

9-2020

## Virginia Peregrine Falcon Monitoring and Management Program: Year 2020 Report

B. D. Watts

*The Center for Conservation Biology, bdwatt@wm.edu*

M. U. Watts

*The Center for Conservation Biology, muwatt@wm.edu*

Follow this and additional works at: [https://scholarworks.wm.edu/ccb\\_reports](https://scholarworks.wm.edu/ccb_reports)



Part of the [Biology Commons](#), and the [Ornithology Commons](#)

---

### Recommended Citation

Watts, B. D. and Watts, M. U., "Virginia Peregrine Falcon Monitoring and Management Program: Year 2020 Report" (2020). *CCB Technical Reports*. 676.

[https://scholarworks.wm.edu/ccb\\_reports/676](https://scholarworks.wm.edu/ccb_reports/676)

This Report is brought to you for free and open access by the Center for Conservation Biology (CCB) at W&M ScholarWorks. It has been accepted for inclusion in CCB Technical Reports by an authorized administrator of W&M ScholarWorks. For more information, please contact [scholarworks@wm.edu](mailto:scholarworks@wm.edu).



## VIRGINIA PEREGRINE FALCON MONITORING AND MANAGEMENT PROGRAM: YEAR 2020 REPORT



**THE CENTER FOR CONSERVATION BIOLOGY**  
**WILLIAM & MARY**

# **VIRGINIA PEREGRINE FALCON MONITORING AND MANAGEMENT PROGRAM: YEAR 2020 REPORT**

**Bryan D. Watts, PhD  
Marian U. Watts  
The Center for Conservation Biology  
William & Mary**

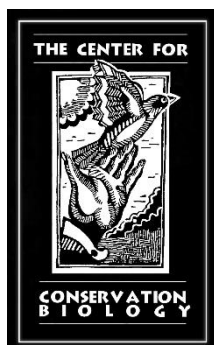
## **Recommended Citation:**

Watts, B. D. and M. U. Watts. 2020. Virginia peregrine falcon monitoring and management program: Year 2020 report. Center for Conservation Biology Technical Report Series, CCBTR-20-17. William & Mary, Williamsburg, VA. 21 pp.

## **Project Partners:**

**Virginia Department of Wildlife Resources  
National Aeronautics and Space Administration  
National Park Service  
United States Fish and Wildlife Service  
United States Forest Service  
Virginia Department of Transportation  
The Nature Conservancy  
Dominion Energy  
United States Coast Guard  
The Center for Conservation Biology**

**Front Cover:** Marian Watts holds a female peregrine after banding on the Benjamin Harrison Bridge.  
Photo by Bryan Watts.



**The Center for Conservation Biology is an organization dedicated to discovering innovative solutions to environmental problems that are both scientifically sound and practical within today's social context. Our philosophy has been to use a general systems approach to locate critical information needs and to plot a deliberate course of action to reach what we believe are essential information endpoints.**

# Table of Contents

## Contents

EXECUTIVE SUMMARY	1
BACKGROUND	2
Context	2
OBJECTIVES	3
METHODS	3
Geographic Focus	3
Nest Site Surveys	3
Banding	6
Band Resights	6
Translocations	6
Addled Eggs	6
RESULTS	7
Site Surveys	7
Breeding Results	9
Selected Site and Breeding Observations	10
Banding	10
Band Resights	13
Translocations	17
Addled Eggs	18
DISCUSSION	18
ACKNOWLEDGMENTS	19
LITERATURE CITED	20

## EXECUTIVE SUMMARY

The peregrine falcon (*Falco peregrinus*) was believed to be extirpated as a breeding species in Virginia by the early 1960s. An aggressive restoration program was initiated in 1978 that included the release of 115 captive-reared birds on the Coastal Plain (1978-1985) and 127 birds in the mountains (1985-1993). This program resulted in the first breeding of the modern era in 1982. Since this time, the population has proceeded through a rapid establishment phase followed by a consolidation phase. However, more than 95% of all breeding activity over the past 30 years has occurred on the Coastal Plain with very limited breeding within the historic mountain range. Since 2000 a dedicated translocation program has moved more than 250 birds from eyries on the coast to hack sites in the mountains in an effort to restore the mountain breeding population. Restoration of the breeding population in the mountains continues to be a management priority for the state.

In 2020, Virginia supported a known falcon population of 32 breeding pairs including 26 within the Coastal Plain, 3 in the Piedmont and 3 in the mountains. This is the highest population recorded in the state and represents the third consecutive year that the population has exceeded 30 breeding pairs. New pairs were discovered on Jump Mountain and in an abandoned quarry along the Occoquan River.

The 2020 breeding season was the second most productive in the state's history producing 58 young. A minimum of 89 eggs were laid with at least 62 hatching. Only 4 (6.5%) of the 62 hatchlings did not survive to banding age. The reproductive rate was 1.87 young/occupied territory. Of 18 clutches that were followed completely from laying to fledging, 46 of 70 (65.7%) of eggs hatched and 44 of 46 (95.6%) of young survived to banding age. Four young were known to have problems after fledging including 3 birds that were recovered on the ground in Norfolk, Richmond and Reston and were taken for rehab. A male that was hacked from Franklin Cliffs was picked up in Timberville and later died.

Efforts continued in 2020 to identify breeding adults via field-readable bands to better understand dispersal and demography throughout the mid-Atlantic region. The banding status of 55 (85.9%) of the 64 adult peregrines known within the breeding population was determined. Fourteen (25.5%) of the 55 birds were unbanded. The alpha-numeric bands were read for 34 adults and of these the USGS bands have been recorded for 31. Of the banded birds where state of origin could be determined, 26 were from VA, 5 from MD, 2 from NJ, 1 from DE and 1 from PA. Birds ranged in age from 2 to 19 years old.

During the 2020 season, 3 young falcons (all males) were translocated to Shenandoah National Park and hacked. Birds were released on 13 June, 2020 and were fine on release. Six addled falcon eggs were recovered during the 2020 season from 4 eyries.

# BACKGROUND

## Context

The historical population of peregrine falcons (*Falco peregrinus*) in the eastern United States was estimated to contain approximately 350 breeding pairs, relied on open cliff faces and cut-banks for nesting, and was mostly confined to the Appalachian Mountains (Hickey 1942). The population experienced a precipitous decline throughout the 1950s (Hickey 1969) due to contaminant-induced reproductive suppression (Anderson and Hickey 1972) and was believed to have been extirpated by the early 1960s (Berger et al. 1969). The peregrine falcon was listed as endangered on the U.S. Federal List of Endangered and Threatened Wildlife (50 CFR 17.11-17.12) in June 1970. In 1975, the U.S. Fish and Wildlife Service appointed an Eastern Peregrine Falcon Recovery Team to develop and implement a recovery plan (Bollengier et al. 1979). A retrospective assessment of the historic peregrine falcon population in Virginia identified 24 historical eyries in the Appalachian Mountains (Gabler 1983). Two additional nesting sites were documented on old osprey nests along the Virginia portion of the Delmarva Peninsula (Jones 1946).

As part of a national effort to restore the eastern peregrine population, the Virginia Department of Wildlife Resources, Cornell University, and the College of William and Mary initiated a hacking program for Virginia in 1978. The program involved the release of captive-reared peregrines with the hope that these birds would re-colonize the historic breeding range. Between 1978 and 1993, approximately 250 young falcons were released in Virginia. Since the close of this program, captive-reared peregrines have been released on a limited basis within the state. Such releases have involved more targeted projects. Beginning in 2000, Virginia initiated a translocation program that has moved birds from coastal territories to be hacked from mountain release sites. The program has taken advantage of young produced from sites where fledging success has been poor. More than 250 birds have been moved since the inception of the program.

The first successful nesting of peregrines falcons in Virginia after the DDT era occurred in 1982 on Assateague Island. Since that time, the breeding population has continued a slow but steady increase. The size of the known breeding population within Virginia now exceeds 30 pairs. However, both hatching rate and chick survival remain somewhat erratic in both the coastal and mountain breeding populations. An analysis by the U.S. Fish and Wildlife Service in the early 1990s of addled eggs collected in Virginia, showed levels of DDE, Dieldrin, and egg-shell thinning that have been shown previously to have an adverse impact on reproduction. An additional problem that has been suspected but not fully quantified is that the turnover rate of breeding adults appears to be high. At present, the long-term viability of the Virginia population in the absence of continued immigration from surrounding populations remains questionable. Continued monitoring and management of this population is needed to ensure that the population will continue to recover

# OBJECTIVES

The objectives of this project were:

- 1) to track the recovery of the breeding population of peregrine falcons in Virginia (both in terms of the size and distribution of the breeding population and the number of young produced),
- 2) to evaluate the success of past and present management techniques used with the breeding population,
- 3) to improve productivity of nesting pairs through active management, and
- 4) to increase our understanding of peregrine falcon natural history in the mid-Atlantic region.

# METHODS

## Geographic Focus

As in previous years, monitoring in 2020 was focused on the Coastal Plain where most breeding activity has been known. Additional efforts focused on mountain sites (Harding 2020) and those efforts are summarized in this report to provide a state-wide overview.

## Nest Site Surveys

Between 1977 and 2009, more than 60 structures were established specifically for breeding peregrine falcons within the Coastal Plain of Virginia (Table 1). An effort was made to check all of the existing structures on the Coastal Plain that survived to the 2020 breeding season for evidence of resident falcons. An initial survey of breeding structures on the Coastal Plain was conducted between 1 March and 30 April by foot, boat or aircraft. The number of adults attending sites and/or activity within the nest box was recorded. Remaining sites on bridges or within urban areas were surveyed on the ground for occupation and activity. Sites were surveyed in the mountains by the Virginia Department of Wildlife Resources (DWR), U.S. Forest Service (USFS) and the National Park Service (NPS).

Coastal sites that were confirmed to have peregrine activity were monitored with 2-5 additional ground visits to document breeding activity, to band young and to document fledging success. A breeding territory was considered to be “occupied” if a pair of adult peregrines was resident during the breeding season. Nests were considered to be “active” if eggs or young were detected (Postupalsky 1974). Complete breeding information (e.g. clutch size, hatching rate) could not be obtained for a small portion of active sites due to poor access. However, the number of birds surviving to banding age was determined for all active sites when possible. Reproductive rates were calculated using number of chicks reaching banding age.



**Table 1.** Catalog of nesting structures established for Peregrine Falcons in Virginia (1977-2020). Table gives the type of structure, year of establishment where appropriate and whether or not the site was checked for Peregrine Falcon activity during the 2020 breeding season.

Site Code	Location Description	Structure Type	Year Est	2020
VA-PEFA-02	Cobb Island Tower	Peregrine Tower	1978	Y
VA-PEFA-06	Wallops Island Tower	Peregrine Tower	1981	Y
VA-PEFA-09	Watts Island Tower	Peregrine Tower	1997	Y
VA-PEFA-10	Finney's Island Tower	Peregrine Tower	1997	Y
VA-PEFA-12	Hyslop Marsh Tower	Peregrine Tower	1995	Y
VA-PEFA-13	Saxis Marsh N. Tower	Peregrine Tower	1996	Y
VA-PEFA-14	Saxis Marsh S. Tower	Peregrine Tower	1998	Y
VA-PEFA-15	Parker Marsh Tower	Peregrine Tower	1997	Y
VA-PEFA-16	Elkins Marsh Chimney	Nest Box	1995	Y
VA-PEFA-17	Elkins Marsh Shack Tower	Nest Box/Tower	1997/2004	Y
VA-PEFA-18	Wachapreague Shack Tower	Peregrine Tower	1994/2000	Y
VA-PEFA-20	Coleman Bridge Box Rt 17	Nest Box	1989	Y
VA-PEFA-21	Norfolk Southern RxR Bridge	Bridge	1992	Y
VA-PEFA-22	James River Bridge Rt 17	Nest Box	1991	Y
VA-PEFA-23	Berkley Bridge I-264	Nest Box	1996	Y
VA-PEFA-24	Benjamin Harrison Bridge Rt 106	Nest Box	1996	Y
VA-PEFA-25	Mills Godwin Bridge Rt 17	Nest Box	1996	Y
VA-PEFA-26	West Norfolk Bridge Rt 164	Nest Box	1996	Y
VA-PEFA-27	Norris Bridge Rt 3	Nest Box	1989	Y
VA-PEFA-28	Little Stony Man, SNP	Natural Cliff Face	-----	Y <sup>a</sup>
VA-PEFA-29	Old Rag, SNP	Natural Cliff Face	-----	Y <sup>a</sup>
VA-PEFA-34	Mockhorn Island Tower	Peregrine Tower	1997	Y
VA-PEFA-36	Upsher Bay Tower	Peregrine Tower	2000	Y
VA-PEFA-37	Silver Beach Range Tower	Nest Box	1997	Y
VA-PEFA-38	Hawksbill Mountain, SNP	Natural Cliff Face	-----	Y <sup>a</sup>
VA-PEFA-39	Concrete Ships	Nest Box	1995	Y
VA-PEFA-40	Chesterfield Substation	Nest Box	1998	Y
VA-PEFA-41	Holiday Inn VA Beach	Nest Box	1997	Y
VA-PEFA-42	Possum Point Substation	Nest Box	1998	Y
VA-PEFA-43	Newport News City Hall	Nest Box	1993	Y
VA-PEFA-45	Cargill Grain Elevator	Nest Box	1993	Y



Site Code	Location Description	Structure Type	Year Est	2020
VA-PEFA-46	Lafayette Bridge Rt 337	Nest Box	1998	Y
VA-PEFA-48	Churchland Bridge US 17	Nest Box	1999	Y
VA-PEFA-49	Yorktown Substation	Nest Box	1998	Y
VA-PEFA-51	Campostella Bridge Rt 168	Nest Box	1998	Y
VA-PEFA-52	Highrise Bridge I-64	Nest Box	1999	Y
VA-PEFA-53	ALCOA RxR Bridge	Nest Box	1999	Y
VA-PEFA-54	I-295 Bridge	Nest Box	2001	Y
VA-PEFA-55	Dominion Building	Nest Box	2000	Y <sup>b</sup>
VA-PEFA-56	River Front Plaza Building	Nest Box	2002	Y <sup>b</sup>
VA-PEFA-57	BB&T Building	Nest Box	1984	Y <sup>b</sup>
VA-PEFA-59	Bermuda Hundred	Nest Box	1998	Y
VA-PEFA-60	Chesapeake Bay Bridge Tunnel	Pier Cap	2004	Y
VA-PEFA-61	Tappahannock Bridge Rt 360	Nest Box	2004	Y
VA-PEFA-62	Gull Marsh Tower	Peregrine Tower	2004	Y
VA-PEFA-63	Godwin Island Box	Nest Box	2004	Y
VA-PEFA-65	Craddock Neck	Peregrine Tower	1995	Y
VA-PEFA-66	Hoffler Building Virginia Beach	Nest Box	2009	Y
VA-PEFA-67	White Rocks	Natural Cliff Face	-----	Y <sup>b</sup>
VA-PEFA-68	Big House Mountain	Natural Cliff Face	-----	Y <sup>b</sup>
VA-PEFA-69	Breaks Interstate Park	Natural Cliff Face	-----	Y <sup>b</sup>
VA-PEFA-70	Pamunkey Eltham Bridge Rt 33	Nest Box	2017	Y
VA-PEFA-71	Cedar Island	Ground Nest	-----	Y <sup>b</sup>
VA-PEFA-72	Stony Man, SNP	Natural Cliff Face	-----	Y <sup>a</sup>
VA-PEFA-74	Birchwood Power Plant	Nest Box	2014	Y
VA-PEFA-75	Reston Town Center	Air Intake Vent	2015	Y
VA-PEFA-76	New Jordan Bridge	Pier Cap	2016	Y
VA-PEFA-77	Hazelwood Bridge	Pier Cap	2016	Y
VA-PEFA-78	Dresser Bridge Rt 5	Pier Cap	2017	Y
VA-PEFA-79	Norfolk Naval Shipyard	Unknown	-----	Y
VA-PEFA-80	Ashburn Quarry	Quarry High Wall	-----	Y
VA-PEFA-81	Occoquan Quarry	Quarry High Wall	-----	Y <sup>c</sup>
VA-PEFA-82	Jump Mountain	Natural Cliff Face	-----	Y <sup>b</sup>

<sup>a</sup> Nest monitored by NPS.

<sup>b</sup> Nest monitored by VDWR.

<sup>c</sup> Located but not allowed to monitor due to coronavirus.

## **Banding**

An attempt was made to band all chicks surviving to banding age (18-35 d). Chicks were banded with a USGS lock-on, aluminum tarsal band on the right leg and a bi-colored, green and black, alpha-numeric auxiliary band on the left leg. USGS bands used in Virginia during the 2020 breeding season were anodized green. Band size 6 and 7a were used for male and female chicks respectively. Auxiliary bands were applied with two pop rivets. Hacked falcons were also identified with colored electrical tape applied to the USGS band for temporary identification at the hack site. Accessing nests required coordination and assistance from state, federal, NGO, and corporate partners.

## **Band Resights**

Effort was made to identify individual breeding adults at each nest by reading band codes. Bands were identified through a Bushnell Natureview Cam HD max game camera mounted on the nest box platform, live webcams broadcast online, and by digital photos taken during visits to the nest.

## **Translocations**

Since the early 1990s, many young have been lost at fledging age on coastal bridges. Numerous chicks have been lost in the water during early flights when they are unable to fly back up to nest structures. Other chicks have flown down to the roadbed and been killed by automobiles.

In order to improve survivorship for high-risk sites, a program was initiated to translocate chicks to mountain release sites. Chicks are typically removed from nest sites, transported to mountain sites, and released using standard hacking techniques (Sherrod et al. 1981). In keeping with the objectives of facilitating the re-colonization of the historic mountain range chicks were hacked from a high priority mountain site in Shenandoah National Park (SNP). Only chicks from bridge nests were removed for the hacking program because of limited space in the hack box. Chicks that were found on the ground during fledging or taken to rehabilitation facilities were also included for release from hack sites. SNP has two hack boxes and the hacking program takes up to 10 birds aged for synchronous release. SNP staff led by Rolf Gubler open the door to the hack box at 45-50 days old. Food is provided at the hack site for 6 weeks. Survival is confirmed when the falcons return to the hack site to feed each day (Sherrod et al 1981).

## **Addled Eggs**

Unhatched eggs were collected from nests if eggs were no longer being incubated. Eggs were washed, air dried, covered with aluminum foil and frozen.

# RESULTS

## Site Surveys

Fifty-six structures were surveyed for peregrine falcon activity within the Coastal Plain (Table 1) and several additional sites were surveyed by DWR and NPS in the mountains during the breeding season. Thirty-two sites supported occupied territories. Breeding sites were found across the state (Figure 1). Occupied territories were distributed within the Coastal Plain (n = 26), Piedmont (n = 3) and mountains (n = 3).

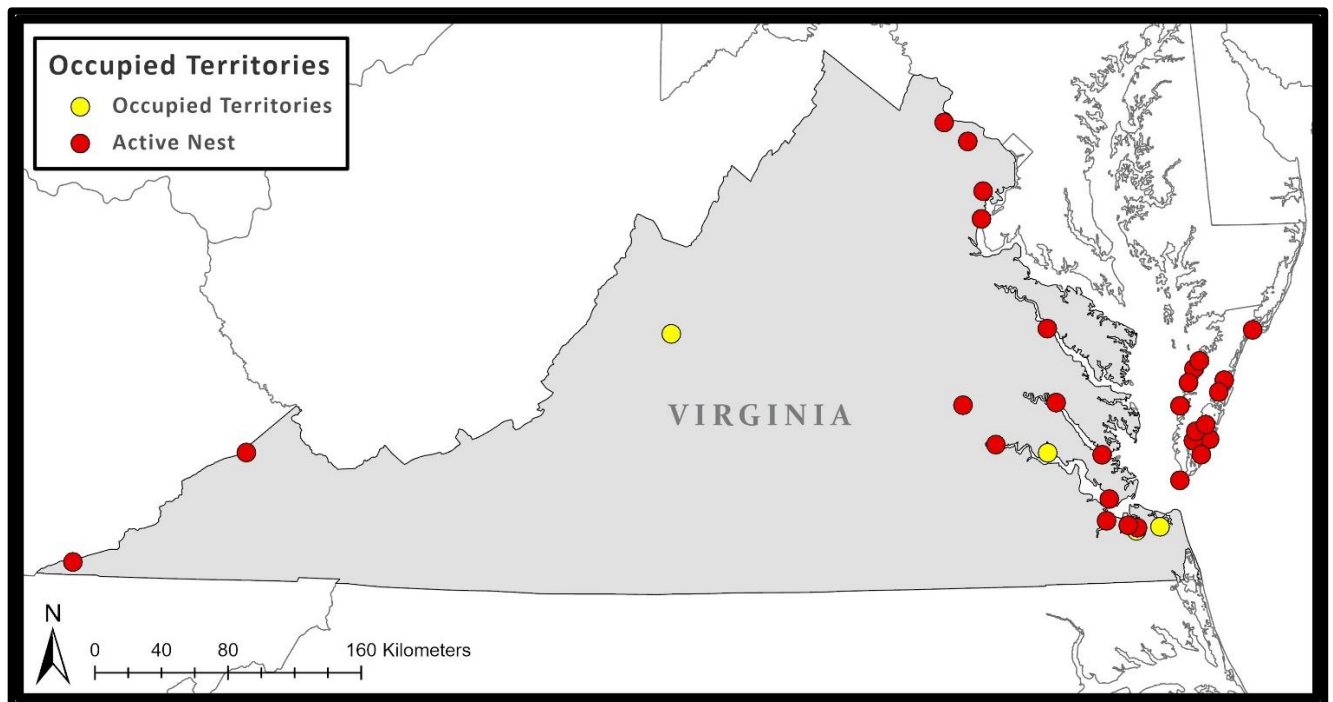
Structures supporting occupied territories included 10 peregrine towers, 10 bridges, 5 cliffs, 4 buildings, 2 marsh shacks, and 1 power plant stacks (Table 2). For the fourth year, no pairs were detected in association with the Norris Bridge and the I-64 High-rise Bridge. New pairs were discovered on Jump Mountain and in an abandoned quarry along the Occoquan River.

**Table 2.** Summary of breeding activity for peregrine falcon pairs in Virginia during the 20 breeding season.

Site Code	Nest name	Occ Terr	Active Nest	Eggs	Young Hatched	Band Age
VA-PEFA-02	Cobb Island Tower	Y	Y	2	0	0
VA-PEFA-06	Wallops Island Tower	Y	Y	≥2	2	0
VA-PEFA-10	Finney's Island Tower	Y	Y	4	4	4
VA-PEFA-12	Hyslop Marsh Tower	Y	Y	4	4	4
VA-PEFA-15	Parker's Marsh Tower	Y	Y	3	3	3
VA-PEFA-16	Elkins Marsh Chimney	Y	Y	4	4	4
VA-PEFA-17	Elkins Marsh Shack Tower	Y	Y	2	0	0
VA-PEFA-18	Wachapreague Shack Tower	Y	Y	4	4	3
VA-PEFA-20	Coleman Bridge Box Rt 17	Y	Y	4	4	3
VA-PEFA-22	James River Bridge Rt 17	Y	Y	4	3	3
VA-PEFA-23	Berkley Bridge I-264	Y	Y	≥1	1	1
VA-PEFA-24	Benjamin Harrison Bridge	Y	Y	5	3	3
VA-PEFA-25	Mills Godwin Bridge Rt 17	Y	Y	4	2	2
VA-PEFA-26	West Norfolk Bridge Rt 164	Y	Y	≥1	0	0
VA-PEFA-36	Upsher Bay Tower	Y	Y	4	4	4
VA-PEFA-37	Silver Beach Range Tower	Y	Y	≥2	≥2	2
VA-PEFA-42	Possum Point Substation	Y	Y	4	0	0
VA-PEFA-56	River Front Plaza Building	Y	Y	4	1	1
VA-PEFA-60	Chesapeake Bay Bridge Tunnel	Y	Y	≥1	0	0

Site Code	Nest name	Occ Terr	Active Nest	Eggs	Young Hatched	Band Age
VA-PEFA-61	Tappahannock Bridge Rt 360	Y	Y	4	3	3
VA-PEFA-62	Gull Marsh Tower	Y	Y	4	4	4
VA-PEFA-63	Godwin Island Box	Y	Y	4	1	1
VA-PEFA-66	Armada Hoffer Building	Y	N	----	----	----
VA-PEFA-67	White Rocks	Y	Y	$\geq 1$	U	U
VA-PEFA-69	Breaks Interstate Park	Y	Y	$\geq 3$	$\geq 3$	3
VA-PEFA-70	Pamunkey Eltham Bridge Rt 33	Y	Y	5	2	2
VA-PEFA-75	Reston Town Center	Y	Y	$\geq 4$	4	4
VA-PEFA-78	Dresser Bridge Rt 5	Y	N	----	----	----
VA-PEFA-79	Norfolk Naval Shipyard	Y	N	----	----	----
VA-PEFA-80	Ashburn Quarry	Y	Y	$\geq 4$	$\geq 4$	4
VA-PEFA-81	Occoquan Quarry	Y	N	----	----	----
VA-PEFA-82	Jump Mountain	Y	N	$\geq 1$	U	0

**Figure 1.** Distribution of Peregrine Falcon occupied territories and single individuals for the 2020 breeding season in Virginia.



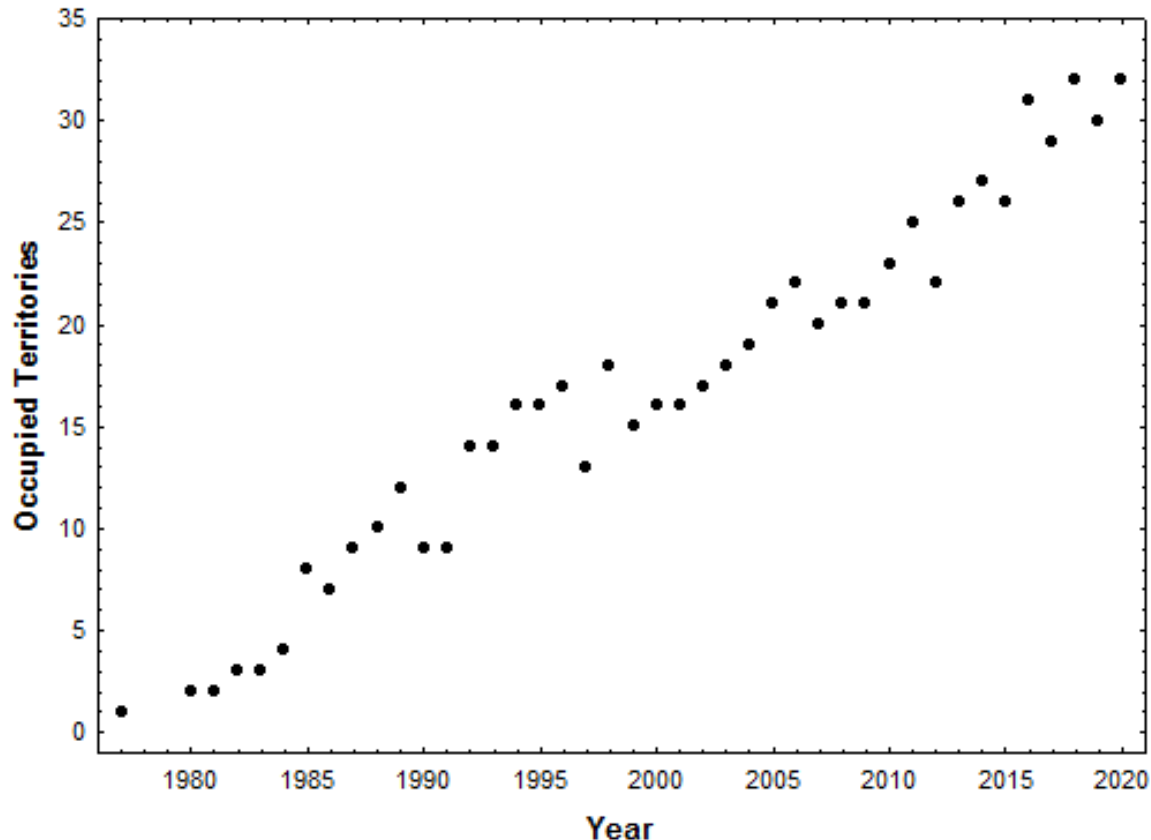
## Breeding Results

Virginia supported 32 known breeding pairs of peregrine falcons during the 2020 breeding season. This is the largest breeding population recorded (32 also in 2018) in the state and third consecutive year that the state has supported more than 30 known breeding pairs (Figure 2).

The 28 falcon pairs that were documented making breeding attempts produced at least 89 eggs (Table 2). At least 62 of the 89 eggs hatched. Only 4 (6.5%) of the 62 hatchlings did not survive to banding age. All of these young disappeared between the last hatching check and the scheduled day of banding (26 to 28 days old). Cause of the loss is not known. The reproductive rate was 1.87 young/occupied territory and 2.15 young/active territory. Of 18 clutches that were followed completely from laying to fledging, 46 of 70 (65.7%) eggs hatched, and 44 of 46 (95.6%) young survived to banding age.

Four young were known to have problems after fledging. The single female produced on the Berkley Bridge hit a building and was taken to the Wildlife Center of Virginia for treatment. The female produced in Richmond was recovered from the median of the downtown expressway, taken to the Wildlife Center for treatment and then released from the hack site on Franklin Cliffs. A male from the Reston Town Center was picked up from a street, rehabbed and released back to the pair while they were still taking care of the brood. A male was picked up in Timberville and taken to the Wildlife Center of Virginia for treatment but died. This bird was hatched on the James River Bridge, hacked at Franklin Cliffs and released on 13 June. The bird was observed feeding at Franklin Cliffs from 13 to 21 June.

**Figure 2.** Virginia Peregrine Falcon breeding population (1977-2020).



## Selected Site and Breeding Observations

- The pair that has nested on the Yorktown substation stack for 5 years moved over to the nest box on the Coleman Bridge and produced 3 young.
- Three second-year females were recruited into the population including birds at the West Norfolk Bridge, Occoquan Quarry and the Dressler Bridge. None produced young.
- A female produced on the Reston Town Center was captured on the Montreal International Airport only 15 days after it was last seen at Reston.
- A female produced in Richmond was picked up on a street, taken to Wildlife Center of Virginia, rehabbed, and released as part of the hack at Shenandoah National Park.
- A male that was hatched on the James River Bridge and hacked in Shenandoah National Park was photographed in Forsythe, NWR in NJ in early fall.
- The Mockhorn Island tower was used by barn owls.
- A new pair was discovered within an abandoned quarry along the Occoquan River but could not be monitored due to covid restrictions.
- A second-year female and a full adult male colonized the west Norfolk Bridge for the first time in several years.
- The Parkers Marsh female has produced 9 young over the past 4 years without the use of her left foot.
- The nest location on the north bound span of the Chesapeake Bay Bridge was filled with asphalt during paving and the pair moved to the south bound span.

## Banding

All young falcons that survived to banding age and that could be accessed were fitted with both USGS and alpha-numeric bands. This included 28 males and 19 females (Tables 3a and 3b). Birds known to be unbanded were 1 young (including 1 female) Berkley Bridge, 3 young (including 2 males and 1 female) on the Coleman Bridge and 4 young (including 3 females and 1 male ) at the Ashburn Quarry.

**Table 3a.** List of band codes for female peregrine falcon chicks banded in Virginia during the 2020 breeding season.

<b>USGS Band</b>	<b>Alpha-numeric Band</b>	<b>Nest</b>	<b>Date</b>
1807-46838	75/BH	Benjamin Harrison Bridge	4/29/2020
1807-46839	76/BH	Downing Bridge	5/7/2020
1807-46840	77/BH	Downing Bridge	5/7/2020
1807-46841	78/BH	Downing Bridge	5/7/2020
1807-46842	79/BH	Mills Godwin Bridge	5/14/2020
1807-46843	80/BH	Reston Town Center	5/21/2020
1807-46844	81/BH	Gull Marsh	5/25/2020
1807-46845	82/BH	Gull Marsh	5/25/2020
1807-46846	83/BH	Elkins Chimney	5/25/2020
1807-46847	84/BH	Elkins Chimney	5/25/2020
1807-46848	85/BH	Elkins Chimney	5/25/2020
1807-46849	86/BH	Finney's Marsh	5/25/2020
1807-46850	87/BH	Wachapreague Shack	5/26/2020
1807-46851	88/BH	Wachapreague Shack	5/26/2020
1807-46852	89/BH	Wachapreague Shack	5/26/2020
1807-46853	90/BH	Parkers Marsh	5/26/2020
1807-46854	91BH	Upshurs Neck	6/8/2020
1807-46855	92/BH	Turner's Marsh	6/8/2020
1907-01925	88/AV	Riverfront Plaza	6/12/2020



**Table 3b.** List of band codes for male peregrine falcon chicks banded in Virginia during the 2020 breeding season.

USGS Band	Alpha-numeric Band	Nest	Date
2206-54859	85/BM	Benjamin Harrison Bridge	4/29/2020
2206-54860	86/BM	Benjamin Harrison Bridge	4/29/2020
2206-54861	87/BM	Eltham Bridge	5/8/2020
2206-54862	88/BM	Eltham Bridge	5/8/2020
2206-54863	89/BM	Silver Beach Range Tower	5/13/2020
2206-54864	90/BM	Silver Beach Range Tower	5/13/2020
2206-54865	91/BM	Mills Godwin Bridge	5/14/2020
2206-54866	92/BM	Reston Town Center	5/21/2020
2206-54867	93/BM	Reston Town Center	5/21/2020
2206-54868	94/BM	Reston Town Center	5/21/2020
2206-54869	95/BM	Gull Marsh	5/25/2020
2206-54870	96/BM	Gull Marsh	5/25/2020
2206-54871	97/BM	Elkins Chimney	5/25/2020
2206-54872	98/BM	Finney's Marsh	5/25/2020
2206-54873	99/BM	Finney's Marsh	5/25/2020
2206-54874	00/BN	Finney's Marsh	5/25/2020
2206-54875	01/BN	Parkers Marsh	5/26/2020
2206-54876	02/BN	Parkers Marsh	5/26/2020
2206-54877	03/BN	James River Bridge	5/29/2020
2206-54878	04/BN	James River Bridge	5/29/2020
2206-54879	05/BN	James River Bridge	5/29/2020
2206-54880	06/BN	Upshurs Neck	6/8/2020
2206-54881	07/BN	Upshurs Neck	6/8/2020
2206-54882	08/BN	Upshurs Neck	6/8/2020
2206-54883	09/BN	Turner's Marsh	6/8/2020
2206-54884	10/BN	Turner's Marsh	6/8/2020
2206-54885	11/BN	Turner's Marsh	6/8/2020
2206-54886	12/BN	Godwin Shack	6/9/2020

## Band Resights

The banding status of 55 (85.9%) of the 64 adult peregrines known within the breeding population was determined during the 2020 season (Table 4). Fourteen (25.5%) of the 55 birds were unbanded. The level of unbanded birds suggests the possibility of unknown eyries within Virginia or surrounding states. Of the banded birds where state of origin could be determined, 26 were from VA, 5 from MD, 2 from NJ, 1 from DE and 1 from PA. The alpha-numeric were read for 34 adults and of these the USGS bands have been recorded for 31. All three of the unknown birds had silver USGS and were likely from MD. The natal territories were determined for 31 adults. Birds ranged in age from 2 to 19 years old.

Twelve Virginia falcon encounters outside of banding activities were reported since the 2019 report (Tables 5 and 6). Five of these birds (all females) originated in Virginia and were found breeding in other states (Table 6). A second-year female from Parkers Marsh was photographed on the beach at Pea Island, NWR in North Carolina. A second-year male from Yorktown was photographed in Middlesex County along the Rappahannock in Virginia. A hatching-year female from the Tappahannock Bridge was captured at Cape May. A hatching-year female from Parkers Marsh was photographed on Assateague Island. A hatching-year male from the James River Bridge that was hacked in Shenandoah National Park was photographed in Forsythe National Wildlife Refuge. A hatching-year male from Reston was photographed at the National Airport. A hatching-year female from Reston was captured on the Montreal International Airport. Two birds hatched in other states were observed in Virginia as nonbreeders including a female from Stone Harbor, NJ that has maintained a hunting territory on Metomkin Island during the 2019 and 2020 summers. A hatching-year male from Hartford, CT hit a power line in Franktown, VA and was killed.

**Table 4.** Banding status and identification of Virginia breeding peregrine falcons during the 2020 season.

Territory Code	Territory	Sex	USGS Band Color	USGS Band	ACRAFT Color	ACRAFT Code	Origin	Age
VA-PEFA-02	Cobb Island Tower	M	----	Unbanded	----	----	Unknown	
	Cobb Island Tower	F	----	Unbanded	----	----	Unknown	
VA-PEFA-06	Wallops Island Tower	M	Green	Unknown	B/G	Unknown	VA	
	Wallops Island Tower	F	Green	1907-01947	B/G	73/AU	Watts Island, VA	5
VA-PEFA-10	Finney's Island Tower	M	Green	1126-11939	B/G	15/AU	Watts Island, VA	6
	Finney's Island Tower	F	Black	1687-02832	B/G	A/15	Dividing Creek, NJ	11
VA-PEFA-12	Hyslop Marsh Tower	M	Green	1126-11824	B/G	15/AB	Godwin Island, VA	12
	Hyslop Marsh Tower	F	Green	1807-65006	B/G	01/AD	Upsher Bay Tower, VA	12
VA-PEFA-15	Parker Marsh Tower	M	----	Unbanded	----	----	Unknown	
	Parker Marsh Tower	F	Green	Unknown	B/G	7?/A?	Unknown, VA	
VA-PEFA-16	Elkins Marsh Chimney	M	Green	1126-11939	B/G	15/AU	Watts Island, VA	6
	Elkins Marsh Chimney	F	Green	1907-01491	B/G	67/AU	Finneys Tower, VA	5
VA-PEFA-17	Elkins Marsh Shack Tower	M	Green	2206-81637	B/G	09/W	Upsher Bay Tower, VA	12
	Elkins Marsh Shack Tower	F	Silver	1907-03507	B/G	65/AD	Smith Island Tower 2, MD	10
VA-PEFA-18	Wachapreague Shack Tower	M	Silver	?????	----	----	Unknown	
	Wachapreague Shack Tower	F	----	Unbanded	----	----	Unknown	
VA-PEFA-20	Coleman Bridge	M	----	Unbanded	----	----	Unknown	
	Coleman Bridge	F	Green	1907-01914	B/G	70/AV	Silver Beach Tower, VA	7
VA-PEFA-22	James River Bridge Rt 17	M	Green	2206-43454	B/G	*7/*C	James River Bridge, VA	19
	James River Bridge Rt 17	F	Silver	?????	----	----	Unknown	3
VA-PEFA-23	Berkley Bridge I-264	M	Green	1126-11953	B/G	29/AU	Yorktown, VA	6

Territory Code	Territory	Sex	USGS Band Color	USGS Band	ACRAFT Color	ACRAFT Code	Origin	Age
	Berkley Bridge I-264	F	Green	1907-01994	B/G	32/BH	Yorktown, VA	4
VA-PEFA-24	Benjamin Harrison Bridge Rt 106	M	Green	2206-81605	B/G	05/Y	BB&T Richmond, VA	15
	Benjamin Harrison Bridge Rt 106	F	Green	1807-02775	B/G	70/Z	Benjamin Harrison, VA	12
VA-PEFA-25	Mills Godwin Bridge Rt 17	M	-----	Unbanded	-----	-----	Unknown	
	Mills Godwin Bridge Rt 17	F	Green	1807-65098	B/G	57/AV	Mockhorn Island, VA	7
VA-PEFA-26	West Norfolk Bridge	M	Green	?????	B/G	????	Unknown	
	West Norfolk Bridge	F	Silver	?????	B/G	????	Unknown	2
VA-PEFA-36	Upsher Bay Tower	M	-----	Unbanded	-----	-----	Unknown	
	Upsher Bay Tower	F	Green	1907-01967	B/G	05/BH	Elkins Chimney, VA	6
VA-PEFA-37	Silver Beach Range Tower	M	Unknown	Unknown	Unknown	Unknown	Unknown	
	Silver Beach Range Tower	F	-----	Unbanded	-----	-----	Unknown	
VA-PEFA-42	Possum Point Substation	M	Silver	816-69379	B/G	X/78	Chalk Point Plant, MD	11
	Possum Point Substation	F	Black	987-95657	B/G	*Y/*4	Betsy Ross Bridge, NJ	13
VA-PEFA-56	River Front Plaza Building	M	Green	1126-11948	B/G	24/AU	Possum Point, VA	6
	River Front Plaza Building	F	Silver	1907-03426	B/G	95/AK	St. George's Bridge, DE	3
VA-PEFA-60	Chesapeake Bay Bridge Tunnel	M	Silver	?????	B/G	16/AK	Clay Island WMA, MD	8
	Chesapeake Bay Bridge Tunnel	F	-----	Unbanded	-----	-----	Unknown	
VA-PEFA-61	Tappahannock Bridge Rt 360	M	Silver	1126-15169	B/G	30/AH	Unknown	
	Tappahannock Bridge Rt 360	F	Silver	Unknown	B/G	26/AK	Unknown	
VA-PEFA-62	Gull Marsh Tower	M	Green	Unknown	B/G	Unknown	VA	
	Gull Marsh Tower	F	Green	1907-01941	B/G	67/AU	Finneys Tower, VA	6
VA-PEFA-63	Godwin Island Box	M	Green	1126-11848	B/G	14/AS	Mockhorn Island, VA	10
	Godwin Island Box	F	Green	1807-02726	B/G	20/V	Upsher Bay Tower, VA	14

Territory Code	Territory	Sex	USGS Band Color	USGS Band	ACRAFT Color	ACRAFT Code	Origin	Age
VA-PEFA-66	Hoffler Building Virginia Beach	M	Green	1126-11943	B/G	19/AU	Elkins Shack Tower, VA	6
	Hoffler Building Virginia Beach	F	-----	Unbanded	-----	-----	Unknown	
VA-PEFA-67	White Rocks	M	Unknown	Unknown	Unknown	Unknown	Unknown	
	White Rocks	F	Unknown	Unknown	Unknown	Unknown	Unknown	
VA-PEFA-69	Breaks Interstate Park	M	Unknown	Unknown	Unknown	Unknown	Unknown	
	Breaks Interstate Park	F	Unknown	Unknown	Unknown	Unknown	Unknown	
VA-PEFA-70	Pamunkey Eltham Bridge Rt 33	M	Green	1126-11954	B/G	30/AU	Yorktown Plant, VA	6
	Pamunkey Eltham Bridge Rt 33	F	Green	1807-65016	B/G	11/AD	Elkins Shack Tower, VA	9
VA-PEFA-72	Stony Man, SNP	M	Unknown	Unknown	Unknown	Unknown	Unknown	
	Stony Man, SNP	F	Unknown	Unknown	Unknown	Unknown	Unknown	
VA-PEFA-75	Reston Town Center	M	Silver	1126-15168	B/G	29/AH	Chalk Point Plant, MD	9
	Reston Town Center	F	Silver	1687-00582	B/G	61/AR	Philadelphia, PA	9
VA-PEFA-78	Dresser Bridge Rt 5	M	-----	Unbanded	-----	-----	Unknown	
	Dresser Bridge Rt 5	F	-----	Unbanded	-----	-----	Unknown	2
VA-PEFA-79	Norfolk Naval Shipyard	M	Unknown	Unknown	Unknown	Unknown	Unknown	
	Norfolk Naval Shipyard	F	-----	Unbanded	-----	-----	Unknown	
VA-PEFA-80	Ashburn Quarry	M	Green	2206-54805	B/G	31/BM	James River Bridge, VA	4
	Ashburn Quarry	F	Silver	1907-03417	B/G	87/AK	MD	4
VA-PEFA-81	Occoquan Quarry	M	Unknown	Unknown	Unknown	Unknown	Unknown	
	Occoquan Quarry	F	-----	Unbanded	-----	-----	Unknown	2
VA-PEFA-82	Jump Mountain	M	Unknown	Unknown	Unknown	Unknown	Unknown	
	Jump Mountain	F	Unknown	Unknown	Unknown	Unknown	Unknown	

**Table 5.** Encounter reports of Virginia peregrine falcons received since the 2019 report.

Resight Location	Resight Date	Sex	USGS Band	Origin	Age
<b>VA birds resighted</b>					
Cape May, NJ	10/15/2019	F	1807-56835	Tappahannock Bridge	HY
Pea Island, NWR, NC	3/27/2020	F	1807-46832	Parkers Marsh	2
Assateague Island, MD	10/24/2020	F	1807-56853	Parkers Marsh	HY
Middlesex, VA	6/7/2020	M	2206-54834	Yorktown Power Station	2
Forsythe, NWR, NJ	8/19/2020	M	2206-54877	James River Bridge	HY
Washington National Airport, VA	9/1/2020	M	2206-54867	Reston Town Center	HY
Montreal International Airport	7/29/2020	F	1807-46843	Reston Town Center	HY
<b>Foreign birds in VA</b>					
Metomkin Island, VA	7/15/2019	F	1947-31847	Stone Harbor, NJ	2
Franktown, VA	12/6/2019	M	1126-14601	Hartford, CT	HY
Metomkin Island, VA	7/8/2020	F	1947-31847	Stone Harbor, NJ	3

**Table 6.** Identification of Virginia-hatched birds known to breed in other states during 2020.

Breeding Territory	Sex	USGS Band	ACRAFT Color	ACRAFT Code	Origin	Age
Columbia, PA Rt 462 Bridge	F	1807-65014	B/G	09/AD	James River Br, VA	10
Safe Harbor Cliff, PA	F	1807-65083	B/G	45/AV	Mills Godwin Br, VA	7
Beesleys Point, NJ	F	1907-01996	B/G	34/BH	Silver Beach Tower, VA	3
Dividing Creek WMA, NJ	F	1807-02735	B/G	29/V	Wachapreague Tower, VA	14
Burlington-Bristol Bridge, NJ	F	1807-65053	B/G	14/AV	Possum Point, VA	9

## Translocations

During the 2020 season, 3 young falcons (all males) were translocated to Shenandoah National Park and hacked (Table 7). All birds were from bridges that have experienced poor fledging success. Birds were placed in a single hack box situated on Franklin Cliffs on 29 May, 2020. Birds were released on 13 June, 2020 and were fine on release. One of the birds was picked up in lean condition in Timberville on 22 June and taken to the Wildlife Center of Virginia where it died.

**Table 7.** Summary of translocation activities for peregrine falcons in Virginia during the 2020 breeding season. Electrical tape was applied to the USFWS band.

USGS Band	Location	Sex	Tape Color	Date Collected	Translocation Site
2206-54877	James River Bridge	M	Yellow	5/29/2020	Shenandoah National Park
2206-54878	James River Bridge	M	Red	5/29/2020	Shenandoah National Park
2206-54879	James River Bridge	M	White	5/29/2020	Shenandoah National Park

## Addled Eggs

Six addled falcon eggs were recovered during the 2020 breeding season (Table 8). Eggs were recovered from 4 sites including 3 bridges and 1 tower.

**Table 8.** Addled eggs collected during the 2020 breeding season.

Site	Date	Eggs
Mills Godwin Bridge	4/26/2020	1
Eltham Bridge	4/27/2020	2
Tappahannock Bridge	4/28/2020	1
Elkins Shack	5/25/2020	2

## DISCUSSION

Between 1975 and 1993 more than 430 captive-reared falcons were released into the mid-Atlantic region as part of an effort to restore the eastern peregrine falcon population. The regional breeding population proceeded through an establishment phase (1979-1985) driven by releases with an average doubling time of 1.3 years to a consolidation phase (1986-) with an average doubling time of 23.4 years (Watts et al. 2015). Reproductive rates have increased significantly over this period from 1.18 young/occupied territory during establishment to 1.87 young/occupied territory as the population has become more stable.

Since the first breeding attempt was documented on Assateague Island in 1982, the Virginia population has exhibited steady growth. To date, growth has been driven by established pairs on the Coastal Plain. Pairs along the coast have accounted for more than 95% of all breeding attempts in the modern era and young produced are responsible for the ongoing formation of new territories. Currently, coastal pairs nesting on artificial substrates represent the demographic engine that is maintaining the state population.

Recent efforts to identify marked adults in both Virginia and New Jersey are providing significant information on dispersal, adult turnover rates, and the age structure of the breeding population.



Capitalizing on efforts to mark all young in the region should be a priority for the foreseeable future. Expanding the effort to other neighboring states (e.g. MD, DE, NC, WV) would expand our understanding of movement patterns.

With few exceptions, establishment of breeding territories within the historic mountain range have been the result of the earlier hacking program (1985-1993) and the more recent translocation project (2000-2020) focused on the mountains. Since 2000, the latter has made use of young produced on bridge and building eyries that have experienced poor fledging success. This is a win-win situation and should continue as long as partners are willing and able to operate the hacks. If possible, new hack sites should be developed and operated in southwestern Virginia around historic breeding sites.

Recent efforts to survey a larger portion of the mountain range are exciting. Although effort-intensive, there is no way of assessing success of the ongoing management program except to continue survey work. Once breeding pairs have been located, increasing the frequency of monitoring may help to improve information on reproductive success.

Peregrine Falcons have contended with a wide array of contaminants since the re-establishment of the breeding population (Morse 1993, Chen et al 2008, 2010, Potter et al. 2009). Continuing the long-term collection and analysis of addled eggs provides a historical record of contaminant exposure within this breeding population.

## ACKNOWLEDGMENTS

Many individuals and organizations contributed to the success of the 2020 monitoring and management effort in Virginia. This project would not have been possible without the continued assistance and cooperation from the Virginia Department of Transportation. We thank Tom Mansfield, Josh Matthews, Jack Meredith, Mike Dangerfield, Alvin Balderson, James Hatcher, Robert Szymczak, Walter Lowe, Darrell Southerland, Melissa Wolford, Jack Burkard, Robert Hewitt, Dave Kurtich, Kip Holloway, Lance Gardner, Ann Durica, Annette Adams, Robert Gidgell, John Gaby, Shawn Coyne, Jamie Weedon, Leslie Danovich, Thomas Miller, Mark Haus, Steven Sharpeta, Dennis Maxey, Marion Mckeever, William White, Joyce McGowan, Walter Lowe, Ronald Peaks, Michael Coffey, Abdoul Koura-bodji, Sharif Ramsis, Robbie Prezioso, Robby Rhine, Sal Sibia, John Schaefer, Leo Snead, Palmer Stearns, Catherine Weile, Dave Bova, Ben Platt, Olivia Daniszewski, and the many other bridge tenders and equipment operators for their expertise and assistance. We thank John Thompson, Sam Rinehart and Rusty Minix from access to Luckstone quarry. We thank Steve Potts and Matt Olear for monitoring the Reston Town Center pair, Sapna Yathiraj and Puablo Guevara for allowing access to the site and Steve Potts for assisting with banding. We thank Alex Wilke from The Nature Conservancy's Virginia Coast Reserve for continued cooperation with the island towers. Ruth Boettcher from DWR assisted with monitoring for pairs along the seaside of the Delmarva. Shane Whealton from NASA Wallops assisted with monitoring the Wallops Island brood. Martin Walker and Robert Jacobson assisted with the monitoring of the James River Reserve Fleet. Matt Overton assisted with coordination of management on Dominion facilities. Jeff Marcell, Barbara Montiero, Dana West and Sean Iseminger assisted with accessing and monitoring the Dominion Possum Point nest. Wayne Clark and Jessica Showalter

assisted with monitoring the Yorktown Substation. Kevin Werthmuller and Laurette Tully from the Coast Guard assisted with access to the Silver Beach Range Tower. The National Park Service has had a long history of supporting the re-introduction of falcons in the mountains and played a critical role in managing and funding the hack site at Shenandoah National Park. Rolf Gubler coordinated the hack and surveyed potential breeding sites with Alan Williams, David Demarest along with a dedicated group of NPS staff. Reese Lukei and Shawn Padgett from the Center for Conservation Biology monitored and helped with management of the Armada-Hoffler pair. Mitchell Byrd and Bart Paxton assisted with fieldwork along the Delmarva. Sergio Harding and Ernie Aschenbach provided regulatory oversight to the project and Meagan Thomas provided management and monitoring for the Richmond pair. Erica Lawler provided contracting assistance from William & Mary. Marie Pitts assisted with report production and fiscal management. This publication was completed in part with funds provided by the Virginia Department of Wildlife Resources through a Federal Aid in Wildlife Restoration grant from the U.S. Fish and Wildlife Service.

## LITERATURE CITED

- Anderson, D. W. and J. J. Hickey. 1972. Eggshell changes in certain North American birds. *Proceedings of the International Ornithological Congress* 15:514-540.
- Berger, D. D., C. R. Sindelar, Jr., and K. E. Gamble. 1969. The status of breeding peregrines in the eastern United States, in J. J. Hickey ed., *Peregrine Falcon Populations: Their Biology and Decline*. University of Wisconsin Press. Madison, WI. Pp. 165-173.
- Bollengier, R. M., Jr., J. Baird, L. P. Brown, T. J. Cade, M. G. Edwards, D. C. Hagar, B. Halla, and E. McCaffrey. 1979. Eastern Peregrine Falcon recovery plan. U.S. Fish and Wildlife Service, Washington, DC, U.S.A.
- Chen, D., M. J. La Guardia, E. Harvey, M. Amaral, K Wohlfort, and R. C. Hale. 2008. Polybrominated diphenyl ethers in Peregrine Falcon (*Falco peregrinus*) eggs from the Northeastern U.S. *Environmental Science and Technology* 42: 7594–7600.
- Chen, D., R. C. Hale, B.D. Watts, M. J. La Guardia, E. Harney, E. K. Mojica. 2010. Species-specific accumulation of polybrominated diphenyl ether flame retardants in birds of prey from the Chesapeake Bay region, USA. *Environmental Pollution* 158: 1183-1889.
- Gabler, J. K. 1983. The peregrine falcon in Virginia: Survey of historic eyries and reintroduction effort. Unpublished master's thesis, College of William and Mary, Williamsburg, VA. 81 pp.
- Harding, S.R. 2020. 2017-2020 Surveys for Peregrine Falcons in Western Virginia. Virginia Department of Wildlife Resources, Wildlife Division, Henrico, Virginia. 13 pp.
- Hickey, J. J. 1942. Eastern population of the Duck Hawk. *Auk* 59:176-204.
- Hickey, J. J., Ed. 1969. *Peregrine Falcon Populations: Their Biology and Decline*. University of Wisconsin Press. Madison, Wisconsin.
- Jones, F. M. 1946. Duck Hawks of Eastern Virginia. *Auk* 63:592.

- Morse, N. J. 1993. Contaminants in Peregrine Falcon (*Falco peregrinus*) eggs from Virginia, Maryland, and West Virginia. U.S. Fish and Wildlife Service report. Virginia Field Office, White Marsh, VA.
- Postupalsky, S. 1974. Raptor reproductive success: some problems with methods, criteria and terminology. Raptor Research Report 2:21-31.
- Potter, K. E., B. D. Watts, M. J. LaGuardia, E. P. Harvey, and R. C. Hale. 2009. Polybrominated diphenyl ether flame retardants in Chesapeake Bay region, USA, Peregrine Falcon (*Falco peregrinus*) eggs: Urban/rural trends. Environmental Toxicology and Chemistry 28:973-981.
- Sherrod, S. K., W. R. Heinrich, W. A. Burnham, J. H. Barclay, and T. J. Cade. 1981. Hacking: A method for releasing peregrine falcons and other birds of prey. The Peregrine Fund, Inc. 62 pp.
- Watts, B. D., S. M. Padgett, E. K. Mojica, and B. J. Paxton. 2011. FALCONTRAK: Final Report. Center for Conservation Biology Technical Report Series. CCBTR-11-07. College of William and Mary, Williamsburg, VA. 33 pp.
- Watts, B. D., K. E. Clark, C. A. Koppie, G. D. Therres, M. A. Byrd, and K. A. Bennett. 2015. Establishment and growth of the peregrine falcon breeding population within the mid-Atlantic Coastal Plain. Journal of Raptor Research 49:350-358.