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## Virginia Peregrine Falcon monitoring and management program: Year 2014 report

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# **VIRGINIA PEREGRINE FALCON MONITORING AND MANAGEMENT PROGRAM: YEAR 2014 REPORT**



**Center for Conservation Biology  
College of William and Mary  
& Virginia Commonwealth University**

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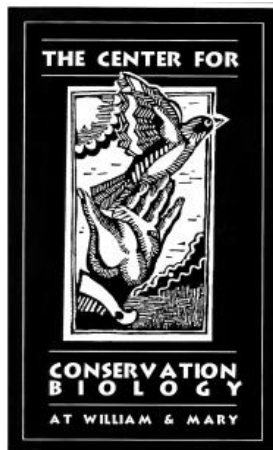
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## **Project Partners:**

**The Virginia Department of Game and Inland Fisheries  
National Aeronautics and Space Administration  
National Park Service  
United States Fish and Wildlife Service  
Virginia Department of Transportation  
The Nature Conservancy  
Dominion Power  
United States Coast Guard  
Center for Conservation Biology**

**Front Cover:** *Juvenile peregrine falcon from the Berkley Bridge recently released from the hack box at Shenandoah National Park. Photograph 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.**

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## EXECUTIVE SUMMARY

The Peregrine Falcon (*Falco peregrinus*) was believed to be extinct as a breeding species in Virginia by the mid-1960s. Intensive management efforts since the late 1970s have resulted in a known breeding population that has now exceeded 20 pairs. However, most known breeding pairs currently nest on artificial structures and reproductive performance continues to be erratic. The primary objective of this program is to continue to monitor population trends and to improve reproductive performance through active management. The ultimate goal of the program is to recover a population that is self-sustaining.

The Virginia breeding population supported 27 known pairs during the 2014 breeding season. Since 1982, the population has exhibited a steady recovery with an average doubling time of 5.4 years. Fifty-eight nesting structures were surveyed for Peregrine Falcon activity during the 2014 breeding season. Occupied nesting structures included 10 peregrine towers, 1 ground nest, 1 bridge, 1 navigation tower, and 2 fishing shacks on the Delmarva Peninsula; 7 bridges, 1 power plant stack, and 1 high-rise building in the coastal plain; and 3 natural cliff sites in the mountains. Twenty-four falcon pairs made breeding attempts producing 80 eggs and 46 chicks known to have survived to banding age. The reproductive rate was 1.7 chicks/occupied territory and 1.9 chicks/active territory.

Nine falcons representing 20% of the chicks produced in the state were translocated from the coast to the mountains during the 2014 breeding season. This included 2 females and 7 males. All translocated chicks originated on bridges that have a history of poor fledging success. Birds collected from bridge territories were transported to Hogback Mountain in Shenandoah National Park and released in a hacking program.



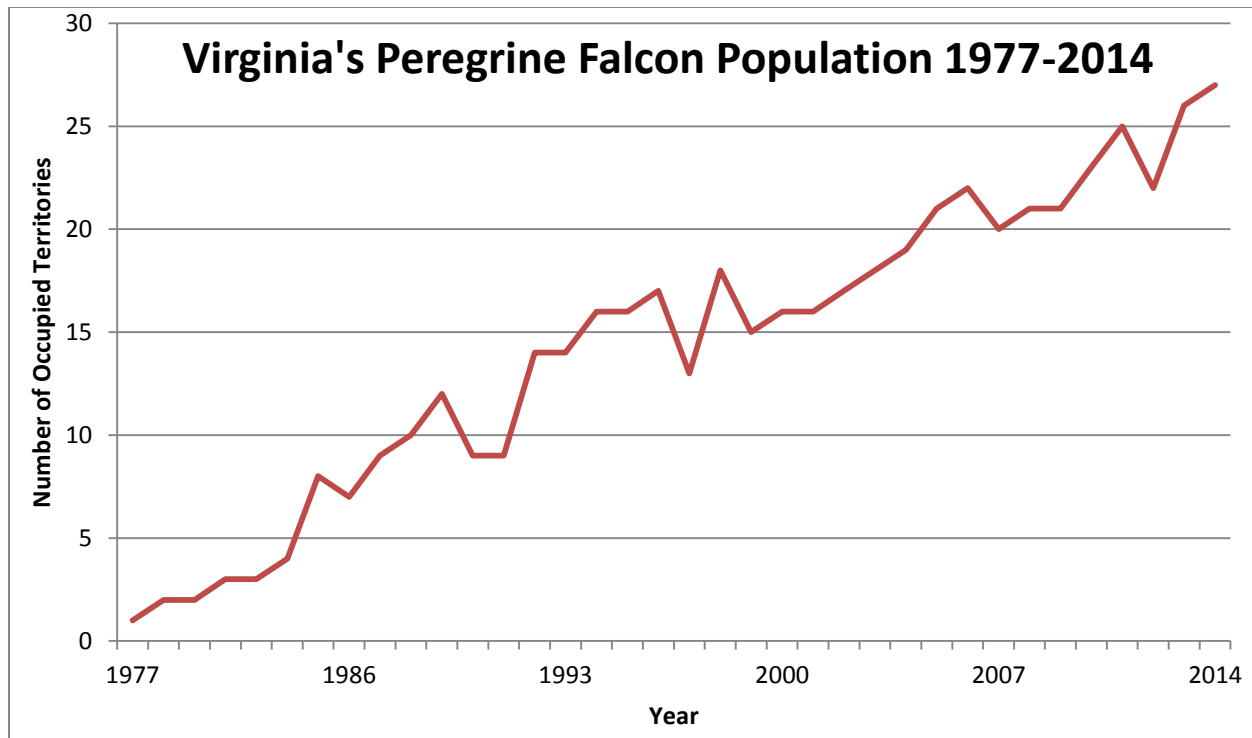
## BACKGROUND

### Context

The original population of Peregrine Falcons in the eastern United States was estimated to contain approximately 350 breeding pairs (Hickey 1942). From published records and accounts, there have been 24 historical Peregrine eyries documented in the Appalachians of Virginia (Gabler 1983). Two additional nesting sites were documented on old osprey nests along the Virginia portion of the Delmarva Peninsula (Jones 1946). Throughout the 1950s, and into the 1960s, Peregrine Falcon populations throughout parts of Europe and North America experienced a precipitous decline (Hickey 1969). A survey of 133 historic eyries east of the Mississippi River in 1964 failed to find any active sites (Berger et al. 1969). The Peregrine Falcon was believed to be extinct in Virginia as a breeding species by the early 1960s.

As part of a national effort to restore the eastern Peregrine population, the Virginia Department of Game and Inland Fisheries, 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. Since the program began in 2000, over 235 wild-reared falcons have been translocated from coastal breeding sites in Virginia to mountain release sites in Virginia and West Virginia. Such movements have taken advantage of young produced from sites where fledging success is known to be poor.

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 20 pairs (Figure 1). 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 1990's 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.



**Figure 1.** Breeding population of Peregrine Falcons in Virginia 1977-2014.

## OBJECTIVES

The objectives of this project were:

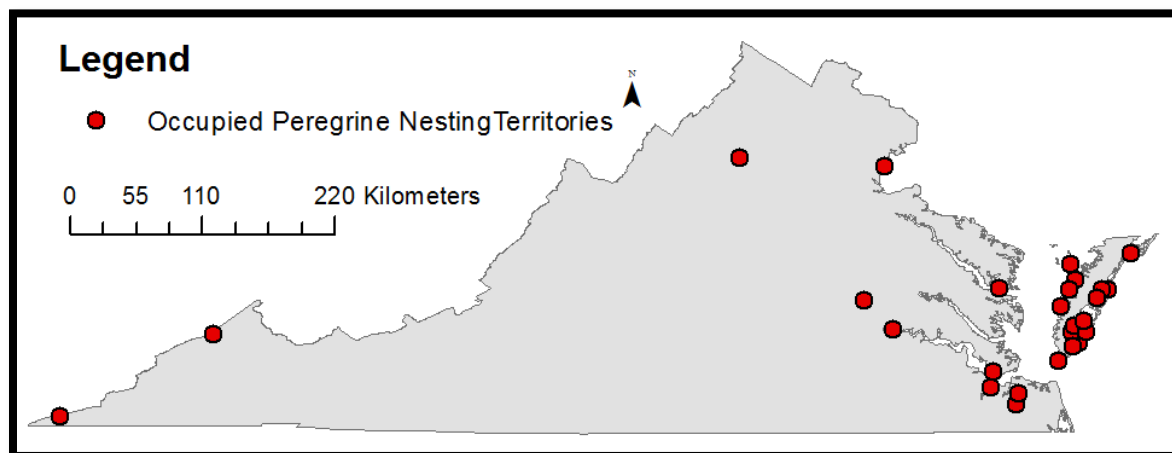
- 1) to track the recovery of the breeding population of Peregrine Falcons in Virginia (both in terms of the size and distribution of the breeding population and the number of young produced),
- 2) to evaluate the success of past and present management techniques used with the breeding population,
- 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

In 2014, the geographic scope of this project included 24 breeding territories within the coastal plain, 3 mountain cliff nesting sites, and 1 mountain hawk site at Hogback Mountain in Shenandoah National Park (Figure 2). Most of the effort was focused on the coastal plain where the majority of breeding pairs occur. In addition,

breeding pairs documented by project partners at VDGIF (Harding 2015) and NPS (R. Gubler pers. comm.) are included in the state wide totals.



**Figure 2.** Map of occupied territories monitored during the 2014 breeding season.

### 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 2014 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 or boat. 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. Mountain sites were monitored by project partners.

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, fledging rate was determined for all active sites when possible. Nest sites were visited approximately 2 weeks after projected fledging date to determine fledging success. This time threshold was developed from satellite tracking data (2001-2002) that indicates a pulse of mortality just prior to fledging and in the 2 weeks following fledging (Watts et al. 2011). Reproductive rates were calculated using number of chicks reaching banding age.

### Banding

An attempt was made to band all chicks surviving to banding age (18-32 d). Chicks were banded with a U.S. Fish and Wildlife Service lock-on, aluminum tarsal band on the



right leg and a bi-colored, green and black, alpha-numeric auxiliary band on the left leg (Fig 3). USFWS bands used in Virginia during the 2014 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 USFWS band for temporary identification at the hack site. Accessing nests required

coordination and assistance from state, federal, NGO, and corporate partners (Fig. 4-5).



**Figure 3.** Virginia falcons are banded with a green federal band and black over green field-readable band.



**Figure 4.** George Newsome and Laura Shumaker during chick banding at Dominion Power's Possum Point facility.



**Figure 5.** VDOT Hampton Roads bridge staff made extracting a chick from the Highrise Bridge nest a priority on Easter morning.

## 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 (Fig. 6), live webcams broadcast online, and by digital photos taken during visits to the nest.



**Figure 6.** Elkins Marsh Shack female, banded A/\*S, identified with a game camera in 2014.

## Translocations

Over the past decade, some breeding sites on bridges have been known to experience low fledging rates. Observations indicate that losses occur during initial flight attempts or when chicks are near fledging age. 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. SNP has two hack boxes and the hacking program takes up to 10 birds aged for synchronous release. Conflicts between the breeding pair at Stony Man and hacked young are avoided by releasing young in late May-early June. 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 not longer being incubated. Eggs were washed, air dried, sealed in individual ziploc bags, and frozen.

# RESULTS

## Nest Site Surveys

Fifty-eight nesting structures were surveyed for Peregrine Falcon activity during the breeding season (Table 1). Of the sites with known occupation, 27 supported resident pairs. Occupied nesting structures included 10 peregrine towers, 1 ground nest, 1 bridge, 1 navigation tower, and 2 fishing shacks on the Delmarva Peninsula; 7 bridges, 1 power plant stack, and 1 high-rise building in the coastal plain; and 3 natural cliff sites in the mountains (Table 2).

**Table 1.** Catalog of nesting structures established for Peregrine Falcons in Virginia (1977-2009). Table gives year of establishment and whether or not the site was checked for Peregrine Falcon activity during the 2014 breeding season.

Site Code	Location Description	Structure Type	Year Est	Checked 2014
VA-PEFA-02	Cobb Island Tower	Peregrine Tower	1978	Y
VA-PEFA-06	Wallops Island Tower	Peregrine Tower	1981	Y

Site Code	Location Description	Structure Type	Year Est	Checked 2014
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	Nest Box	1989	Y
VA-PEFA-21	Norfolk Southern RR Bridge	Bridge	1992	Y
VA-PEFA-22	James River Bridge	Nest Box	1991	Y
VA-PEFA-23	Berkley Bridge	Nest Box	1996	Y
VA-PEFA-24	Benjamin Harrison Bridge	Nest Box	1996	Y
VA-PEFA-25	Mills Godwin Bridge	Nest Box	1996	Y
VA-PEFA-26	West Norfolk Bridge	Nest Box	1996	Y
VA-PEFA-27	Norris Bridge	Nest Box	1989	Y
VA-PEFA-28	Little Stony Man, SNP	Natural Cliff Face	-----	Y <sup>b</sup>
VA-PEFA-29	Old Rag, SNP	Natural Cliff Face	-----	Y <sup>b</sup>
VA-PEFA-32	Plum Tree Island Box	Nest Box	1990	Y
VA-PEFA-33	Saxis Marsh W. Tower	Peregrine Tower	1998	Y
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	Natural Cliff Face	-----	Y <sup>b</sup>
VA-PEFA-39	Concrete Ships	Nest Box	1995	Y
VA-PEFA-40	Chesapeake 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-44	Elizabeth River Substation	Nest Box	1998	Y
VA-PEFA-45	Cargill Grain Elevator	Nest Box	1993	Y
VA-PEFA-46	Lafayette Bridge	Nest Box	1998	Y
VA-PEFA-48	Churchland Bridge	Nest Box	1999	Y
VA-PEFA-49	Yorktown Substation	Nest Box	1998	Y
VA-PEFA-51	Campostella Bridge	Nest Box	1998	Y
VA-PEFA-52	I-64 Bridge	Nest Box	1999	Y

Site Code	Location Description	Structure Type	Year Est	Checked 2014
VA-PEFA-53	ALCOA 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>c</sup>
VA-PEFA-56	River Front Plaza Building	Nest Box	2002	Y <sup>c</sup>
VA-PEFA-57	BB&T Building	Nest Box	1984	Y <sup>c</sup>
VA-PEFA-58	Russell Island Tower	Peregrine Tower	1982	N
VA-PEFA-59	Bermuda Hundred	Nest Box	1998	Y
VA-PEFA-61	Tappahannock Bridge	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-64	James River Ghost Ship 2	Moth Ball Fleet	-----	Y <sup>d</sup>
VA-PEFA-65	Craddock Neck	Peregrine Tower		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>c</sup>
VA-PEFA-69	Breaks Interstate Park	Natural Cliff Face	-----	Y <sup>c</sup>
VA-PEFA-70	Pamunkey Bridge	Bridge	-----	Y
VA-PEFA-71	Cedar Island	Ground Nest	-----	Y <sup>c</sup>
VA-PEFA-72	Stony Man, SNP	Natural Cliff Face	-----	Y <sup>b,e</sup>

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

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

<sup>c</sup> Nest monitored by VDGIF.

<sup>d</sup> Boat sold by USDOT in 2012. New location of falcons unknown. USDOT monitored remaining fleet.

<sup>e</sup> Site code created in 2014 to differentiate from Little Stony Man which was only used 1992-1993. All use after 1993 has been on adjacent Stony Man. Per coordination with R. Gubler, NPS.

## Breeding Results

Virginia supported 27 known breeding pairs of Peregrine Falcons during 2014 (Table 2). The 24 falcon pairs that were documented making breeding attempts produced 80 eggs, at least 54 of which hatched. Only 46 chicks were documented to survive to banding age. The reproductive rate was 1.7 chicks/occupied territory and 1.9 chicks/active territory. Of 23 clutches that were followed completely from laying to fledging, 53 of 79 (67.1%) eggs hatched, 49 of 53 (92.5%) chicks survived to banding age, and 43 of 49 chicks (87.8%) fledged successfully (includes 9 hatched chicks).

- In July 2014, VDOT contractors at the Benjamin Harrison bridge reported a dead banded falcon on the bridge span. The falcon was reportedly hit by a car. The carcass was mistakenly thrown away and the band not documented. Without a photo we cannot confirm the carcass was a peregrine. The adult female of this pair is banded and we can confirm if she's present during the 2015 breeding season. VDOT Environmental staff have worked with the contractor on protocols in the event they find another falcon carcass.
- Three peregrines were seen at the Rt 360 bridge in Tappahannock in October 2013 by DGIF including two females banded 1687-02892 and 1947-01712. CCB was not able to document a breeding attempt in 2014 so these falcons may have abandoned the territory.
- The Richmond pair fledged 2 young but one collided with a building two days after fledging. The bird sustained eye damage and is non-releasable. Source: S. Harding VDGIF Richmond Falcon Blog and The Wildlife Center website <http://wildlifecenter.org/critter-corner/archive-patient/peregrine-falcon-14-1319>.
- The Coast Guard navigation tower at Silver Beach was climbed twice this season to monitor the pair at the top of the 300' tower. Future nest checks should wait until chicks hatch because of the long time to ascend the tower and disturbance to the pair. Fledge checks are difficult at this site because the fledged young move to the adjacent shoreline.
- The Cedar Island pair nested again on the sand but this year without the crab pot for shade (Fig. 7). The pair made two nesting attempts but both failed. A game camera documented the two chicks in the second clutch died of heat exhaustion.



**Figure 7.** Adult falcon brooding 2 chicks shortly before nest failure from extreme summer temperatures.

- Two intruder female falcons were seen on the webcam battling for the Cobb Island territory. The 2014 female 1807-65005 fended off the intruders and successfully produced young.
- The Chesapeake Bay Bridge Tunnel underwent significant construction activity in 2014 with repeated activity above and below deck during the breeding season. The falcon pair were documented flying at the CBBT Highrise bridge but no breeding attempt was seen. CBBT staff met with VDGIF, USFWS, and CCB about the construction project but the disturbance was determined unavoidable. CBBT is willing to discuss placing a new nest box on the bridge to facilitate safe access to the nest. It would require VDGIF to provide CBBT assurance they would not be liable if the box fell and caused injury or damage. Construction will likely continue into the beginning of the 2015 breeding season (T. Holloway per. comm.).
- We coordinated with VDOT to extract the chick from the Highrise bridge. The bridge has high traffic volume and lane closures for a snoop truck are rarely authorized. This year, we were able to remove the chick before a construction project commenced on the bridge alleviating the time of year restriction for VDOT and moving the chick to the safer hack site.



**Table 2.** Summary of productivity results for Peregrine Falcon pairs in Virginia during the 2014 breeding season.

Site Code	Nest name	Occ Terr	Active Nest	Eggs	Hatched	Band Age	Fledged
VA-PEFA-02	Cobb Island Tower	Y	Y	3	3	3	3
VA-PEFA-06	Wallops Island Tower	Y	Y	2	0 <sup>a</sup>		
VA-PEFA-09	Watts Island Tower	Y	Y	>=4	>=2	2	2
VA-PEFA-10	Finney's Island Tower	Y	Y	>=4	>=2	2	1
VA-PEFA-12	Hyslop Marsh Tower	Y	Y	>=1	0 <sup>a</sup>		
VA-PEFA-16	Elkins Marsh Chimney	Y	Y	>=4	>=4	4	2
VA-PEFA-17	Elkins Marsh Shack Tower	Y	Y	>=3	>=3	3	3
VA-PEFA-18	Wachapreague Shack Tower	Y	Y	4	4	4	4
VA-PEFA-22	James River Bridge Rt 17	Y	Y	4	2	2	2 <sup>b</sup>
VA-PEFA-23	Berkley Bridge I-264	Y	Y	>=3	>=2	2	2 <sup>b</sup>
VA-PEFA-24	Benjamin Harrison Bridge	Y	Y	4	4	2	2 <sup>b</sup>
VA-PEFA-25	Mills Godwin Bridge Rt 17	Y	Y	2	0 <sup>c</sup>		
VA-PEFA-27	Norris Bridge Rt 3	Y	Y	4	>=2	2	2 <sup>b</sup>
VA-PEFA-34	Mockhorn Island Tower	Y	Y	>=2	>=2	2	2
VA-PEFA-36	Upsher Bay Tower	Y	Y	4	4	4	>=3
VA-PEFA-37	Silver Beach Range Tower	Y	Y	5	>=2	2	2 <sup>g</sup>
VA-PEFA-42	Possum Point Substation	Y	Y	4	>=2	2	1
VA-PEFA-52	I-64 Highrise Bridge	Y	Y	>=2	>=1	1	1 <sup>b</sup>
VA-PEFA-56	River Front Plaza Building	Y	Y	3	2	2	1 <sup>d</sup>
VA-PEFA-60	Chesapeake Bay Bridge Tunnel	Y	U				
VA-PEFA-61	Tappahannock Bridge	Y	N				
VA-PEFA-62	Gull Marsh Tower	Y	Y	4	4	4	4
VA-PEFA-63	Godwin Island Box	Y	Y	>=4	>=3	3	3
VA-PEFA-67	White Rocks	Y	U				
VA-PEFA-69	Breaks Interstate Park	Y	Y	>=1	>=1	>=1	>=1 <sup>f</sup>
VA-PEFA-71	Cedar Island	Y	Y	6	>=2	0	0
VA-PEFA-72	Stony Man, SNP	Y	Y	3	3	3	3
<i>Totals</i>		27	24	80	54	46	44

<sup>a</sup> Eggs or young depredated by raccoon.

<sup>b</sup> All young translocated for hacking at Shenandoah National Park.

<sup>c</sup> Nest abandoned. Eggs depredated by unknown predator (likely crows).

<sup>d</sup> One fledgling collided with building shortly after fledging.

<sup>e</sup> Two breeding attempts. First clutch of 2 eggs failed. Second clutch of four eggs failed because of heat wave and unprotected nest location.

<sup>f</sup> New nest location not found in the park. Assumed juvenile bird observed in territory fledged from Breaks pair.

<sup>g</sup> Chicks difficult to count during the fledging period because they move to the mainland.

## Banding

All falcon chicks that survived to banding age were fitted with both USFWS and alpha-numeric bands. This included 25 females and 21 males (Tables 3a and 3b).

**Table 3a.** List of band codes for female peregrine falcon chicks banded in Virginia during the 2014 breeding season.

USFWS Band	Alpha-numeric Band	Nest	Date
1807-65094	62/AV	Benjamin Harrison Bridge	5/2/2014
1907-01901	64/AV	River Front Plaza Building	5/30/2014
1907-01903	66/AV	Mockhorn Island Tower	5/21/2014
1907-01904	67/AV	Elkins Marsh Chimney	5/21/2014
1907-01905	68/AV	Elkins Marsh Chimney	5/21/2014
1907-01906	69/AV	Silver Beach Range Tower	5/22/2014
1907-01907	71/AV	Gull Marsh Tower	5/28/2014
1907-01908	72/AV	Gull Marsh Tower	5/28/2014
1907-01909	73/AV	Gull Marsh Tower	5/28/2014
1907-01910	74/AV	Finney's Island Tower	5/28/2014
1907-01911	75/AV	Wachapreague Shack Tower	6/2/2014
1907-01912	76/AV	Wachapreague Shack Tower	6/2/2014
1907-01913	77/AV	Wachapreague Shack Tower	6/2/2014
1907-01914	70/AV	Silver Beach Range Tower	5/22/2014
1907-01915	78/AV	Wachapreague Shack Tower	6/2/2014
1907-01916	79/AV	Upsher Bay Tower	6/2/2014
1907-01917	80/AV	Upsher Bay Tower	6/2/2014
1907-01918	81/AV	Upsher Bay Tower	6/2/2014
1907-01919	82/AV	Elkins Marsh Shack Tower	6/3/2014
1907-01920	83/AV	Cobb Island Tower	6/4/2014
1907-01921	84/AV	Cobb Island Tower	6/4/2014
1907-01922	85/AV	Godwin Island Box	6/4/2014
1907-01923	86/AV	Godwin Island Box	6/4/2014
1907-01924 <sup>a</sup>	65/AV	River Front Plaza Building	5/30/2014
1907-02000	63/AV	Norris Bridge Rt 3	5/2/2014

<sup>a</sup> Sustained permanent eye injury 2 days after fledging. Now an education bird at The Wildlife Center of Virginia.

**Table 3b.** List of band codes for male peregrine falcon chicks banded in Virginia during the 2014 breeding season.

USFWS Band	Alpha-numeric Band	Nest	Date
1126-11923	01/AU	Norris Bridge Rt 3	5/2/2014
1126-11924	02/AU	I-64 Highrise Bridge	5/11/2014
1126-11925	03/AU	Possum Point Substation	5/13/2014
1126-11926	04/AU	Possum Point Substation	5/13/2014
1126-11927	05/AU	Berkley Bridge I-264	5/18/2014
1126-11928	08/AU	Berkley Bridge I-264	5/18/2014
1126-11931	09/AU	James River Bridge Rt 17	5/19/2014
1126-11932	10/AU	James River Bridge Rt 17	5/19/2014
1126-11934	11/AU	Mockhorn Island Tower	5/21/2014
1126-11935	12/AU	Elkins Marsh Chimney	5/21/2014
1126-11936	13/AU	Elkins Marsh Chimney	5/21/2014
1126-11938	14/AU	Watts Island Tower	5/22/2014
1126-11939	15/AU	Watts Island Tower	5/22/2014
1126-11940	16/AU	Gull Marsh Tower	5/28/2014
1126-11941	17/AU	Finney's Island Tower	5/28/2014
1126-11942	18/AU	Upsher Bay Tower	6/2/2014
1126-11943	19/AU	Elkins Marsh Shack Tower	6/3/2014
1126-11944	20/AU	Elkins Marsh Shack Tower	6/3/2014
1126-11945	21/AU	Cobb Island Tower	6/4/2014
1126-11946	22/AU	Godwin Island Box	6/4/2014
1807-65093	61/AV	Benjamin Harrison Bridge	5/2/2014

### Band Resights

Fourteen breeding adults were identified through video cameras on nests and direct observations with digital cameras (Table 4). An additional 12 banded falcons were reported to CCB during 2014 including territorial battles, 2 HY falcons sighted at hawk watch and hawk trap sites, a line collision near Oyster, VA, and the death of a 2013 fledgling at Possum Point. Three Virginia falcons were reported breeding in New Jersey by K. Clark.

**Table 4.** List of resighted banded falcons in 2014.

Federal Band	Color Code	Color Band <sup>1</sup>	Sex	Resight Location	Origin Nest	Age in Years
<i>Breeding in Virginia</i>						
1807-02775	black/green	70/Z	F	Ben Harrison Bridge	Ben Harrison Bridge, VA	6
1687-02832	black/green	A/15	F	Cedar Island	Dividing Creek, Delaware Bay, NJ	5
1126-11853	black/green	19/AS	M	Cedar Island	Cobb Island, VA	4

Federal Band	Color Code	Color Band <sup>1</sup>	Sex	Resight Location	Origin Nest	Age in Years
1807-37495	black/red	A/*S	F	Elkins Marsh Shack	Egg Island,NJ	11
2206-81637	black/green	09/W	M	Elkins Marsh Shack	Upsher Bay,VA	8
1807-02799	black/green	Z/34	F	Finney's Island	Cobb Island,VA	5
1807-65028	black/green	53/AU	F	Godwin Island	Upsher Bay,VA	4
1126-11848	black/green	14/AS	M	Godwin Island	Mockhorn Island,VA	4
1687-01333	black/green	Y/80	F	I-64 Highrise Bridge	Nums Island,NY	5
1687-02823	black/green	A/06	F	Norris Bridge	Ocean Gate tower,NJ	6
2206-07444	black/red	V*/S	M	River Front Plaza		14
987-95669	black/green	56/Y	F	Silver Beach Range Tower	Sea Isle City,NJ	8
1126-11841	black/green	07/AS	M	Silver Beach Range Tower	Gull Marsh Tower,VA	4
1126-11801	black/green	X/52	M	Stony Man	Godwin Bridge,VA	7
<i>Reported sightings</i>						
1126-11881	black/green	59/AS	M	Finney's Island, VA	Hyslop Marsh Tower,VA	3
1126-11901	black/green	79/AS	M	Possum Point, VA (dead)	Possum Point, VA	<1
1126-11920	black/green	98/AS	M	Oyster, VA (dead)	Gull Marsh tower,VA	1
1126-11928	black/green	08/AU	M	Lovettsville, VA	Berkley Bridge,VA	1
1807-65085	black/green	51/AV	F	Cobb Island Tower ,VA	Finney's Island,VA	1
1807-65090	black/green	60/AV	F	Cobb Island Tower, VA	Finney's Island,VA	1
1807-65098	black/green	57/AV	F	Craney Island, VA	Mockhorn Island,VA	2
1907-01904	black/green	67/AV	F	Virginia Beach, VA (dead)	Elkins Marsh Chimney,VA	<1
1907-01916	black/green	79/AV	F	Cape Charles, VA	Upsher Bay Tower,VA	<1
1907-01918	black/green	81/AV	F	Cape May Point, NJ	Upsher Bay tower, VA	<1
1907-01924	black/green	65/AV	F	Richmond, VA (injured)	Riverfront Plaza, VA	<1
2206-81631	black/green	04/W	M	Jones Point Park, VA	Benjamin Harrison Bridge,VA	8
<i>Breeding outside of Virginia</i>						
1807-65062	black/green	23/AV	F	Heislerville prison water	Elkins Marsh Shack	2

Federal Band	Color Code	Color Band <sup>1</sup>	Sex	Resight Location	Origin Nest	Age in Years
				tower, NJ		
0987-76814	black/red	*P/*G	F	Atlantic City Hilton, NJ	Wachapreague	16
1807-02735	black/green	29/V	F	Dividing Creek WMA, NJ	Wachapreague Tower	8

<sup>1</sup> A \* indicates the character is oriented horizontally on the band

## Translocations

In 2014, nine young falcons were translocated to a hack site at Shenandoah National Park 's Hogback Mountain (Table 5). This included 2 females and 7 males. All of these chicks originated on bridges that have a history of poor fledging success.

**Table 5.** Summary of translocation activities for Peregrine Falcons in Virginia during the 2014 breeding season. Electrical tape was applied to the USFWS band.

Band	Nest Site	Sex	Tape Color	Date Collected	Translocation Site
1807-65093	Benjamin Harrison Bridge	M	BLUE	5/2/2014	Shenandoah NP
1807-65094	Benjamin Harrison Bridge	F	YELLOW	5/2/2014	Shenandoah NP
1126-11923	Norris Bridge Rt 3	M	RED	5/2/2014	Shenandoah NP
1907-02000	Norris Bridge Rt 3	F		5/2/2014	Shenandoah NP
1126-11924	I-64 Highrise Bridge	M	ORANGE	5/11/2014	Shenandoah NP
1126-11927	Berkley Bridge I-264	M	YELLOW	5/18/2014	Shenandoah NP
1126-11928	Berkley Bridge I-264	M	WHITE	5/18/2014	Shenandoah NP
1126-11931	James River Bridge Rt 17	M	BLACK	5/19/2014	Shenandoah NP
1126-11932	James River Bridge Rt 17	M	GRAY	5/19/2014	Shenandoah NP

## Addled Eggs

Ten addled eggs were collected during the 2014 breeding season. Eggs collected in previous years on this project were analyzed as part of a long term monitoring study of organochloride and polybrominated diphenyl ether contaminants by Da Chen and Rob Hale at Southern Illinois University and Virginia Institute of Marine Science (Chen et al 2008, Chen et al 2010).

**Table 6.** Addled eggs collected from Peregrine Falcon nests in 2014.

Site Code	Location Description	Addled
VA-PEFA-09	Watts Island Tower	2
VA-PEFA-10	Finney's Island Tower	2
VA-PEFA-22	James River Bridge Rt 17	2
VA-PEFA-23	Berkley Bridge I-264	1
VA-PEFA-27	Norris Bridge Rt 3	1
VA-PEFA-42	Possum Point Substation	1
VA-PEFA-63	Godwin Island Box	1

## DISCUSSION

The breeding population of Peregrine Falcons in Virginia has steadily increased since 1977. The number of breeding pairs in the state has leveled out to between 22-27 pairs over the last 5 years. The reproductive rate decreased in 2014 but the young per occupied territory and young per active territory stayed within the range of the past 6



years. The 2014 productivity rates in Virginia were comparable to the average for peregrines in the Northeast US (2.02/occupied territory; data collected by state wildlife agencies, USFWS *in litt.* 2009). Virginia continues to have a strong nest success rate of 83% compared to the Northeast US rate of 77%. Virginia's nest success is due in part to active management through the hacking program.

The use of coastal productivity to fuel targeted hacks in priority sites is consistent with the objective of re-establishing a viable breeding population within the historic mountain range of Virginia. Fledging rates from the 8 bridge sites in the coastal plain has been historically very low. The translocation of these birds to the mountains is a good use of this production. Translocation of chicks from the Delmarva Peninsula was suspended in 2012 because of reduced space at the hack site. Priority was given to translocating chicks at bridge nests. This reduction in hacking effort is a result of hacked birds establishing breeding territories in Shenandoah NP and New River Gorge NP. Future hacking will continue at Shenandoah until they establish 2 occupied territories (R. Gubler per. comm.).

VDOT provided a UVA student intern, Olivia Daniszewski, to assist with the falcon program as part of their VDOT Engineering Scholars Program. Olivia assisted with nest monitoring at the Benjamin Harrison bridge and then worked with the hacking activities at Shenandoah with chicks removed from VDOT bridges. This seemed like a successful collaboration and would be a welcome annual addition to the project during nest monitoring and hacking periods.

Nesting on natural cliff sites continues to be precarious. These nests have a history of problems from exposure, drainage, and depredation. Two mountain nests were documented fledging young this year. The intensive management of the mountain falcon population through translocation and hacking should continue in the future until the mountain population is self-sustaining. The discovery of pairs at White Rocks, Breaks, and House Mountain in recent years is encouraging and future surveys of historic eyries should be considered to document additional breeding pairs.

Addled eggs will continue to be collected for analysis in future years at the Virginia Institute of Marine Science. This transfer represents a continuing effort to monitor contaminant levels in Virginia peregrines and to continue to explore the potential for this species to accumulate brominated fire retardants that remain on the market. These contaminants have been found in high level in falcon populations in the northeastern US and have the potential to affect avian productivity rates (Chen et al 2008, Chen et al. 2010, Potter 2004, Morse 1993, Weimeyer et al 1986).

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