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**VIRGINIA PEREGRINE FALCON MONITORING AND
MANAGEMENT PROGRAM: YEAR 2010 REPORT**



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

VIRGINIA PEREGRINE FALCON MONITORING AND MANAGEMENT PROGRAM: YEAR 2010 REPORT

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Project Partners:

The Virginia Department of Game and Inland Fisheries
(Wildlife Diversity Program)
National Aeronautics and Space Administration
National Park Service
United States Fish and Wildlife Service
Virginia Department of Transportation
The Nature Conservancy
Dominion Power
Center for Conservation Biology

Front Cover: *Adult female breeding at Watts Island, VA. Banded as a chick in Maryland *R/*9.*
Photograph by Barton Paxton.



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 nests 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 23 known pairs during the 2010 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 2010 breeding season. Occupied nesting structures included 9 peregrine towers and 2 fishing shacks on the Delmarva Peninsula; 7 bridges, 1 retired ship, 1 power plant stack, and 1 high-rise building in the coastal plain; and 2 natural cliff sites in the mountains. Twenty falcon pairs made breeding attempts producing 65 eggs and 57 chicks that survived to banding age. Reproductive rate was 2.5 chicks/occupied territory and 2.9 chicks/active territory. Of 17 clutches that were followed completely from laying to fledging, 58 of 62 (93.5%) eggs hatched, 57 of the 58 (98.2%) chicks survived to banding age, and 46 (80.7%) fledged successfully.

Eighteen falcons representing 40% of the chicks produced in the state were translocated from the coast to the mountains during the 2010 breeding season. This included 9 females and 10 males. Thirteen of these chicks originated on bridges that have a history of poor fledging success. The remaining 5 chicks were from towers along the Delmarva Peninsula (1) and a ship in the James River Reserve Fleet (4). Birds collected from territories were transported to Franklin Cliffs in Shenandoah National Park, and Grandview in New River Gorge National River. The management strategy initiated in 2006 to utilize productivity along the Delmarva to fuel targeted hacks in the mountains was continued in 2010. This strategy meets the objective of both repopulating the mountain range and reducing impacts to sensitive waterbirds.

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. Beginning in 2000, 168 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 the coastal plain has now exceeded 20 pairs (Figure 1). However, both hatching rate and chick survival remain somewhat erratic. 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.

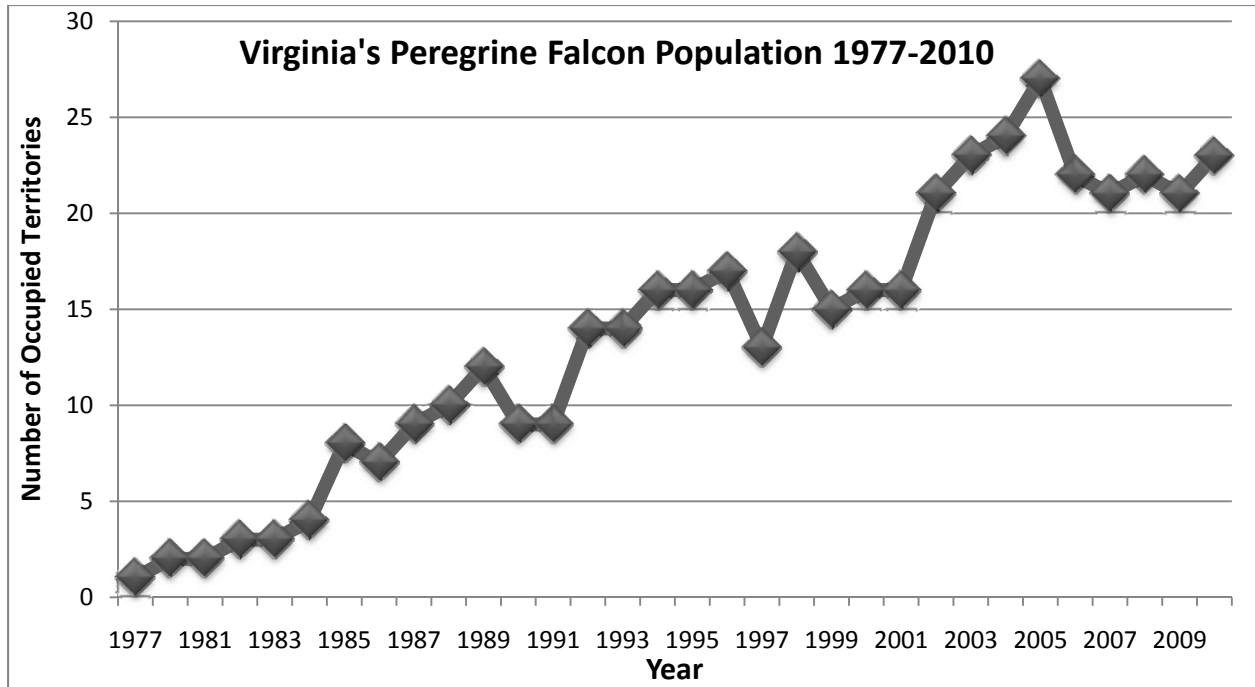


Figure 1. Breeding population of Peregrine Falcons in Virginia 1977-2010.

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 2010, the geographic scope of this project included breeding locations within the coastal plain, two mountain nesting sites, and two mountain hawk sites at Franklin Rocks in Shenandoah National Park and Grandview in New River Gorge National River, WV (Figures 2 and 3). Most of the effort was focused on the coastal plain where the majority of breeding pairs occur. In addition, observations of a new pair documented at White Rocks by the Virginia Department of Game and Inland Fisheries (Harding 2010) is included in the state wide totals.

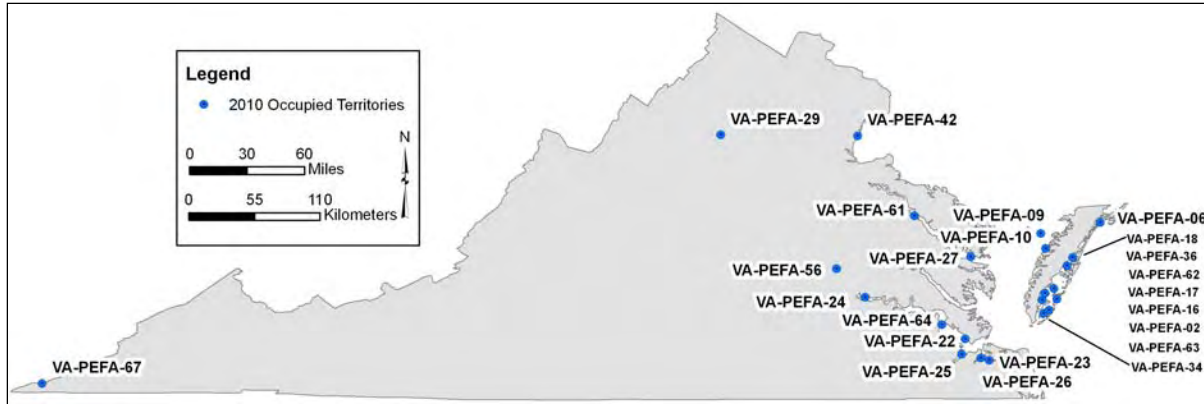


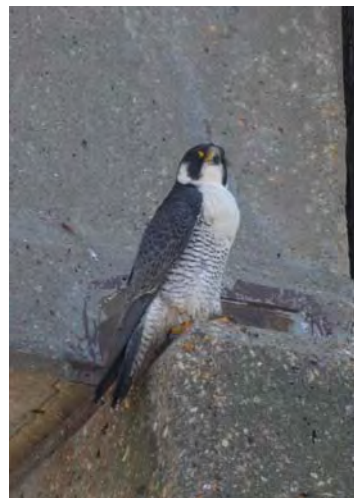
Figure 2. Map of nesting structures for Peregrine Falcons surveyed during the 2010 breeding season.

Nest Site Surveys

Between 1977 and 2004, more than 60 structures were established specifically for breeding Peregrine Falcons within the coastal plain of Virginia (Table 1). Nearly all of the structures that survived to the 2010 breeding season were checked for evidence of resident falcons. An initial survey of breeding structures was conducted between 1 March and 30 April. All surveys of towers and boxes along the Delmarva Peninsula and fringe of the western shore were surveyed from the air using a Cessna 172, high-wing aircraft. Fly bys were conducted at low altitude to flush attending adults and to view the inside of nest boxes for activity. 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.



CCB intern Beth Dzula checks the status of the nest tower on Gull Marsh.



Male falcon identified at a newly occupied nest box on the Tappahannock Bridge, Rt 360.

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. 2002).



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 2010 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.



Jeff Marcell at Dominion's Possum Point substation assisted banding the three chick brood.



VDOT and Atsalis Brothers staff assisted with retrieval of falcon chicks from under the Norris bridge.

Translocations

Over the past several years, 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 and reducing the impacts of the breeding Peregrine population on sensitive waterbirds (Long and Watts, unpublished data), chicks were taken from selected nesting sites along the seaside of the Delmarva Peninsula to be hacked from high priority mountain sites (Figure 3).

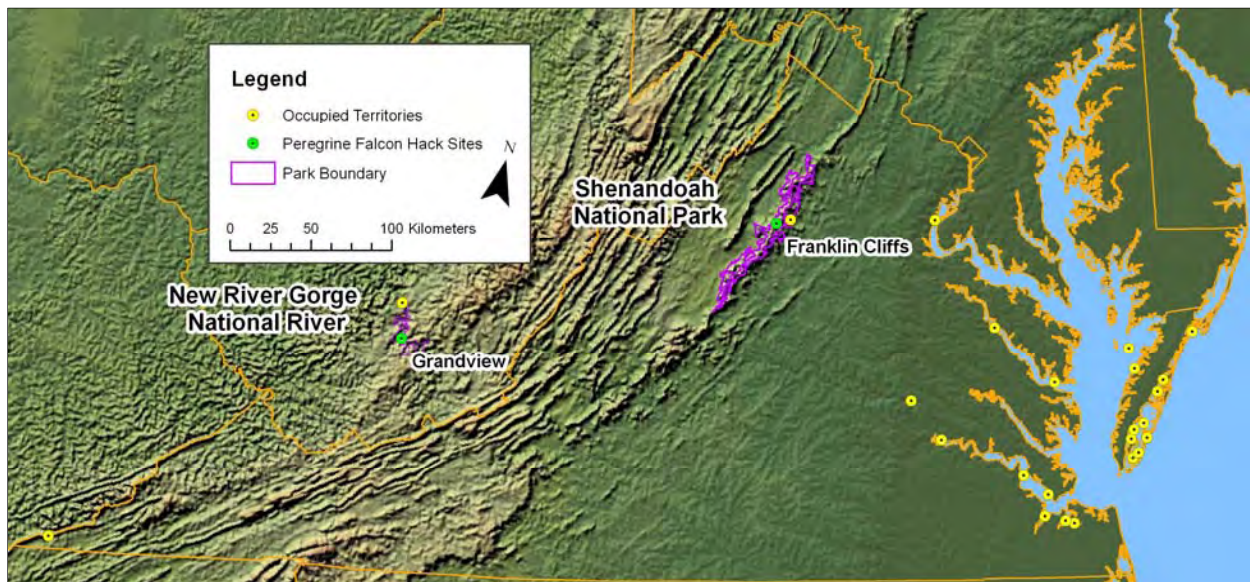


Figure 3. Hack sites where Virginia falcons were released in 2010.



Grandview hack site. (photo:TRAC)



Franklin Cliffs hack site. (photo NPS)

RESULTS

Site Surveys

Fifty-six nesting structures were surveyed for Peregrine Falcon activity during the breeding season (Table 1). Of the sites with known occupation, 23 supported resident pairs. These included 9 peregrine towers, 7 bridges, 1 reserve ship, 1 power plant stack, 2 fishing shacks, 2 cliff sites, and 1 high-rise building (Table 2).

Breeding Results

Virginia supported 23 known breeding pairs of Peregrine Falcons during 2010 (Table 2). The 20 falcon pairs that made breeding attempts produced 65 eggs, at least 58 of which hatched. Only 46 survived to fledging age. Fledging success was 2.5 chicks/occupied territory and 2.9 chicks/active territory (Figure 4). It should be noted that much of the chick production resulted from management actions taken during the breeding season. During the 2010 breeding season, hatching rates were at a record high while fledging rates continued below 80% (Figure 5). Of 17 clutches that were followed completely from laying to fledging, 58 of 62 (93.5%) eggs hatched, 57 of the 58 (98.2%) chicks survived to banding age, and 46 (80.7%) fledged successfully.

Six sites had new breeding pairs this season. The Tappahannock bridge pair laid eggs but failed for unknown reasons. The pair from Cobb Island moved to Elkins Marsh Chimney after the Cobb tower box was taken by Barn Owls. The Chimney pair fledged 2 young, the first ever fledged from this site. A pair was seen on the west water tower at Naval Amphibious Base Little Creek in February 2010. Efforts to encourage the Navy to install a nest box failed. Another pair was seen on the Hoffler building in Virginia Beach. A nest box was installed on the roof but the pair was not observed using the box. The last observation of the pair was April 15 suggesting this may only be a wintering territory for this pair. A new pair was documented occupying a territory at White Rocks by VDGIF (Harding 2010).

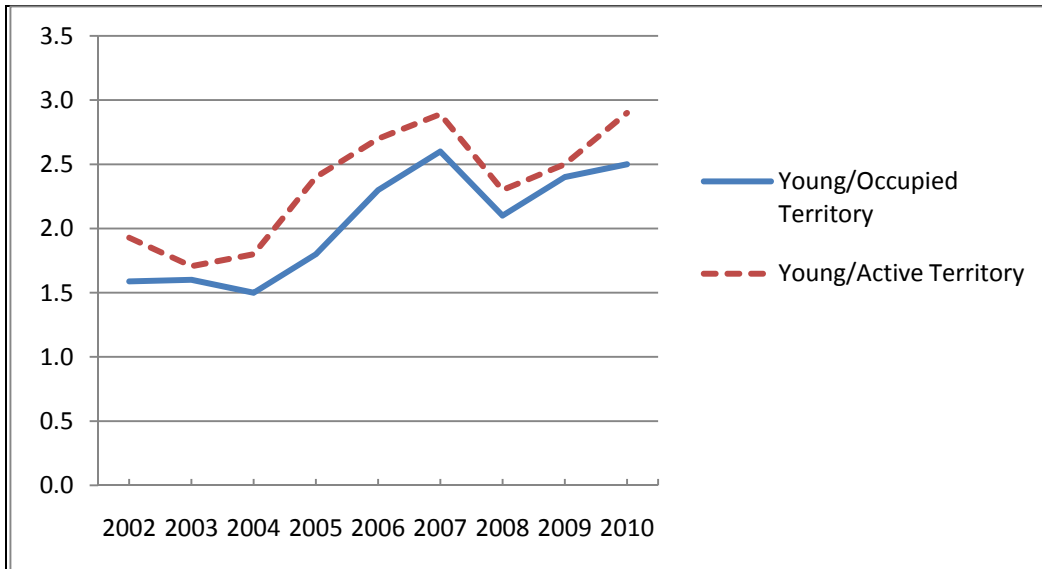


Figure 4. Productivity rates of Peregrine Falcon nests in Virginia.

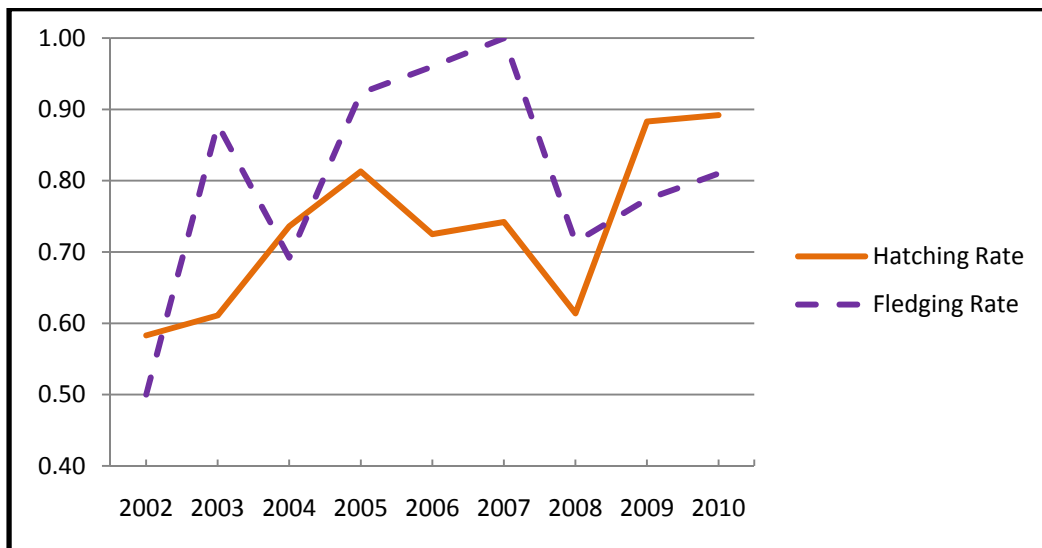


Figure 5. Hatching and fledging rates of Peregrine Falcon nests in Virginia.

Table 1. Catalog of nesting structures established for Peregrine Falcons in Virginia (1977-2004). Table gives year of establishment and whether or not the site was checked for Peregrine Falcon activity during the 2010 breeding season. Dashed lines indicate that the structure is no longer present.

Site Code	Location Description	Structure Type	Year Est	Checked 2010
VA-PEFA-01	Fisherman's Island Tower	Peregrine Tower	1980	Y
VA-PEFA-02	Cobb Island Tower	Peregrine Tower	1978	Y
VA-PEFA-03	Hog Island Tower	Peregrine Tower	1977	----
VA-PEFA-04	Paramore Island Tower	Peregrine Tower	1982	----
VA-PEFA-05	Metompkin Island Tower	Peregrine Tower	1982	---- ^a
VA-PEFA-06	Wallops Island Tower	Peregrine Tower	1981	Y ^b
VA-PEFA-07	Chincoteague Tower	Peregrine Tower	1979	----
VA-PEFA-08	Great Fox 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-11	Tangier Island Water Tower	Nest Box	1999	----
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-19	James River Ghost Ship 1	Moth Ball Fleet	1987	----
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 ^c
VA-PEFA-29	Old Rag, SNP	Natural Cliff Face	----	Y ^c
VA-PEFA-30	Back Bay Tower	Peregrine Tower	1982	----
VA-PEFA-31	Plum Tree Island Tower	Peregrine Tower	1998	----
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-35	Tangier Island Tower	Peregrine Tower	2000	----
VA-PEFA-36	Upsher Bay Tower	Peregrine Tower	2000	Y

Site Code	Location Description	Structure Type	Year Est	Checked 2010
VA-PEFA-37	Silver Beach Range Tower	Nest Box	1997	Y
VA-PEFA-38	Hawksbill Mountain	Natural Cliff Face	-----	Y ^c
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-47	North Elkins Shack	Nest Box	1994	Y
VA-PEFA-48	Churchland Bridge	Nest Box	1999	Y
VA-PEFA-49	Yorktown Substation	Nest Box	1998	Y
VA-PEFA-50	Jordan Bridge	Nest Box	1995	Y
VA-PEFA-51	Campostella Bridge	Nest Box	1998	Y
VA-PEFA-52	I-64 Bridge	Nest Box	1999	Y
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
VA-PEFA-56	River Front Plaza Building	Nest Box	2002	Y ^d
VA-PEFA-57	BB&T Building	Nest Box	1984	Y
VA-PEFA-58	Russell Island Tower	Peregrine Tower	1982	Y
VA-PEFA-59	Bermuda Hundred	Nest Box	1998	Y
VA-PEFA-60	Chesapeake Bay Bridge	Nest Box	2004	-----
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 ^e
VA-PEFA-65	Craddock Neck	Peregrine Tower		N
VA-PEFA-66	Hoffler Building Virginia Beach	Nest Box	2009	Y
VA-PEFA-67	White Rocks	Natural Cliff Face	2010	Y ^d

^a Nest tower removed by staff from The Nature Conservancy and CCB in January 2010.

^b Nest monitored by NASA staff.

^c Nest monitored by NPS staff.

^d Nest monitored by VDGIF staff.

^e Nest monitored by USDOT staff.

Table 2. Summary of productivity results for Peregrine Falcon pairs in Virginia during the 2010 breeding season.

Site Code	Location Description	Occupied Territory	Active Nest	No. Eggs	Chicks Hatched	Band Age	Fledged
VA-PEFA-02	Cobb Island Tower	Y	Y	4	4	4	4
VA-PEFA-06	Wallops Island Tower	Y	N				
VA-PEFA-09	Watts Island Tower	Y	Y	3	2	2	1 ^a
VA-PEFA-10	Finney's Island Tower	Y	Y	3	3	3	3
VA-PEFA-16	Elkins Marsh Chimney	Y	Y	3	2	2	2
VA-PEFA-17	Elkins Marsh Shack Tower	Y	Y	4	4	4	3
VA-PEFA-18	Wachapreague Shack Tower	Y	Y	3	3	3	2
VA-PEFA-22	James River Bridge	Y	Y	4	3	3	3 ^b
VA-PEFA-23	Berkley Bridge	Y	Y	1+			
VA-PEFA-24	Benjamin Harrison Bridge	Y	Y	4	4	4	3 ^c
VA-PEFA-25	Mills Godwin Bridge	Y	Y	4	4	4	4 ^d
VA-PEFA-26	West Norfolk Bridge	Y	N				
VA-PEFA-27	Norris Bridge	Y	Y	3	3	3	2 ^e
VA-PEFA-29	Old Rag, SNP	Y	Y	1+			
VA-PEFA-34	Mockhorn Island Tower	Y	Y	4	4	4	1
VA-PEFA-36	Upsher Bay Tower	Y	Y	3	3	3	2
VA-PEFA-42	Possum Point Substation	Y	Y	4	4	3	3
VA-PEFA-56	River Front Plaza Building	Y	Y	4	3	3	3
VA-PEFA-61	Tappahannock Bridge	Y	Y	1+			
VA-PEFA-62	Gull Marsh Tower	Y	Y	4	4	4	4
VA-PEFA-63	Godwin Island Box	Y	Y	4	4	4	3
VA-PEFA-64	James River Ghost Ship 2	Y	Y	4	4	4	3
VA-PEFA-67	White Rocks	Y	N				

^a 1 young translocated to New River Gorge. It did not survive first week at hack because of interference from visiting adult falcons.

^b 3 young translocated to Shenandoah

^c 3 of 4 young translocated to Shenandoah. Single chick was inaccessible on bridge structure. Disappeared from the bridge before fledging age and assumed dead.

^d 4 young translocated to New River Gorge

^e 3 young translocated to New River Gorge. One did not survive first week at hack because of storm.

Banding

All falcon chicks that survived to banding age were fitted with both FWS and alpha-numeric bands. This included 28 females and 28 males (Tables 3a and 3b).

Table 3a. List of band codes for female peregrine falcon chicks banded in Virginia during the 2010 breeding season.

Band	Alpha-numeric Band	Nest	Date
1807-65009	04/AD	Norris Bridge	5/27/2010
1807-65010	05/AD	Benjamin Harrison Bridge	5/14/2010
1807-65011	06/AD	James River Ghost Ship 2	5/13/2010
1807-65012	07/AD	James River Ghost Ship 2	5/13/2010
1807-65013	08/AD	James River Bridge	5/14/2010
1807-65014	09/AD	James River Bridge	5/14/2010
1807-65016	11/AD	Elkins Marsh Shack Tower	5/25/2010
1807-65017	12/AD	River Front Plaza Building	6/1/2010
1807-65018	13/AD	Possum Point Substation	6/2/2010
1807-65019	14/AD	Possum Point Substation	6/2/2010
1807-65020	15/AD	Mockhorn Island Tower	6/4/2010
1807-65021	16/AD	Mockhorn Island Tower	6/4/2010
1807-65022	17/AD	Elkins Marsh Chimney	6/4/2010
1807-65023	18/AD	Elkins Marsh Chimney	6/4/2010
1807-65024	19/AD	Godwin Island Box	6/6/2010
1807-65025	50/AU	Godwin Island Box	6/6/2010
1807-65026	51/AU	Godwin Island Box	6/6/2010
1807-65027	52/AU	Upsher Bay Tower	6/7/2010
1807-65028	53/AU	Upsher Bay Tower	6/7/2010
1807-65029	54/AU	Mills Godwin Bridge	6/22/2010
1807-65030	55/AU	Mills Godwin Bridge	6/22/2010
1807-65032	57/AU	Cobb Island Tower	6/22/2010
1807-65033	58/AU	Cobb Island Tower	6/22/2010
1807-65034	59/AU	Wachapreague Shack Tower	6/23/2010
1807-65035	60/AU	Wachapreague Shack Tower	6/23/2010
1807-65036	61/AU	Finney's Island Tower	7/5/2010
1807-65037	62/AU	Finney's Island Tower	7/5/2010
1807-65038	63/AU	Finney's Island Tower	7/5/2010

Table 3b. List of band codes for male peregrine falcon chicks banded in Virginia during the 2010 breeding season.

Band	Alpha-numeric Band	Nest	Date
1126-11829	95/AB	Benjamin Harrison Bridge	5/14/2010
1126-11830	96/AB	Benjamin Harrison Bridge	5/14/2010
1126-11831	97/AB	Gull Marsh Tower	5/25/2010
1126-11832	98/AB	Gull Marsh Tower	5/25/2010
1126-11833	99/AB	Gull Marsh Tower	5/25/2010
1126-11834	00/AS	Watts Island Tower	5/13/2010
1126-11835	01/AS	Watts Island Tower	5/13/2010
1126-11836	02/AS	James River Ghost Ship 2	5/13/2010
1126-11837	03/AS	James River Ghost Ship 2	5/13/2010
1126-11838	04/AD	James River Bridge	5/14/2010
1126-11839	05/AS	Elkins Marsh Shack Tower	5/25/2010
1126-11840	06/AS	Elkins Marsh Shack Tower	5/25/2010
1126-11841	07/AS	Gull Marsh Tower	5/25/2010
1126-11842	08/AS	Norris Bridge	5/27/2010
1126-11843	09/AS	Norris Bridge	5/27/2010
1126-11844	10/AS	River Front Plaza Building	6/1/2010
1126-11845	11/AS	River Front Plaza Building	6/1/2010
1126-11846	12/AS	Possum Point Substation	6/2/2010
1126-11847	13/AS	Mockhorn Island Tower	6/4/2010
1126-11848	14/AS	Mockhorn Island Tower	6/4/2010
1126-11849	15/AS	Godwin Island Box	6/6/2010
1126-11850	16/AS	Upsher Bay Tower	6/7/2010
1126-11851	17/AS	Mills Godwin Bridge	6/22/2010
1126-11852	18/AS	Mills Godwin Bridge	6/22/2010
1126-11853	19/AS	Cobb Island Tower	6/22/2010
1126-11854	20/AS	Wachapreague Shack Tower	6/23/2010
1807-65015	10/AD	Elkins Marsh Shack Tower	5/25/2010
1807-65031	56/AU	Cobb Island Tower	6/22/2010

Effort was made to identify individual breeding adults at each nest by reading band codes. Nine adults were identified through video cameras on nests and direct observations with telescopes and digital cameras. In addition, two young falcons from Virginia were reported dead on the Eastern Shore, both from collisions with manmade structures (Table 4).

Table 4. List of resighted banded falcons in Virginia in 2010.

Date	FWS Band	FWS color	Color band	Color code ¹	Sex	Resight Location	Origin
BREEDING							
3/09/2010		silver	black	R02R	M	James River Bridge	VA
3/19/2010		black	black/ red	B/*3	F	Elkins Marsh Chimney	NJ
4/09/2010	1807-02733	green	black/ green	27/V	F	Cobb Island	VA
4/11/2010	0816-69379	silver	black/ green	X/78	F	Tappahannock Bridge	MD
5/13/2010		silver	black/ green	*R/*9	F	Watts Island	MD
5/21/2010	2206-81658	green	black/ green	X/02	M	Old Rag Mountain	VA
5/24/2010	2206-81686	green	black/ green	X/37	M	Cobb Island	VA
5/27/2010		silver	black/ green	*8/*Y	F	Norris Bridge	PA
5/28/2010		green	black/ red	V*/S	M	River Front Plaza	VA
DEAD							
3/18/2010	1126-11825	green	black/ green	16/AB	M	Eastville, VA, power line collision, found dead	VA
3/24/2010	1126-11817	green	black/ green	08/AB	M	Onley, VA, injured & euthanized	VA

¹ A * indicates the character is oriented horizontally

Translocations

Eighteen young falcons were translocated to hacking sites during the course of the 2010 breeding season (Table 5). This included 9 females and 10 males. Thirteen of these chicks originated on bridges that have a history of poor fledging success. The remaining 5 chicks were from towers along the Delmarva Peninsula (1), and a ship in the James River Reserve Fleet at Fort Eustis (4).

The birds removed from towers were taken from one of the highest density breeding areas in Virginia where concern for the impact of peregrines on beach and colonial nesting birds is the highest. The nest site chosen on the reserve ship was in a doorway that was lower than the surrounding structure making it unlikely that the birds could fledge without falling into the water. Birds collected from these territories were transported to Franklin Cliffs in Shenandoah National Park and Grandview in New River Gorge National River.

Table 5. Summary of translocation activities for Peregrine Falcons in Virginia during the 2010 breeding season.

Translocation Site	Band	Nest Site	Date Collected	Tape Color
New River Gorge, NPS	1126-11834	Watts Island Tower	5/13/2010	YELLOW/TURQUOISE
New River Gorge, NPS	1126-11836	James River Ghost Ship 2	5/13/2010	BLACK/YELLOW
New River Gorge, NPS	1126-11837	James River Ghost Ship 2	5/13/2010	BLACK/BLUE
New River Gorge, NPS	1807-65011	James River Ghost Ship 2	5/13/2010	BLACK/RED
New River Gorge, NPS	1807-65012	James River Ghost Ship 2	5/13/2010	BLACK/PURPLE
New River Gorge, NPS	1126-11842	Norris Bridge	5/27/2010	GREEN/RED
New River Gorge, NPS	1126-11843	Norris Bridge	5/27/2010	GREEN/YELLOW
New River Gorge, NPS	1807-65009	Norris Bridge	5/27/2010	GREEN/PURPLE
New River Gorge, NPS	1126-11851	Mills Godwin Bridge	6/22/2010	GREEN
New River Gorge, NPS	1126-11852	Mills Godwin Bridge	6/22/2010	SILVER
New River Gorge, NPS	1807-65029	Mills Godwin Bridge	6/22/2010	PINK
New River Gorge, NPS	1807-65030	Mills Godwin Bridge	6/22/2010	TURQUOISE
Shenandoah, NPS	1126-11838	James River Bridge	5/14/2010	None
Shenandoah, NPS	1807-65013	James River Bridge	5/14/2010	YELLOW
Shenandoah, NPS	1807-65014	James River Bridge	5/14/2010	RED
Shenandoah, NPS	1126-11829	Benjamin Harrison Bridge	5/14/2010	WHITE
Shenandoah, NPS	1126-11830	Benjamin Harrison Bridge	5/14/2010	BLUE
Shenandoah, NPS	1807-65010	Benjamin Harrison Bridge	5/14/2010	GRAY

Dispersal from the mountain hack sites to future breeding sites ranges from <1 mile to >300 miles (Figure 6). One male falcon, banded 987-95679 and fitted with a transmitter during the 2007 hack at New River Gorge, was documented with 2 young at a cliff site near Harper's Ferry, WV (Figure 9). When the site was visited for banding activities a few days later, the cliff ledge was vacant and no adults were present. The young are presumed depredated by an unknown predator. The transmitter indicates he is still alive and in the territory (see tracking map [here](#)).

Breeding pairs were documented in the mountains by the National Park Service in Shenandoah NP and New River Gorge. Both breeding attempts failed. The nest on Old Rag was washed out by a storm during the incubation period. The Old Rag pair was later seen at the Franklin Cliffs hack site. The male of this pair is the falcon (FWS band 2206-81658) from the 2007 hack and the female is an unknown banded falcon (R. Gubler, pers. comm.). The eyrie at the Cirque in New River Gorge failed for unknown reasons this spring (W. Perrone pers. comm.).

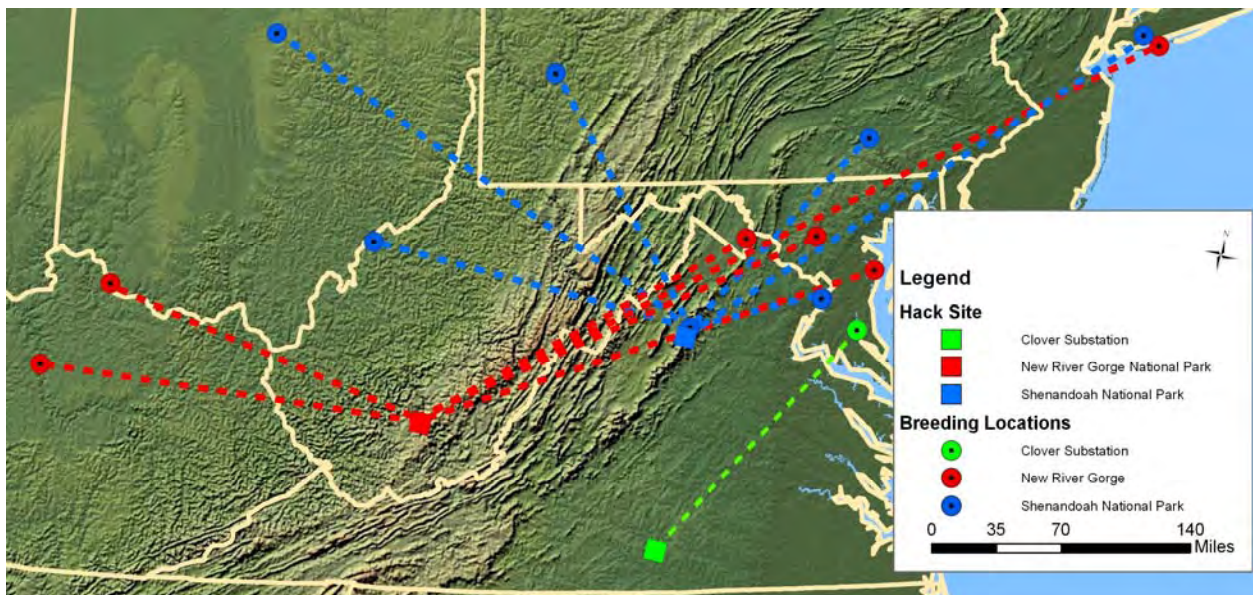


Figure 6. Dispersal of Peregrine Falcons from hack sites to breeding sites.



Millville Quarry eyrie, near Harper's Ferry, WV. Adult is circled in red. Two chicks circled in blue.



Craig Koppie (USFWS) and Bryan Watts climb down to the eyrie at Millville Quarry.

Addled Eggs

During the 2010 season, 4 addled eggs were collected during banding activities. These eggs will be 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 (Table 5, Chen et al 2008, Chen et al 2010).

Table 5. Addled eggs collected from Virginia Peregrine Falcon nests for contaminants analysis during the 2010 breeding season.

Site code	Location Description	No Eggs
VA-PEFA-09	Watts Island Tower	1
VA-PEFA-16	Elkins Marsh Chimney ^a	1
VA-PEFA-22	James River Bridge	1
VA-PEFA-56	River Front Plaza Building ^b	1

^a Egg broken during handling and discarded.

^b Egg collected by VDGIF.

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 21 - 23 pairs over the last 5 years.

The reproductive rate increased in 2010 to match rates recorded in 2007 when productivity was the highest since 1988. The hatching rate during the 2010 breeding season was the highest rate recorded in the past 9 years. The fledging rate also increased from last season but lower than the record 100% set during the 2007 season. The 2010 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. Over the past decade, pairs along the lower Delmarva Peninsula have increased to a very high breeding density. This population exists completely on artificial structures and has been highly productive. Diet within this system is dominated by migrant shorebirds and nesting waterbirds that are themselves of conservation concern (Long 2009). In recent years, concern about the impact of this breeding population on the management of waterbirds has increased. Three peregrine nest boxes were removed from key shorebird breeding areas (Chincoteague, Fisherman's, and Metompkin Islands) in 2009-2010 in an attempt to reduce peregrine predation and disturbance on these sensitive populations. The management strategy initiated in 2006 to utilize productivity along the Delmarva to fuel targeted hacks in the mountains was continued in 2010. This strategy meets the objective of both repopulating the mountain range and reducing impacts to sensitive waterbirds.

A total of 18 birds representing more than 32% of the total production was moved to the mountains and released. Falcons were hacked from Franklin Cliffs in Shenandoah National Park and Grandview in New River Gorge National River. Efforts

in future years should continue to support the establishment of a breeding pair within these sites and should establish the infrastructure and partnerships necessary for at least 1 additional hack site in Virginia.

Nesting on natural cliff sites continues to be precarious. These nests have a history of problems from exposure, drainage, and depredation. The two nests reported near the hack sites in New River and Shenandoah are encouraging but the future success of these mountain territories is uncertain. 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 newly discovered pair at White Rocks is also encouraging and future surveys of historic eyries should be considered to document additional breeding pairs.

During the 2010 season, addled eggs were collected and analyzed 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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