phase III – Migration Movement

The third phase is marked by Basil's southern movement. Her flight was not direct. Rather, she moved between sites 65 mile apart for more than a week before heading south.

Aug	28	DE-MD Border
	30	Newtowne Neck
	31	Newtowne Neck
Sept	2	DE-MD Border
	3	DE-MD Border
	5	DE-MD Border
	7	Blackwater Refuge
	8	Blackwater Refuge
	10	Demeron Marsh (12:40 am)
		Newport Comfort (1:30 am)
		Langley AFB (1:40 am)



"Boris" (tag #232)



Activity in Doe Run Area

May 20

Male tagged at Old Schoolhouse Farm – “Boris” (tag #232)

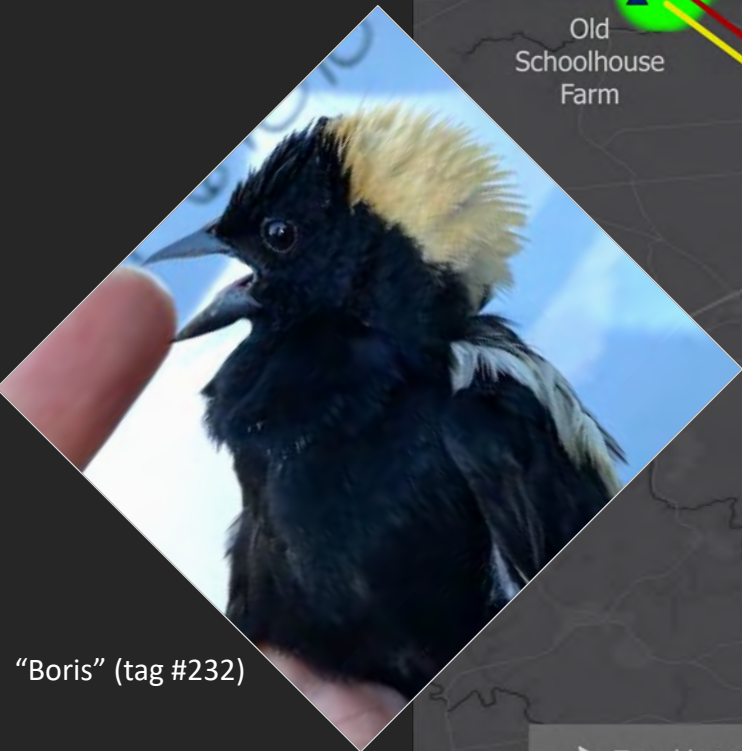
May 21 – Aug 27

107 local detections among Buck & Doe, Buck Run, and Old Schoolhouse Farms

Before June 18, the majority of the detections were at Buck Run Farm.

From June 18 until July 5, Boris spent most of his time at Old Schoolhouse Farm. During this time, there were periods of continuous detection at Old Schoolhouse Farm intermixed with trips to Buck & Doe Farm.

After July 5, most of the detections were at Buck Run Farm though he did return periodically to Old Schoolhouse Farm.



"Boris" (tag #232)



Aug 14	Buck & Doe (10:35 am) RP Wildlife Refuge (12:55 pm)
21	Buck Run Farm (10:55 am) RP Wildlife Refuge (12:20 pm)
22	Buck Run Farm
23	Buck Run Farm
25	Old Schoolhouse Farm
26	Old Schoolhouse Farm (12:50 pm) RP Wildlife Refuge (10:50 pm)
27	RP Wildlife Refuge (11:50 am) Old Schoolhouse Farm (12:40 pm)

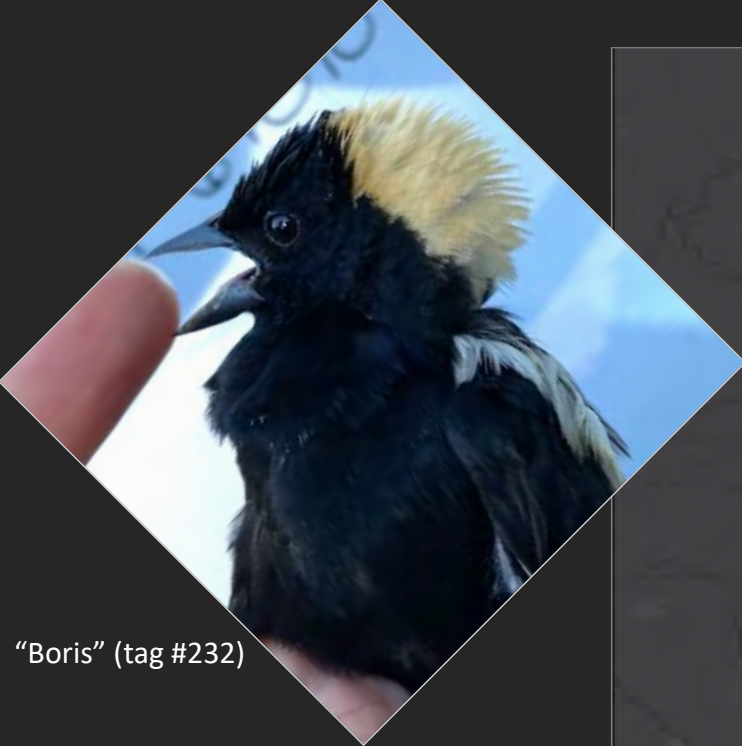
Phase II – Post-Breeding Movement

From July 14 – Aug 14, Boris was only detected in the Doe Run area 5 times.

He began spending more time in the area on Aug 14, but his local range expanded over the next 13 days.

In that time, he was making regular trips to the Russell Peterson National Refuge, DE.

Lines represents a single day's movement. Triangles indicate Boris remained in a single location for a 24 hour period.



"Boris" (tag #232)



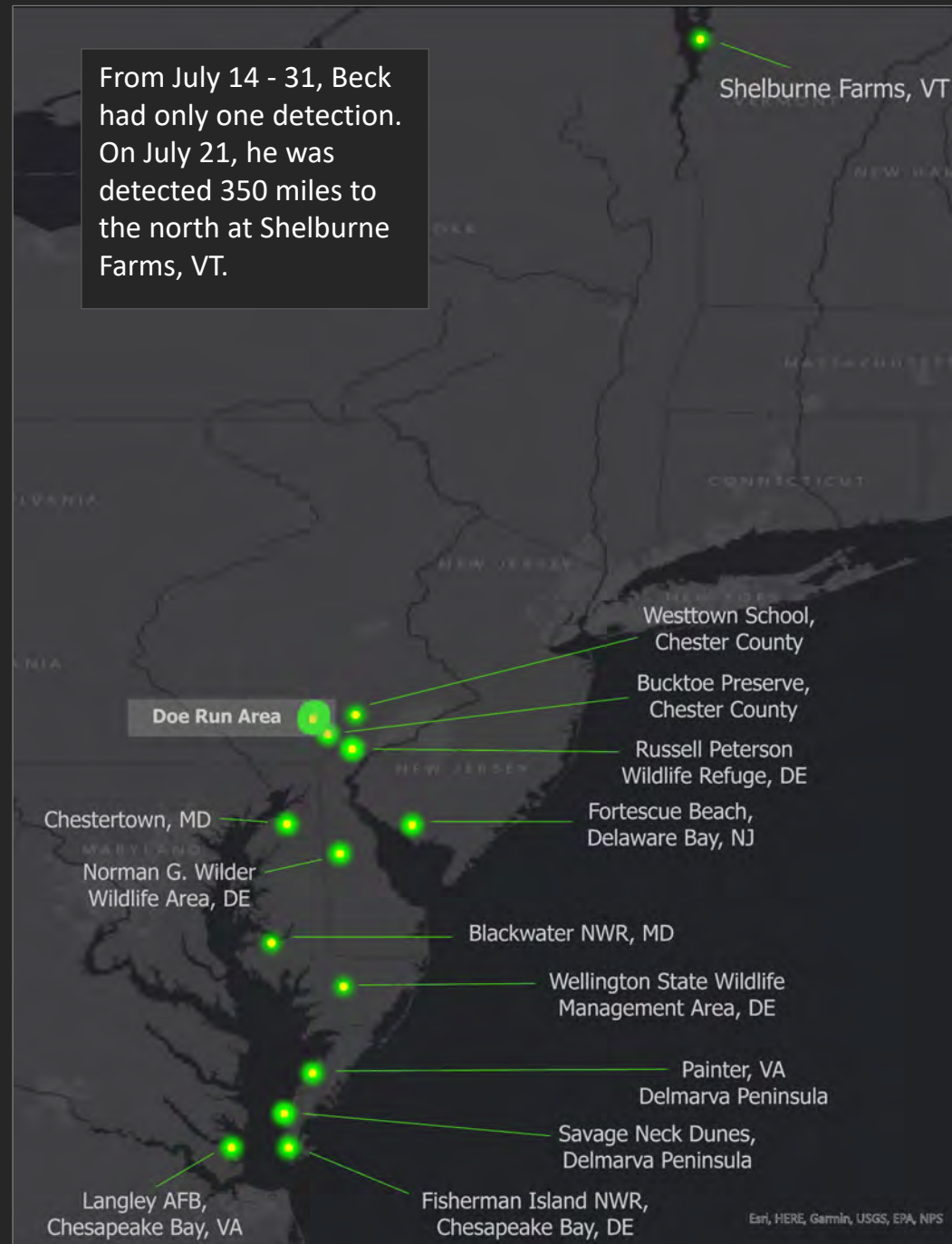
Phase III – Migration Movement

Migration began on Sept 3. Boris was headed to Poplar Island in the first minutes of the day. In just over 24 hours, he flew 900 miles south to Hobe Sound National Wildlife Refuge, FL.



"Beck" (tag #237)

From July 14 - 31, Beck had only one detection. On July 21, he was detected 350 miles to the north at Shelburne Farms, VT.



Activity in Doe Run Area

May 19

Male tagged at Buck & Doe Farm – “Beck” (tag #237)

May 19 – Sept 1

144 local detections among Buck & Doe, Buck Run, and Old Schoolhouse Farms

Between June 6 and July 5, he moved regularly among the 3 fields, frequently detected at all 3 fields in a single day.

Detections were sparse throughout most of July. Detections in the Doe Run area increased from Aug 5 – 19, when movement expanded to a larger area.

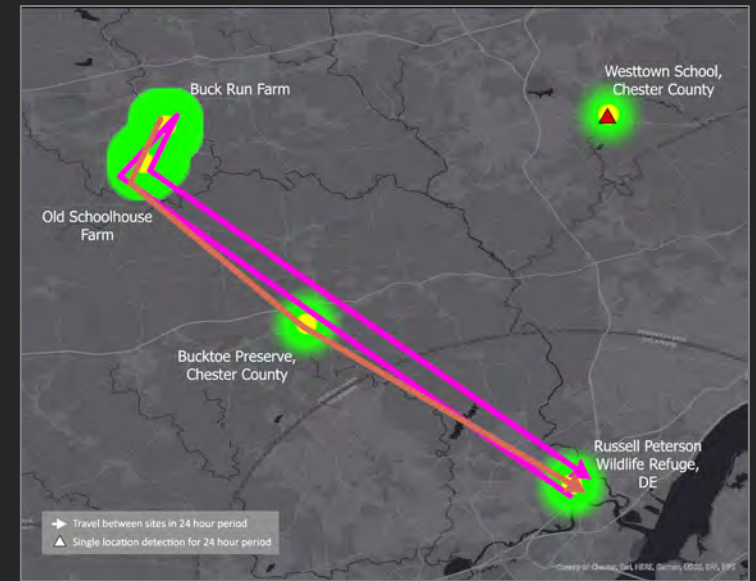
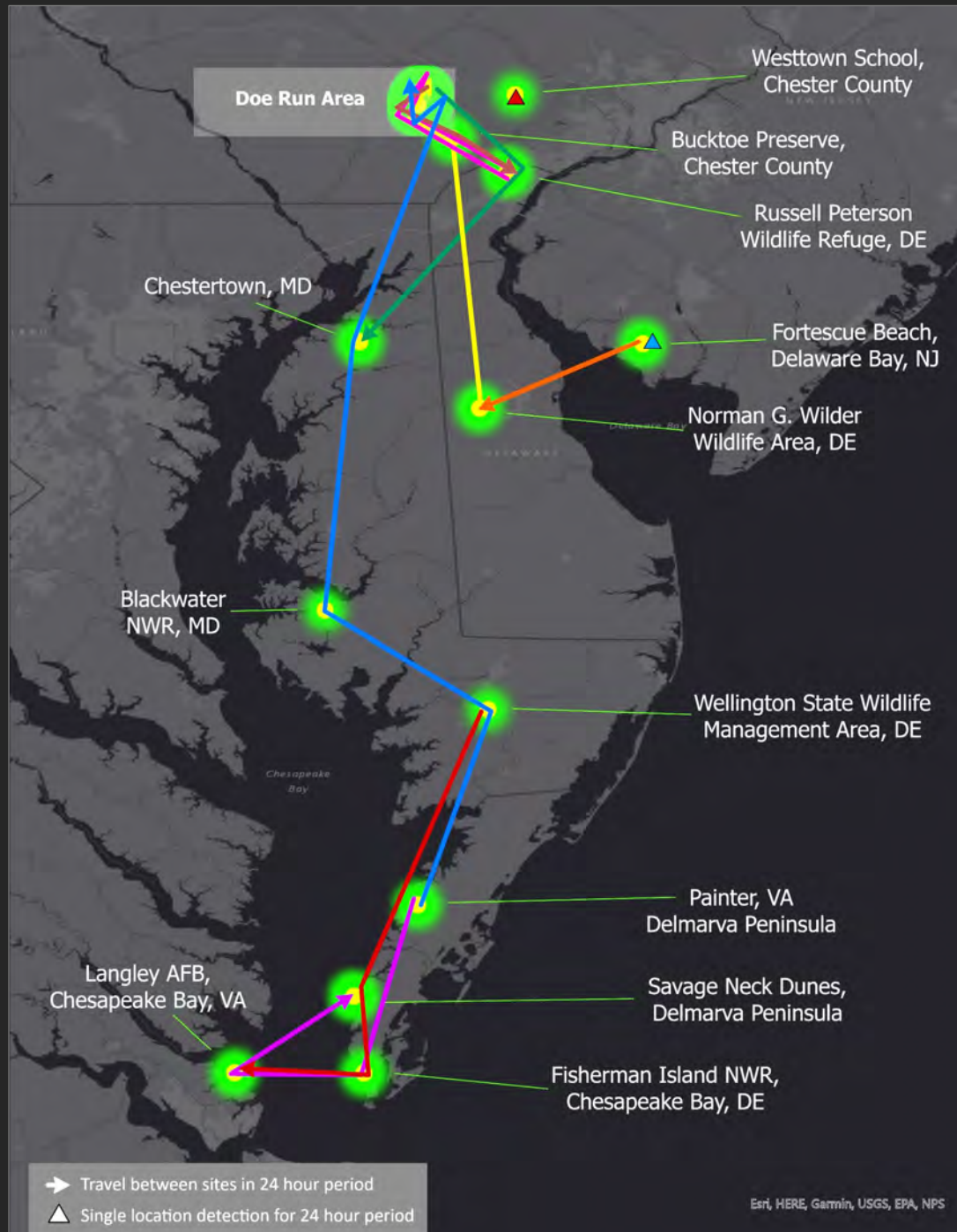
Meandering Migration

Beginning on Aug 20, Beck's movement patterns changed. He began making local trips mixed with longer southern trips.

Each line on the map represents a single day's movement.



"Beck" (tag #237)



Beck was detected around the Delmarva Peninsula on Aug 21 (purple line) and on Aug 26 (blue line) before returning to the greater Doe Run area for about 3 days. He traveled within the area (see box above) before venturing to NJ and DE (orange line).

On Sept 1, he made his final trip back to the Doe Run area (yellow line)

On Sept 2, he traveled to the Delmarva Peninsula and Chesapeake Bay where he was last detected (red line).

There were some Bobolinks that were rather elusive.
Their detections were limited to the Doe Run area, and
the frequency of detections was limited.

We thought they deserved recognition of their own.



Top: "Brett" tag #238

Bottom: "Betsy" tag #228



Stealthy Bobbie Award

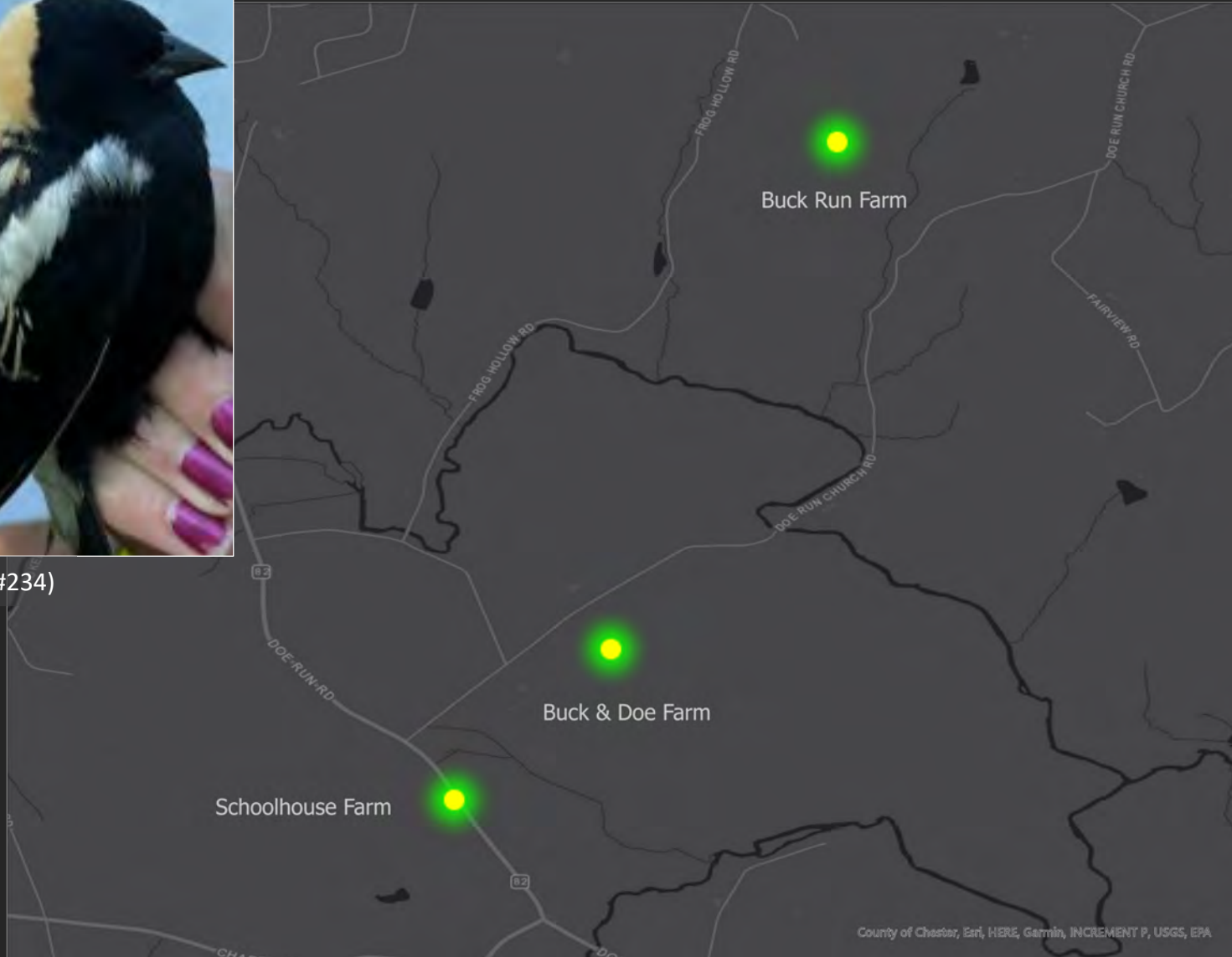
On May 17, a male and female Bobolink were tagged at Buck & Doe Farm. ("Brett" tag #238 and "Betsy" tag #228)

Betsy was detected by the Buck Run tower between May 20 and May 28. There were no further detections until July 23, when there was a single detection.

Brett was detected *only once* on Aug 1 at Buck Run Farm.



“Bill” (tag #234)



Here Today, Gone Tomorrow Award (Male)

May 20

Male tagged at Old Schoolhouse Farm – “Bill” (tag #234)

June 4 – July 15

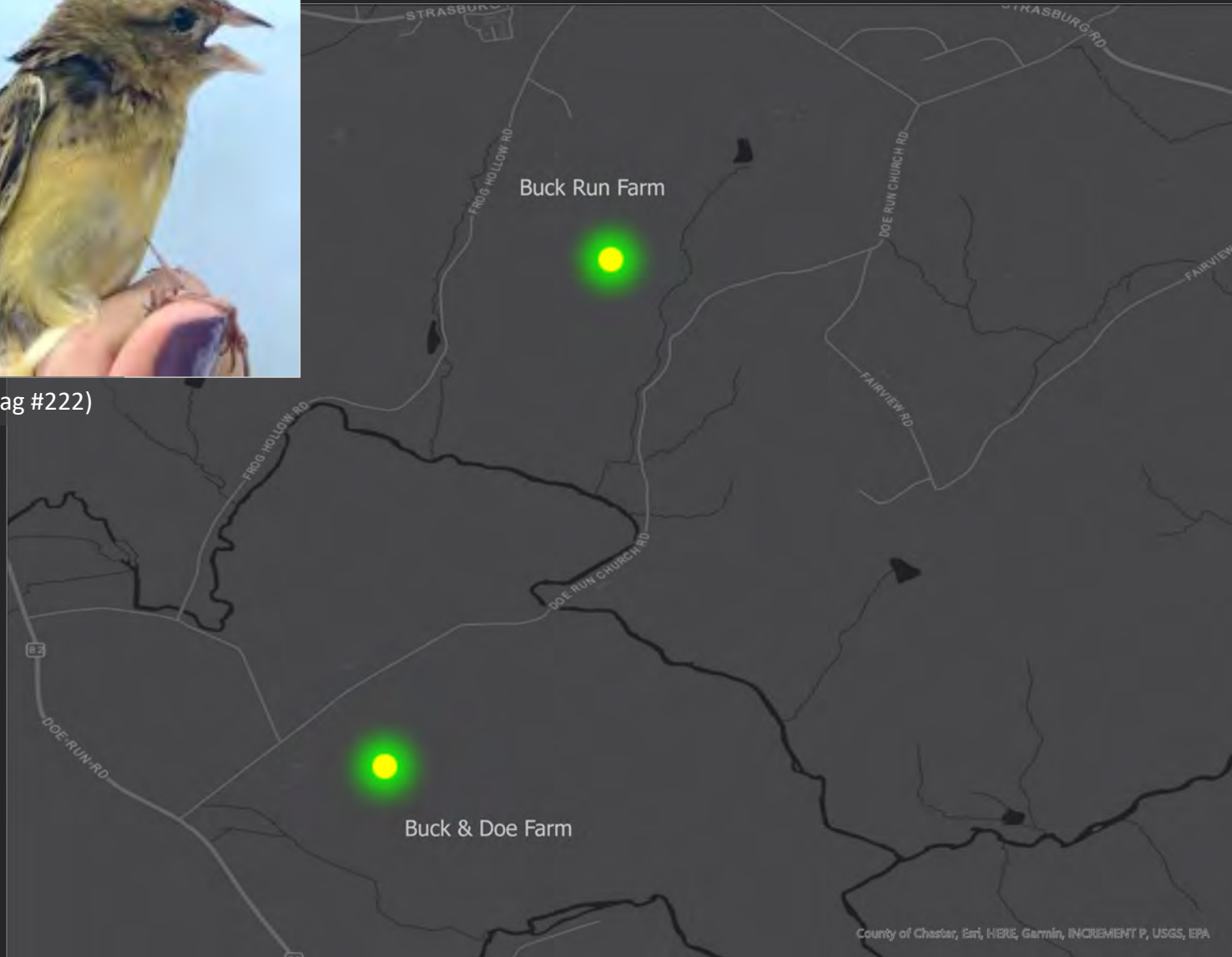
Though there were a few brief detections at Buck & Doe and Buck Run Farms, Bill was loyal to Old Schoolhouse Farm.

He was detected there almost continuously from June 4 – July 2. His detections there were more sporadic from July 3 – 5, and there were no detections from July 6 – 10.

Then he was, again, detected almost continuously at Old Schoolhouse from July 11 -15. The last detection was on July 15 at 7:40 pm.



“Bonnie” (tag #222)



Here Today, Gone Tomorrow Award (Female)

May 26

Female tagged at Buck Run Farm – “Bonnie” (tag #222)

May 26 – June 15

Bonnie was present almost exclusively at Buck Run Farms while she was in the Doe Run area.

From May 26 – June 14, she was detected almost continuously at Buck Run Farm.

She had one brief detection at Buck & Doe Farm on June 2.

Her last detection was on the morning of June 14.

In the coming weeks, we anxiously
await detections beyond the US borders!