

1998 PEREGRINE FALCON MIGRATION STUDIES AT ASSATEAGUE ISLAND, MD/VA

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Summary

As part of a continuing research program for the Department of Defense's Legacy Resource Management Program, field studies were conducted on the peregrine falcon, *Falco peregrinus*. Study sites were Kangerlussuaq, Greenland, Assateague Island, MD/VA, and Padre Island, TX. This report focuses on the study at Assateague Island.

Between 23 September and 18 October the survey team expended 556.3 man-hours in the field, observing 999 peregrines and capturing 261 individuals. Of the total captured eight were previously-banded falcons. Resightings of individuals captured during the survey numbered 288 and recaptures 35. All sightings of the Wash Flats resident peregrines were excluded from data presented here. During the survey 179 merlins (*Falco columbarius*) were observed.

Background

The presence of peregrine falcons on Assateague each autumn was confirmed by falconers in 1938. Most of these were *Falco peregrinus tundrius*, a migratory Arctic and boreal nesting subspecies. Some individuals of the subspecies *Falco peregrinus anatum* were also determined to be present on Assateague in the fall. These anatum peregrines were known to breed on rock faces in the eastern United States.

Widespread use of chlorinated hydrocarbons (such as DDT) as agricultural pesticides after World War II caused catastrophic declines in peregrine populations on a global scale. Food chain contamination resulted in high levels of DDE (the principal metabolite of DDT) in the tissues of peregrines, which caused the formation of thin eggshells and increased reproductive failures. The *anatum* peregrine was extirpated east of the Mississippi River and only remnant populations survived elsewhere in temperate North America. By the late 1960's the *tundrius*, or tundra peregrine was in rapid decline and received endangered species status in 1972.

Diverse efforts were undertaken to study, monitor and augment peregrine populations. Assateague Island, as a major focal point of the

autumn tundra peregrine falcon migration, had been monitored for the preceding three decades by falconers, bird banders and scientists. In 1970 the Department of the Army initiated a program to monitor the tundra peregrine and develop new technologies to assist in the study of highly migratory threatened, endangered and sensitive species. The program rapidly expanded to include research in diverse geographic regions to assess all aspects of the natural history of the tundra peregrine, and specifically the issues associated with global contaminants affecting their population dynamics. We are presently using new and innovative technologies to examine the wintering biology of this subspecies and dramatically extend our knowledge of this macropredator during its wintering period in the Neotropics.

Methods

Our study area on Assateague Island, MD/VA, consists of the following domains: Assateague Island National Seashore (NPS, MD/VA), Chincoteague National Wildlife Refuge (USFWS, VA) and Assateague State Park (MD). From 23 September through 18 October the island was normally traversed each day from sunup to sundown by two parties in four-wheel-drive vehicles. The island was divided at the state line and each area to the north and south was surveyed in the morning by single vehicles, which switched sides of the island at midday. All raptors observed were recorded according to species, time, location and activity at time of sighting. We also recorded the location of each peregrine sighting using portable Global Positioning System (GPS) receivers for integration with the Assateague Island National Seashore and Chincoteague National Wildlife Refuge Geographic Information Systems (GIS).

An attempt was made to capture peregrines encountered during the survey which were not identified through color marking as resights and which were found in areas conducive to trapping. Unbanded peregrines were fitted with a USFWS lock-on band (size 6 for males and 7a for females) and processed according to current research protocols before release at the capture site. Past protocols have included recording of weight and body measurements, collection of small feather snips, pollen samples from plumage, and 2cc blood samples, and the attachment of color-coded alpha-numeric bands. In the past, both conventional and pulse-coded transmitters have been attached to falcons captured and

released on Assateague. During the 1993-1996 field surveys and in 1998 we deployed Platform Transmitter Terminals (PTT's) on a small sample of adult females, which were tracked and located globally by polar orbiting satellites. Before each falcon was released the head was marked with red dye. This identified the individual as one already sampled during the survey and precluded recapture attempts; it fades quickly over a four week period.

Results and Discussion

The total of 999 peregrines sighted (table 1) was highest in the 29 years of the survey, as were the number of sightings per 10 man-hours and the 261 captures (table 2.) The number of captures per 10 man-hours was fourth highest ever. Contributing factors to our extraordinary productivity in 1998 were: 1) preponderance of weather patterns conducive to sightings and captures, 2) a minimum of time lost to severe weather, high tides and mechanical breakdown, and 3) improvement of north end peregrine habitat.

The eight recoveries of previously banded falcons are still being analyzed. Four were individuals from the recently established population in the eastern United States. Of these, one was first captured on 28 September and still present at the close of the survey. Another recovery was that of a third-year female we had originally banded on Assateague 27 September 1996. The recovery of a familiar fourth-year female, however, was most important. On 12 October 1996 we affixed a PTT to a second-year female. Satellite tracking confirmed that she spent that winter at various locales in the vicinity of Assateague. She departed in early May of 1997, arriving in her breeding area to the northwest of Hudson Bay in early June and remaining there until PTT batteries failed sometime after 14 July. On the morning of 4 October 1997 we captured this falcon less than 1500 m from the site of her 1996 capture on the McCabe Tract. She was in excellent condition and we removed the PTT. Subsequent sightings indicated she probably planned another winter in the area. On the evening of 7 October 1998 we captured her again, and she was observed in the vicinity late in the survey. All sightings and captures of this individual over the three successive survey periods have been inside a circle with a radius not exceeding 1000 m. She apparently has a great degree of fidelity to the area and suffered no ill effects from her year of bearing the PTT.

Resightings of individuals captured during the survey (table 1.) numbered 288, compared to 164 in 1997. The red dye first used for color marking this year was much more visible than the picric acid we had applied since 1979. It is therefore probable we were able to identify a greater percentage of these individuals than was previously possible.

Adults comprised 9.24% of all individuals sighted (table 3). This is slightly below the 28-year average of 13.29%, but is no cause for concern. The disparity in sightings lies in the differences in migration strategies between immatures and adults, and even between adult females and adult males. The latter class must comprise close to a quarter of the migrants, yet this year we confirmed the observation of only 10. Weather during the migration also compounds the consequences of these differences in migration strategies, so the sighting ratios may vary wildly from year to year. The bottom line is that only several years of high adult-to-immature ratios would be cause for concern.

Sightings and captures by sector (table 4) warrant some discussion. The character of the island has changed significantly since the winter of 1991/92, in large part due to severe winter storms. The McCabe Tract on the north end has been most dramatically altered, with major washover zones creating beach to bay sand flats in some areas. This is favorable habitat for migrating peregrines in the autumn as well as good breeding habitat for the endangered piping plover (*Charadrius melodus*). Springtime storms in 1998 opened up the area even more, to an extent we had not previously seen. While visitor foot traffic sometimes reduced our potential on this sector, its productivity by unit of effort was virtually identical to that of the Wash Flats. These two sectors were, as usual in recent years, our most productive.

Due to its very narrow beachfront, development and public use, the Assateague State Park is seldom utilized by migrant peregrines. The Maryland Beach continues to widen somewhat due to erosion westward of the dune line, with significant washover areas where sand and water have taken out or buried vegetation. The Refuge Beach in Virginia is generally narrower and less conducive to effective capture attempts due to a more intact barrier dune system, yet productivity there was higher than on the Maryland Beach. This was probably due to: 1) the most intensive public use in memory of four-wheel drive vehicles on the Maryland Beach, and

2) the lack of extreme high tides during the survey. The Hook's suitability for observing and capturing peregrines is still tied to the amount of public use at any given time. Although vegetative encroachment continues, there is still good resting habitat and the area's topography naturally draws peregrines in good numbers. It is suspected that, absent public use, productivity on this southernmost sector would rival that of the McCabe Tract and Wash Flats.

The Wash Flats, in its natural state, was a huge washover area of beach to bay sand flats and was prime peregrine habitat. Construction and maintenance of the stabilized barrier dune system have resulted in dramatic vegetative growth. During the past 29 seasons alone more than half of the open area has been lost as good hunting and resting habitat for migrant peregrines. Hope for the future lies in the CNWR's current policy of not maintaining the barrier dune north of D-Dike. This will foster a more natural progression of barrier island geomorphology and may return this sector to its natural state, but only after many years and only if the interior dikes are also allowed to erode. The remaining open area of the Wash Flats is often under water, but in 1998 a prolonged drought left the area dry and we had good access for observation and capture attempts.

On 14 October 1993 two adult female peregrines were equipped with PTT's tracked and globally positioned by the Argos/Tiros system. As a result of our joint project of many years with the U.S. Army, the USFWS, and the Applied Physics Laboratory of Johns Hopkins University, Dr. Paul Howey of Microwave Telemetry, Inc. provided two 27-gram PTT's. These were equipped with activity, temperature and battery voltage sensors, and transmitted signals at programmed intervals to orbiting satellites. The accuracy of the system in locating the PTT depends upon several factors, and may range from several hundred meters to several miles.

One of the 1993 adults wintered in a unique wetland habitat at 14,000 feet on the west slope of the Andes in Argentina. Members of our research team reached this area in February of 1994, where they made detailed observations on the wintering behavior of the falcon and did a complete habitat analysis and avifauna survey. It was determined that an immature female peregrine also wintered in this small wetland with the adult we tracked. Batteries on the transmitter failed in southern Peru while the falcon was on her northern migration in May.

Since that time we have continued to refine and apply this technology to unlock the remaining mysteries of the tundra peregrine's ecology. This subspecies has been removed from the list of endangered species entirely on the basis of population trends evident from breeding ground surveys in the Arctic and migration studies in temperate zone flyways. Although contaminant levels have declined in tundra peregrines, they are still susceptible to contaminants that gain entry into the food chains in their Central and South American wintering grounds. Today there is still very little known about the wintering ground biology of the tundra peregrine; perhaps no more than was known in the early 1970's when it was placed on the endangered species list. Because of its extreme sensitivity to a variety of chemical contaminants still widely used in its wintering areas, it remains imperative that this aspect of its natural history be closely studied and monitored. This should be done in an effort to examine the routes and mechanisms of contamination which may one day cause another population decline. With the use of space-based assets to track and locate peregrines and monitor their behavior, the full dynamics of dispersal, migration and wintering biology will unfold. We will have gained an invaluable tool in identifying and mitigating global sources of contaminants affecting peregrines as well as other Neotropical migrants.

On 13 October, in concert with refuge manager John Schroer and other CNWR personnel, we outfitted a second-year female with PTT number 12931. Her migration track (fig. 1) was not out of the ordinary until she left the Florida Keys, and then the effects of Hurricane Mitch's influence in Central America became manifest. She headed for the upper Mexican Gulf coast, then apparently hopped on a boat and let it take her into Galveston, TX. After spending almost a week around Austin Bayou (just west of Galveston) she pushed off and with a full moon at 0200 local time was over the Gulf headed southeast, 80 miles off the coast. The next day she apparently was back on a boat (four locations in the same general area over deep water) two hundred miles south of the central Louisiana coast. Another long flight then placed her near Cancun on the east coast of the Yucatan peninsula. Analysis of weather maps indicates the hurricane kept her off her desired track, so she waited it out and when winds were favorable took off with them at her tail. Continuing through Central America, she reached north coastal Colombia on 26 November and may have settled on a wintering locale in Venezuela by 7 December.

In 1980 captive-bred peregrines were first released from a hawk tower constructed on the Wash Flats. In 1981 a pair took up residence, produced young, and stayed on territory during the fall migration of tundra peregrines. Since that time residents have been present during each survey and we have witnessed many territorial attacks on migrants in degrees ranging from the casual to earnest attempts to injure the perceived intruder. Other individuals of the newly established eastern population have at times taken territories on the north and south ends of the island and have been observed defending these territories. It has been clear that the artificial establishment of this coastal population has resulted in many agonistic encounters for resting and hunting migratory peregrines in the autumn. On four occasions we observed the male of the 1998 pair in territorial encounters with migrants, and he successfully relocated the interloper in each instance.

Recommendations

The tundra peregrine has made a significant recovery and has been removed from the list of endangered species. Because of this survey's long-term continuity and standard method for data collection it has become a valuable tool in monitoring this migratory population. As outlined above, our work with satellite telemetry will allow for continued research to elucidate the hitherto undescribed aspects of its wintering biology. Given the available technology, Assateague remains the ideal laboratory in which to study and address certain present and future issues of concern to peregrines and other Neotropical migrants. In addition, the new race of eastern peregrines reintroduced from captive stocks is encountered routinely on the island. Our continued observations on this race and its interactions with migrating tundra peregrines should be an invaluable asset when future management decisions are considered. Accordingly, this research effort is projected to continue into the foreseeable future.

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TABLE 1.

ASSATEAGUE AUTUMN PEREGRINE SURVEY
1998 TOTALS

	Observed	Captured	Recaptured	resighted
Immature male	275	79	5	66
Immature female	530	148	20	215
Adult male	10	3	-	-
Adult female	72	31	10	1
Unidentified	112	-	-	6
Total	999	261	35	288

TABLE 3.

ASSATEAGUE AUTUMN PEREGRINE SURVEY
1998 SIGHTINGS BY AGE CLASS

	Adults sighted	Adults sighted/ 10 man- hours	Immatures sighted	Immatures sighted/ 10 man- hours	Percent adults
1970	8	.26	50	1.61	13.79
1971	9	.41	107	4.84	7.76
1972	7	.21	23	.71	23.33
1973	18	.50	111	3.08	13.96
1974	13	.36	40	1.11	24.53
1975	14	.42	153	4.60	8.38
1976	14	.42	120	3.57	10.45
1977	18	.38	167	3.57	9.73
1978	32	.73	199	4.56	13.85
1979	35	.82	501	11.72	6.53
1980	42	.93	408	9.04	9.33
1981	59	1.04	232	4.11	25.54
1982	64	1.01	457	7.23	12.28
1983	47	.73	407	6.39	10.35
1984	76	1.05	397	5.48	16.07
1985	60	.87	353	5.17	14.53
1986	109	1.55	630	8.95	14.75
1987	73	1.20	177	2.91	29.20
1988	87	1.30	246	3.66	26.13
1989	119	1.97	573	9.53	17.20
1990	90	1.77	492	9.66	15.46
1991	70	1.11	551	8.74	11.27
1992	70	1.25	239	4.28	22.65
1993	75	1.26	440	7.42	14.56
1994	56	1.00	336	6.03	14.29
1995	53	1.09	407	8.38	11.52
1996	50	1.34	432	11.54	10.37
1997	111	2.15	633	12.26	14.92
1998	82	1.47	805	14.47	9.24
Total	1485	1.01	9686	6.62	13.29

FIGURE 1.

