2013

Virginia Peregrine Falcon monitoring and management program: Year 2013 report

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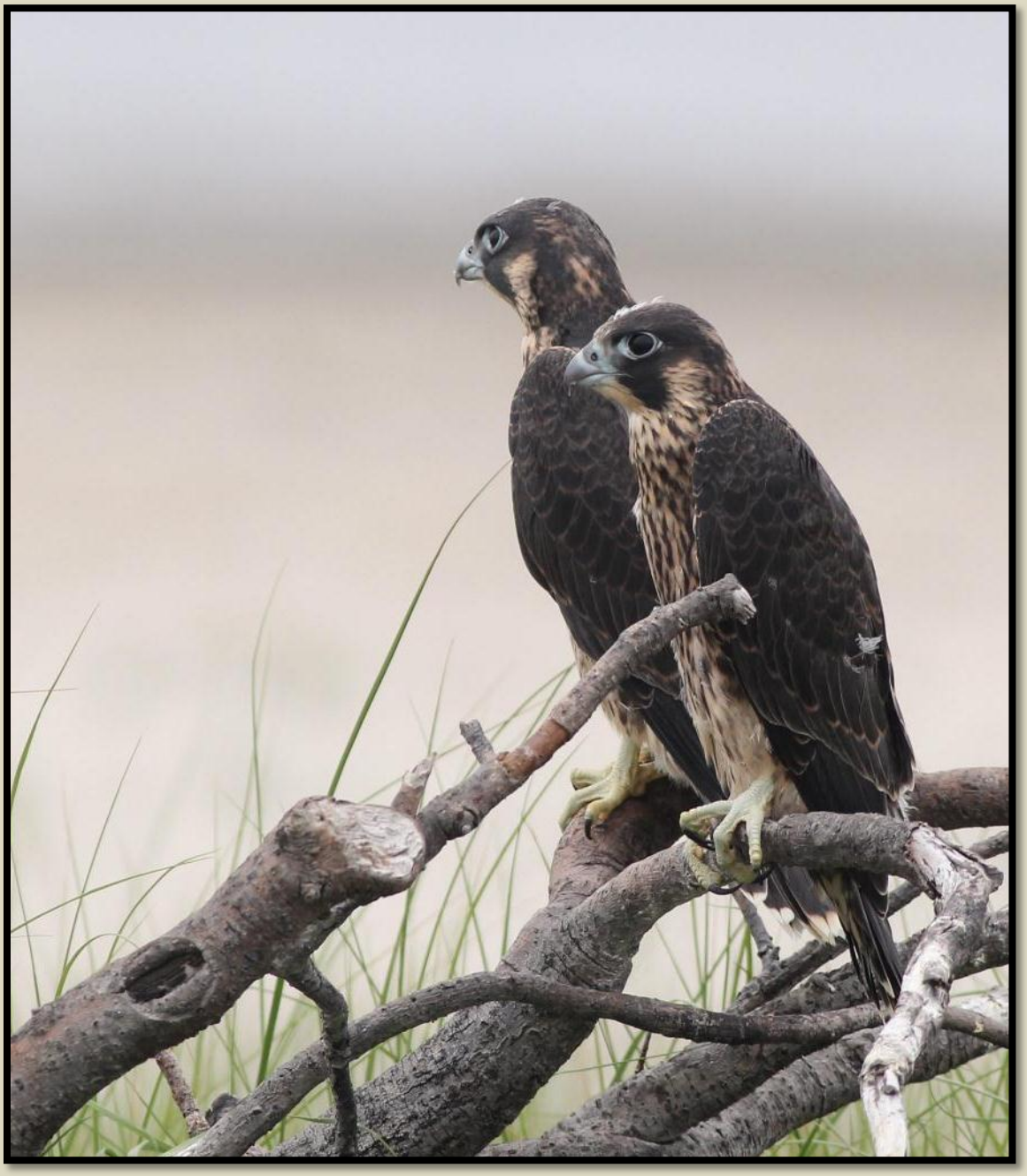
VIRGINIA PEREGRINE FALCON MONITORING AND MANAGEMENT PROGRAM: YEAR 2013 REPORT



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VIRGINIA PEREGRINE FALCON MONITORING AND MANAGEMENT PROGRAM: YEAR 2013 REPORT

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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: *Hatch-year peregrines on Cedar Island, VA. Photograph by Alex Lamoreaux.*

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.

Contents

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 26 known pairs during the 2013 breeding season. Since 1982, the population has exhibited a steady recovery with an average doubling time of 5.4 years. Fifty-six nesting structures were surveyed for Peregrine Falcon activity during the 2013 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; 6 bridges, 1 power plant stack, and 1 high-rise building in the coastal plain; and 3 natural cliff sites in the mountains. Twenty-six falcon pairs made breeding attempts producing 91 eggs and 50 chicks known to have survived to banding age. The reproductive rate was 2.0 chicks/occupied territory and 2.0 chicks/active territory.

Nine falcons representing 18% of the chicks produced in the state were translocated from the coast to the mountains during the 2013 breeding season. This included 8 females and 1 male. 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 226 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.

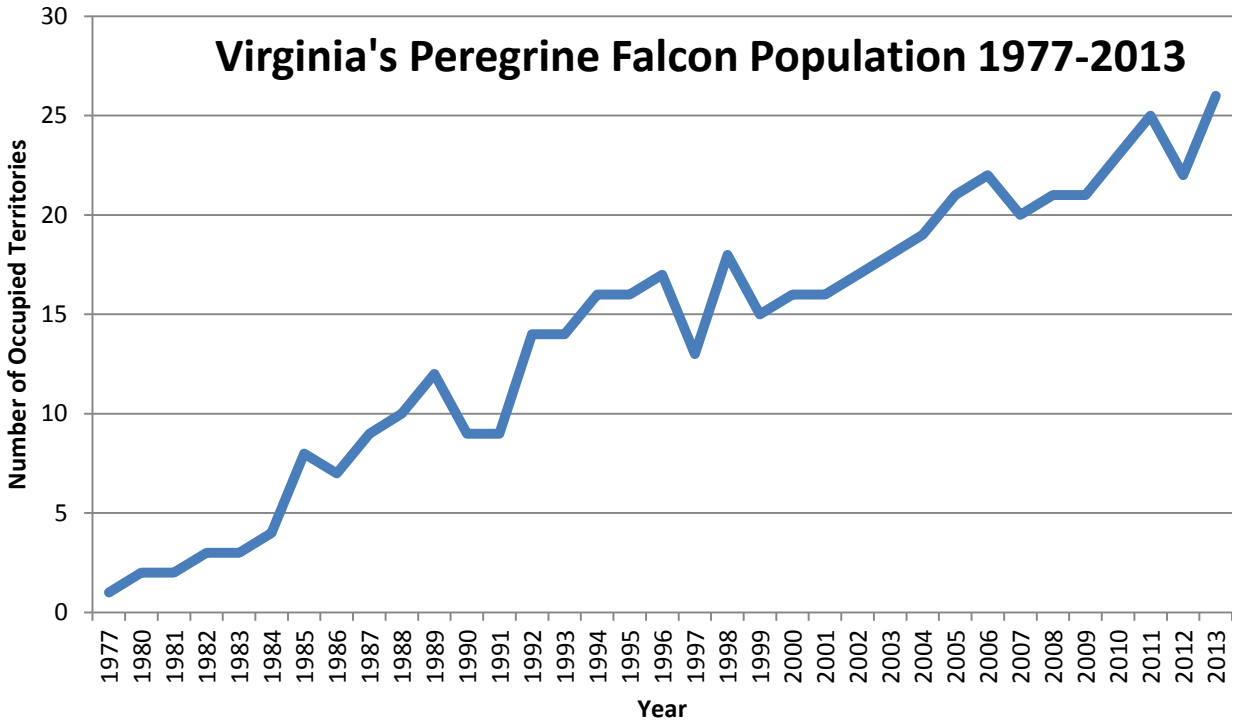

Figure 1. Breeding population of Peregrine Falcons in Virginia 1977-2013.

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 2013, the geographic scope of this project included 21 breeding territories within the coastal plain, 3 mountain cliff nesting sites, and 1 mountain hack 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 2013) and NPS (R. Gubler pers. comm.) are included in the state wide totals.

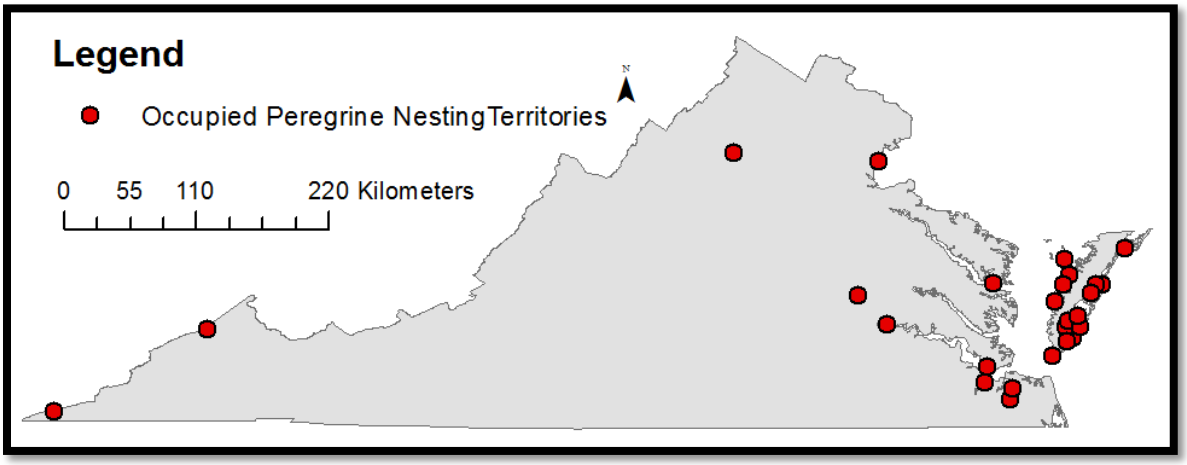

Figure 2. Map of occupied territories monitored during the 2013 breeding season.

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 2013 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).

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. USFWS bands used in Virginia during the 2013 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. George Newsome, Matt Overton, and Jeff Marcell during chick banding at Dominion Power's Possum Point facility.

Figure 4. Libby Mojica removed chicks from the Berkley Bridge with expert assistance from VDOT staff.

Band Resights

Effort was made to identify individual breeding adults at each nest by reading band codes. Bands were identified through Bushnell Natureview Cam HD max game camera mounted on the nest box platform (Fig. 5), live webcams broadcast online, and by digital photos taken during visits to the nest.

Figure 5. Godwin Island Shack male, banded *2/*K, identified with a game gamera.

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-six nesting structures were surveyed for Peregrine Falcon activity during the breeding season (Table 1). Of the sites with known occupation, 26 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; 6 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 2013 breeding season.

Site Code	Location Description	Structure Type	Year Est	Checked 2013
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 2013
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[b]
VA-PEFA-29	Old Rag, SNP	Natural Cliff Face	-----	Y[b]
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[b]
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 2013
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[c]
VA-PEFA-56	River Front Plaza Building	Nest Box	2002	Y[c]
VA-PEFA-57	BB&T Building	Nest Box	1984	Y[c]
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[d]
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	2010	Y[b]
VA-PEFA-68	Big House Mountain	Natural Cliff Face	-----	Y[c]
VA-PEFA-69	Breaks Interstate Park	Natural Cliff Face	-----	Y[c]
VA-PEFA-70	Pamunkey Bridge	Bridge	-----	Y
VA-PEFA-71	Cedar Island	Ground Nest	2013[e]	Y

[a] Nest monitored by NASA.
[b] Nest monitored by NPS.
[c] Nest monitored by VDGIF.
[d] Boat sold by USDOT in 2012. New location of falcons unknown. USDOT monitored remaining fleet.
[e] New ground nest found in sand dunes on Cedar Island.

Table 2. Summary of productivity results for Peregrine Falcon pairs in Virginia during the 2013 breeding season.

Site Code	Location Description	Occ Terr	Active Nest	Eggs	Hatched	Band Age	Fledged Successfully
VA-PEFA-02	Cobb Island Tower	Y	Y	2	2	2	2
VA-PEFA-06	Wallops Island Tower	Y	Y	4	0[a]		
VA-PEFA-09	Watts Island Tower	Y	Y	4	2	2	0[h]
VA-PEFA-10	Finney's Island Tower	Y	Y	4	4	4	0[h]
VA-PEFA-12	Hyslop Marsh Tower	Y	Y	≥2	≥2	2	2
VA-PEFA-16	Elkins Marsh Chimney	Y	Y	4	2	2	2
VA-PEFA-17	Elkins Marsh Shack Tower	Y	Y	3	3	1	0[h]
VA-PEFA-18	Wachapreague Shack Tower	Y	Y	4	4	4	0[h]
VA-PEFA-22	James River Bridge	Y	Y	4	3	2	2[b]
VA-PEFA-23	Berkley Bridge	Y	Y	4	4	4	4[b]
VA-PEFA-24	Benjamin Harrison Bridge	Y	Y	6[c]	6	1	0
VA-PEFA-25	Mills Godwin Bridge	Y	Y	4	3	3	3[b]
VA-PEFA-27	Norris Bridge	Y	Y	4	1	1	0
VA-PEFA-28	Little Stony Man, SNP	Y	Y	4	≥1	1	1
VA-PEFA-34	Mockhorn Island Tower	Y	Y	4	4	4	4
VA-PEFA-36	Upsher Bay Tower	Y	Y	≥2	≥2	2	2
VA-PEFA-37	Silver Beach Range Tower	Y	Y	4	4	4	4
VA-PEFA-42	Possum Point Substation	Y	Y	4	4	4	4
VA-PEFA-52	I-64 Bridge	Y	Y	≥1	?[d]		
VA-PEFA-55	Dominion Building	Y	Y	5	0[e]		
VA-PEFA-56	River Front Plaza Building	Y	Y	4	4	0[f]	
VA-PEFA-60	Chesapeake Bay Bridge	Y	Y	1	0		
VA-PEFA-62	Gull Marsh Tower	Y	Y	4	2	1	?
VA-PEFA-63	Godwin Island Box	Y	Y	4	3	3	1[g, h]
VA-PEFA-67	White Rocks	Y	Y	≥1	≥1	?	?
VA-PEFA-69	Breaks Interstate Park	Y	Y	2	≥1	≥1	1
VA-PEFA-71	Cedar Island	Y	Y	≥2	≥2	2	2
		26	26	91	63	50	34

[a] Eggs or young depredated by unknown predator.
[b] All young translocated for hacking at Shenandoah National Park.
[c] Two breeding attempts. Clutch of 2 eggs on south tower failed. Second clutch on north tower.
[d] Nest contents not visible from ground. Observations suggest pair were incubating eggs. Unknown if eggs hatched. No chicks were seen at nest.
[e] Unclear if eggs were viable. Four eggs were removed by adults during the expected hatching period and assumed chicks died during hatching. VA-PEFA-56 and VA-PEFA-55 are the same breeding territory.
[f] Two chicks died during hatching. Two died around 2 weeks old.
[g] No fledglings documented at nest during fledge checks. One chick caught during fall trapping by H Gabler.
[h] Observations made by technician. Suspect fledging rates were much higher than those listed in table.

Breeding Results

Virginia supported 26 known breeding pairs of Peregrine Falcons during 2013 (Table 2). The 26 falcon pairs that were documented making breeding attempts produced 91 eggs, at least 63 of which hatched. Only 50 chicks were documented to survive to banding age. The reproductive rate was 2.0 chicks/occupied territory and 2.0 chicks/active territory. Of 16 clutches that were followed completely from laying to fledging, 45 of 56 (80.4%) eggs hatched, 39 of 45 (86.7%) chicks survived to banding age, and 34 of 39 chicks (87.2%) fledged successfully.

- The pair on the Benjamin Harrison Bridge (VA-PEFA-24) laid two clutches of eggs. The first was on the south tower where they laid on a beam. The second clutch was laid in the nest box on north tower. Three chicks died before banding (one carcass found on road bed ~ 3 weeks old). Single chick banded and later died from injuries related to hitting either the bridge structure or a vehicle after fledging.
- Three peregrines were seen at the Rt 360 bridge in Tappahannock in October 2013 by DGIF. Two females were recovered from the water after an assumed territorial battle. A SY female banded 1687-02892 and black/green 35/AN (origin NJ, banded as nestling in 2012) was released after a week at The Wildlife Center of Virginia. The ATY falcon was banded with 1947-01712 and released after 4 weeks of rehabilitation at The Wildlife Center of Virginia. The nest box is no longer present on this bridge. Consideration should be given to installing a nest box to manage this pair in 2014.
- The Richmond pair continues to have egg hatching problems. The pair laid two clutches. The first clutch was laid on the Dominion building and 4 of the 5 eggs disappeared around hatching time, presumably the young died during hatching. Two chicks hatched successfully in Richmond but later died around 14 days old. A necropsy of one of the carcasses found bacterial sepsis and meningoencephalitis as the cause of death. Source: S. Harding VDGIF Richmond Falcon Blog.
- A new pair was confirmed at the Coast Guard tower near Silver Beach. CCB is in the process of getting official access to climb the tower to manage the nest in 2014. Chicks were not banded in 2013 but were observed fledging to the mainland.
- S. Harding reported a single adult at the House Mountain territory early in the season. The bird was not documented in subsequent visits.
- A new pair was found by R. Boettcher on Cedar Island. The pair appeared to be nesting in an overturned wood crab basket in the sand dunes (see photo right). This is the first ground nesting pair documented in the Atlantic coastal plain. The female is from New Jersey. The male is from Virginia but the band was unreadable.

- Cobb Island lost the breeding female early in the season. 1807-02733 died during the egg laying period from a prolapsed uterus though no egg was present in the reproductive tract. A necropsy was performed by Dr. Sim at The Wildlife Center of Virginia. Within a day of her death two new females were at the nest to claim the territory. Falcon 1807-65054 was not successful but 1807-65005 did secure the territory and fledged two young.
- A pair was confirmed at the Chesapeake Bay Bridge Tunnel on the northbound Highrise Bridge. They laid at least one egg on a concrete pier cap. Consideration should be given to installing a nest box to manage this pair in 2014.
- The pair using the Hoffler Building (VA-PEFA-66) continue to use the site only in winter and leave by late April. We assume these are winter visitors to Virginia.

Banding

All falcon chicks that survived to banding age were fitted with both USFWS and alpha-numeric bands. This included 20 females and 22 males (Tables 3a and 3b).

Table 3a. List of band codes for female peregrine falcon chicks banded in Virginia during the 2013 breeding season.

USFWS Band	Alpha-numeric Band	Nest	Date
1807-65075	37/AV	Possum Point Substation	5/9/2013
1807-65076	38/AV	James River Bridge	5/16/2013
1807-65077	39/AV	James River Bridge	5/16/2013
1807-65078	40/AV	Berkley Bridge	5/16/2013
1807-65079	41/AV	Berkley Bridge	5/16/2013
1807-65080	42/AV	Berkley Bridge	5/16/2013
1807-65081	43/AV	Berkley Bridge	5/16/2013
1807-65082	44/AV	Mills Godwin Bridge	5/16/2013
1807-65083	45/AV	Mills Godwin Bridge	5/16/2013
1807-65084	50/AV	Finney's Island Tower	6/4/2013
1807-65085	51/AV	Finney's Island Tower	6/4/2013
1807-65090	60/AV	Finney's Island Tower	6/4/2013
1807-65091	52/AV	Wachapreague Shack Tower	5/29/2013
1807-65092	53/AV	Wachapreague Shack Tower	5/29/2013
1807-65095	54/AV	Benjamin Harrison Bridge	7/10/2013
1807-65096	55/AV	Cobb Island Tower	6/29/2013
1807-65097	56/AV	Cobb Island Tower	6/29/2013
1807-65098	57/AV	Mockhorn Island Tower	6/11/2013
1807-65099	58/AV	Godwin Island Box	6/11/2013
1807-65100	59/AV	Godwin Island Box	6/11/2013

Table 3b. List of band codes for male peregrine falcon chicks banded in Virginia during the 2013 breeding season.

USFWS Band	Alpha-numeric Band	Nest	Date
1126-11900	78/AS	Possum Point Substation	5/9/2013
1126-11901	79/AS	Possum Point Substation	5/9/2013
1126-11902	80/AS	Possum Point Substation	5/9/2013
1126-11903	81/AS	Elkins Marsh Chimney	5/13/2013
1126-11904	82/AS	Elkins Marsh Chimney	5/13/2013
1126-11906	84/AS	Norris Bridge	4/26/2013
1126-11907	85/AS	Mills Godwin Bridge	5/16/2013
1126-11908	86/AS	Hyslop Marsh Tower	5/28/2013
1126-11909	87/AS	Hyslop Marsh Tower	5/28/2013
1126-11910	88/AS	Wachapreague Shack Tower	5/29/2013
1126-11911	89/AS	Wachapreague Shack Tower	5/29/2013
1126-11912	90/AS	Finney's Island Tower	6/4/2013
1126-11913	91/AS	Watts Island Tower	6/4/2013
1126-11914	92/AS	Watts Island Tower	6/4/2013
1126-11915	93/AS	Godwin Island Box	6/11/2013
1126-11916	94/AS	Mockhorn Island Tower	6/11/2013
1126-11917	95/AS	Mockhorn Island Tower	6/11/2013
1126-11918	96/AS	Mockhorn Island Tower	6/11/2013
1126-11919	97/AS	Elkins Marsh Shack Tower	6/18/2013
1126-11920	98/AS	Gull Marsh Tower	6/29/2013
1126-11929	06/AU	Cedar Island	7/9/2013
1126-11930	07/AU	Cedar Island	7/9/2013

Band Resights

Sixteen adults were identified through video cameras on nests and direct observations with digital cameras (Table 4). An additional 6 banded falcons were reported to CCB during 2013 including adult turnovers and settlement at nests (Cobb Island and Tappahannock), a falcon caught and released during fall hawk trapping (58/AV), an unknown cause of death in Cape Charles, and the death of a fledgling at the Ben Harrison Bridge. Three Virginia falcons were reported breeding in New Jersey by K. Clark.

Table 4. List of resighted banded falcons in 2013.

USFWS Band	Color Code	Color Band	Sex	Resight Location	Origin Nest	Age in Years
Breeding in Virginia						
1807-02775	black/green	70/Z	F	Ben Harrison Bridge	Ben Harrison Bridge, VA	5

USFWS Band	Color Code	Color Band	Sex	Resight Location	Origin Nest	Age in Years
1687-02832	black/green	A/15	F	Cedar Island	Dividing Creek, NJ	4
2206-81686	black/green	X/37	M	Cobb Island	Elkins Marsh Shack, VA	5
1807-65005	black/green	00/AD	F	Cobb Island	Mockhorn Island, VA	4
1807-37497	black/red	B/*S	F	Elkins Marsh Chimney	Heislerville Tower, NJ	10
1807-02799	black/green	Z/34	F	Finney's island	Cobb Island, VA	4
0987-21459	black/green	*9/*U	F	Godwin Island	Watts Island, VA	11
2206-43474	black/green	*2/*K	M	Godwin Island	Metompkin Island, VA	10
2206-43454	black/green	*7/*C	M	James River Bridge	James River Bridge, VA	12
1126-11847	black/green	13/AS	M	Mockhorn Island	Mockhorn Island, VA	3
1807-02726	black/green	20/V	F	Mockhorn Island	Upsher Bay, VA	7
2206-07444	black/red	V*/S	M	River Front Plaza	Virginia, unknown nest	13
0987-95688	black/green	94/Y	F	Upsher Bay	Stone Harbor Marsh, NJ	5
1807-02731	black/green	25/V	F	Wachapreague	Gull Marsh, VA	7
0987-76950	black/green	*R/*9	F	Watts Island	Clay Island, VA	10
2206-81622	black/green	22/Y	M	Watts Island	Wallops Island, VA	8
Reported sightings in Virginia						
1807-65054	black/green	15/AV	F	Cobb Island	Hyslop Marsh, VA	2
1807-02733	black/green	27/V	F	Cobb Island	Gull Marsh, VA	7
1807-65050	black/green	11/AV	F	Cape Charles	Cobb Island, VA	2
1687-02892	black/green	35/AN	F	Tappahannock Rt 360	Burlington-Bristol Bridge, NJ	2
1807-65095	black/green	54/AV	F	Ben Harrison Bridge	Ben Harrison Bridge, VA	1
1947-03286	black/green	58/BA	F	Northampton Co, VA	Unknown	1
Breeding outside of Virginia						
0987-76814	black/red	*P/*G	F	Atlantic City Hilton, NJ	Wachapreague Tower, VA	15
1807-02735	black/green	29/V	F	Dividing Creek WMA, NJ	Wachapreague Tower, VA	7
0987-76849	black/red	*8/D	F	Tuckahoe River, NJ	Cobb Island, VA	13

[1] A * indicates the character is oriented horizontally on the band

Translocations

In 2013, nine young falcons were translocated to a hack site at Shenandoah National Park 's Hogback Mountain (Table 5). This included 8 females and 1 male. 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 2013 breeding season. Electrical tape was applied to the USFWS band.

Translocation Site	USFWS Band	Nest Site	Date Collected	Tape Color
SHENAHDOAH NP	1807-65076	James River Bridge	5/16/2013	ORANGE
SHENAHDOAH NP	1807-65077	James River Bridge	5/16/2013	YELLOW
SHENAHDOAH NP	1807-65078	Berkley Bridge	5/16/2013	BLUE
SHENAHDOAH NP	1807-65079	Berkley Bridge	5/16/2013	GREEN
SHENAHDOAH NP	1807-65080	Berkley Bridge	5/16/2013	RED
SHENAHDOAH NP	1807-65081	Berkley Bridge	5/16/2013	WHITE
SHENAHDOAH NP	1126-11907	Mills Godwin Bridge	5/16/2013	LIGHT GRAY
SHENAHDOAH NP	1807-65082	Mills Godwin Bridge	5/16/2013	WHITE AND BLACK
SHENAHDOAH NP	1807-65083	Mills Godwin Bridge	5/16/2013	YELLOW AND BLACK

Addled Eggs

Eleven addled eggs were collected during the 2013 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 the Virginia Institute of Marine Science (Chen et al 2008, Chen et al 2010).

Table 6.

Site code	Nest Site	No. Eggs
VA-PEFA-09	Watts Island Tower	2
VA-PEFA-16	Elkins Marsh Chimney	2
VA-PEFA-25	Mills Godwin Bridge	1
VA-PEFA-27	Norris Bridge	3
VA-PEFA-55	Dominion Building	1
VA-PEFA-60	Chesapeake Bay Bridge	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 20-25 pairs over the last 5 years.

The reproductive rate decreased in 2013 but the young per occupied territory and young per active territory stayed within the range of the past 6 years. The 2013 productivity rates in Virginia were comparable to the average for peregrines in the Northeast US (2.1 young/active territory and 2.6/occupied territory; data collected by state wildlife agencies, USFWS *in litt.* 2009).

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 7 bridge sites in the coastal plain has been 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.

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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