

1999 PEREGRINE FALCON MIGRATION STUDIES AT ASSATEAGUE ISLAND, MD/VA

CONDUCTED UNDER:

USFWS ENDANGERED SPECIES PERMIT PRT-697823
VIRGINIA ENDANGERED SPECIES COLLECTION PERMIT 012898
MARYLAND ENDANGERED SPECIES PERMIT ESP-27731
AINS (NPS) NATURAL RESOURCE STUDY PERMIT ASIS-99009
CHINCOTEAGUE NWR (USFWS) SPECIAL USE PERMIT 80842
ASSATEAGUE STATE PARK (MD) SPECIAL USE PERMIT 5910A
USFWS MASTER BANDING PERMIT 20127

U.S.ARMY, EDGEWOOD RESEARCH, DEVELOPMENT AND ENGINEERING CENTER

CENTER FOR CONSERVATION RESEARCH AND TECHNOLOGY (CCRT) at
UNIVERSITY OF MARYLAND, BALTIMORE COUNTY

RAPTOR RESEARCH CENTER at BOISE STATE UNIVERSITY

EARTHSPAN

Dr. William S. Seegar
Michael A. Yates
B. James Dayton
Stewart S. Somers

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 Assateague Island, MD/VA, and Padre Island, TX. This report focuses on the 30th annual study at Assateague Island.

Between 24 September and 17 October the survey team expended 504.3 man-hours in the field, observing 560 peregrines and capturing 179 different individuals. Of the total captured twelve were previously-banded falcons. Resightings of individuals captured during the survey numbered 127 and recaptures 14. All sightings of resident peregrines were excluded from data presented here. During the survey 177 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 nesting subspecies. Some few individuals of the subspecies *Falco peregrinus anatum* were also determined to occur on Assateague in the fall. These anatum peregrines were known to breed on rock faces in the eastern United States.

Catastrophic declines in global peregrine populations after the mid 1940's and were attributed to widespread use of chlorinated hydrocarbons (such as DDT) as agricultural pesticides after World War II. 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 also in rapid decline and both subspecies received endangered species status in 1970.

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 24 September through 17 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.

An attempt was made to capture peregrines encountered during the survey which were not identified through color marking as duplicates 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 1999 we collected over 70 blood samples to be analyzed for the presence of the West Nile strain of encephalitis. In the past, both conventional and pulse-coded transmitters have been attached to falcons captured and released on Assateague. Since 1993 we have also deployed Platform Transmitter Terminals (PTTs) on a small sample of adult peregrines, which were tracked and located globally by polar orbiting satellites. Before each falcon was released the head was marked with red dye. This identifies the individual as one already

sampled during the survey and precludes recapture attempts; it fades quickly over a four-week period.

Results and Discussion

The total of 560 peregrines sighted (table 1) was 12th highest in the 30 years of the survey, and sightings per 10 man-hours 10th highest. The 179 captures (table 2) were 9th highest overall, and captures per 10 man-hours were sixth highest.

The twelve recoveries of previously banded falcons are still being analyzed. Two were individuals from the recently established population in the eastern United States, and we had encountered one of these during the 1998 survey. We captured two young peregrines banded last summer in west central Greenland. Five recovered adult falcons had been originally banded by this survey here at Assateague: 1) a female banded in its first year on 10/12/98; 2) a female banded in its first year on 10/8/97; 3) a female banded in its first year on 10/6/96; 4) a female banded in its second year on 10/1/96; and 5) a female banded by Dr. F.P. Ward in its first year on 10/19/88; 11 years old and counting. In addition, we strongly suspect the adult female outfitted with satellite-received telemetry in 1996 and captured again in 1997 and 1998 was back on her McCabe Tract territory. An adult was continually present in the area she had frequented the past three years, but could not be captured due to lack of vehicle access to that area.

Adults comprised 18.46% of identified individuals sighted (table 3), exceeding the 30-year average of 13.51%. The disparity in sightings by age class 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 17. 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.

Sightings and captures by sector (table 4) warrant some discussion. The McCabe Tract's major washover zones feature 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*). In 1999 the Seashore permit limited our operations

to the beachfront of the McCabe Tract due to the appearance in two locations of the endangered plant Sea Beach Amaranth (*Amaranthus pumilus*). This severely limited our sighting and capture potential, and made the occurrence of foot traffic and NPS vehicles along that same beachfront more debilitating to our prospects during those events. This sector's prime habitat still made it 1999's most productive, if perhaps only for lack of access to the Wash Flats.

Due to its very narrow beachfront, development and public use, the Assateague State Park is seldom utilized by migrant peregrines; we spent less than one hour there. 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; 2) the lack of extreme high tides during the survey; and 3) the unavailability of Wash Flats habitat, probably resulting in more falcons using the Refuge beachfront. 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 and shorebird habitat. Construction and maintenance of the stabilized barrier dune system have resulted in dramatic vegetative growth. During the past 30 seasons alone more than half the open area has been lost as good hunting and resting habitat for migrant peregrines and for shorebird foraging and nesting. 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 was inundated in 1999 by rains from hurricanes Dennis and Floyd; we were only able to access the area for a little over an hour during the

entire survey period. This habitat was unavailable to most migrating peregrines and shorebirds, and the effect on overall sightings and captures is incalculable since the Wash Flats is usually our most productive sector. Refuge manager John Schroer advised that by next fall water control devices should be in place enabling automatic control of water levels in the Wash Flats by pumping water between the north and south areas as required.

On 14 October 1993 two adult female peregrines were equipped with PTTs tracked and globally positioned by the Argos/Tiros system. Developed through our joint project of many years with the U.S. Army, the USFWS, and the Applied Physics Laboratory of Johns Hopkins University, these 27-gram PTTs 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 was 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. These technologies comprise an invaluable tool in identifying and mitigating global sources of contaminants affecting peregrines as well as other Neotropical migrants.

In addition, we are currently conducting a continental avian migration modeling effort, which focuses on relating avian migration behavior to synoptic scale weather and winds aloft. This will allow us to predict the outset and intensity of avian migration each spring and fall, and data gathered from instrumented peregrines are helping to build this model.

Three PTTs, affixed by individually fitted neoprene backpacks, were fielded on peregrines at Assateague during the 1999 survey: 1) PTT no. 24088 (fig. 1) was affixed to a second-year female on 10 October. This falcon had made landfall in Cuba by 22 October and was in Costa Rica two days later. She reached Panama on 30 October and was still within its borders on 2 November; 2) PTT no. 24072 (fig. 2) was affixed to a third-year female on 12 October. She also reached Cuba by 22 October and then Honduras by 26 October. The next day this falcon was in southern coastal Guatemala, then moved to coastal El Salvador by the following day. By 30 October she was on the west coast of Nicaragua, just below the Honduran border, and remained in that vicinity on 7 November; and 3) PTT no. 24090 (fig. 3) was affixed to an adult female on 13 October. This falcon was in the Florida Keys by 26 October and remained there on 2 November. The movements of these falcons will be updated and may be reviewed on CCRT's web site (www.CCRT.org).

In 1980 captive-bred peregrines were first released from a hack 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 aggression towards 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 three occasions we observed the 1999 pair in territorial encounters with migrants, and they successfully relocated the perceived interloper in each instance. These encounters took place on the refuge beach; it is likely many more such incidents would have been observed had we been able to access the Wash Flats.

Recommendations

The tundra peregrine has made a significant recovery and has been removed from the list of endangered species, yet continued monitoring of populations is imperative. Because of this survey's long-term continuity and standard method for data collection it has become an essential tool in that effort. During the past 30 autumn migrations we have logged more than 15,000 hours in the field, observing over 13,000 peregrines and capturing over 3,800 individuals. It is important that this database be perpetuated without changes in protocol that will unnecessarily compromise its value. As outlined above, our work with satellite telemetry will allow for continued research to elucidate the hitherto undescribed aspects of its wintering biology and continental migration. 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 introduced 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.

Acknowledgments

We gratefully acknowledge the support of the Assateague Island National Seashore. We wish especially to recognize Marc Koenings, Carl Zimmerman, Mel Olsen, Jack Kumer, Tracy Ammerman, and Gretchen Knapp of the AINS. John Schroer and Bob Wilson of the Chincoteague National Wildlife Refuge and Bill Simmons of the Assateague State Park have also been instrumental in the continued success of this work. All these stewards of the resource have been long time advocates of our

program. Special thanks go to Dr. Mark R. Fuller of USGS-BRD and Dr. Robert A. Whitney of Earthspan, without whose tireless efforts, friendship and support this survey would not have been possible. We also wish to thank those who assisted us in the field for long hours and in other significant ways. We are indebted to Jenny Somers, Kevin Taylor, Janis Seegar, Billie Dayton, John Wright, Donna Leonard, Jeff Eser, Brian McDonald, Lou Woyce, Tom and James Seegar, Jeff, Amy, Helena and Rain Yates, Gary Pelton, Geoff, Marcia and Katie Nye, Jamie Pitts, Michael Henke, Lowell Stoltzfus, Ken and Blanca Young, Reggie Birch, Nancy West, Brad Smith, Dave and Twig Pittenger, Bill Lent, Michael Colopy, Carol Carpenter, April Williams, Pat Bodley, Fran Meo of UMBC, and Blake Henke, Tom Maechtle and Jim Seegar of CCRT. Finally, yet most importantly, we wish to thank Dr. F. Prescott Ward. Scott established this study in 1970 and infused it with his talent and energy for 21 seasons. This fall he paid us the distinct honor of returning for a few days; just long enough to demonstrate that he hasn't lost a single step and to remind us how sorely his presence is still missed.

TABLE 1.
ASSATEAGUE AUTUMN PEREGRINE SURVEY
1999 TOTALS

	Observed	Captured	Recaptured	resighted
Immature male	183	75	4	38
Immature female	219	70	10	78
Adult male	17	4	-	-
Adult female	74	30	-	3
Unidentified	67	-	-	8
Total	560	179	14	127

TABLE 2.

ASSATEAGUE AUTUMN PEREGRINE SURVEY
1970-1999 TOTALS

	Man- hours expended	Peregrines sighted	Peregrines sighted/10 man-hours	Peregrines captured	Peregrines captured/10 man-hours
1970	310.0	66	2.13	23	.74
1971	221.1	120	5.43	35	1.58
1972	325.6	41	1.26	8	.25
1973	360.7	136	3.77	47	1.30
1974	360.7	59	1.64	22	.61
1975	332.8	186	5.59	40	1.20
1976	336.8	176	5.23	48	1.43
1977	468.2	209	4.46	75	1.60
1978	436.2	259	5.94	64	1.47
1979	427.4	598	13.99	127	2.97
1980	451.1	512	11.35	110	2.41
1981	564.7	347	6.15	89	1.58
1982	632.3	591	9.35	121	1.91
1983	637.2	562	8.82	116	1.82
1984	724.9	547	7.55	150	2.07
1985	683.0	483	7.07	147	2.15
1986	704.1	838	11.90	230	3.27
1987	607.4	327	5.38	112	1.84
1988	671.7	409	6.09	132	1.97
1989	601.2	813	13.52	203	3.38
1990	509.3	659	12.94	248	4.87
1991	630.3	743	11.78	227	3.60
1992	558.8	340	6.08	116	2.08
1993	593.2	595	10.03	192	3.24
1994	557.3	467	8.38	133	2.39
1995	485.4	525	10.82	139	2.86
1996	374.3	568	15.17	192	5.13
1997	516.5	889	17.21	254	4.91
1998	556.3	999	17.96	261	4.69
1999	504.3	560	11.10	179	3.55
Total	15,142.8	13,624	9.00	3840	2.54

TABLE 3.

ASSATEAGUE AUTUMN PEREGRINE SURVEY
1970-1999 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
1999	91	1.80	402	7.97	18.46
Total	1576	1.01	10,088	6.62	13.51

TABLE 4.

ASSATEAGUE AUTUMN PEREGRINE SURVEY
1999 PRODUCTIVITY BY SECTOR

	Sighted	Sighted/10 man-hours	Captured	Captured/10 man-hours
McCabe Tract (MD)	217	15.60	73	5.25
State Park (MD)	2	21.74	-	-
Access Road (MD)	4	2.91	-	-
Maryland Beach	52	8.31	16	2.56
Refuge Beach (VA)	173	11.28	60	3.91
Wash Flats (VA)	6	55.55	-	-
Service Road (VA)	5	1.46	-	-
Hook (VA)	101	10.18	30	3.02

FIGURE 1.

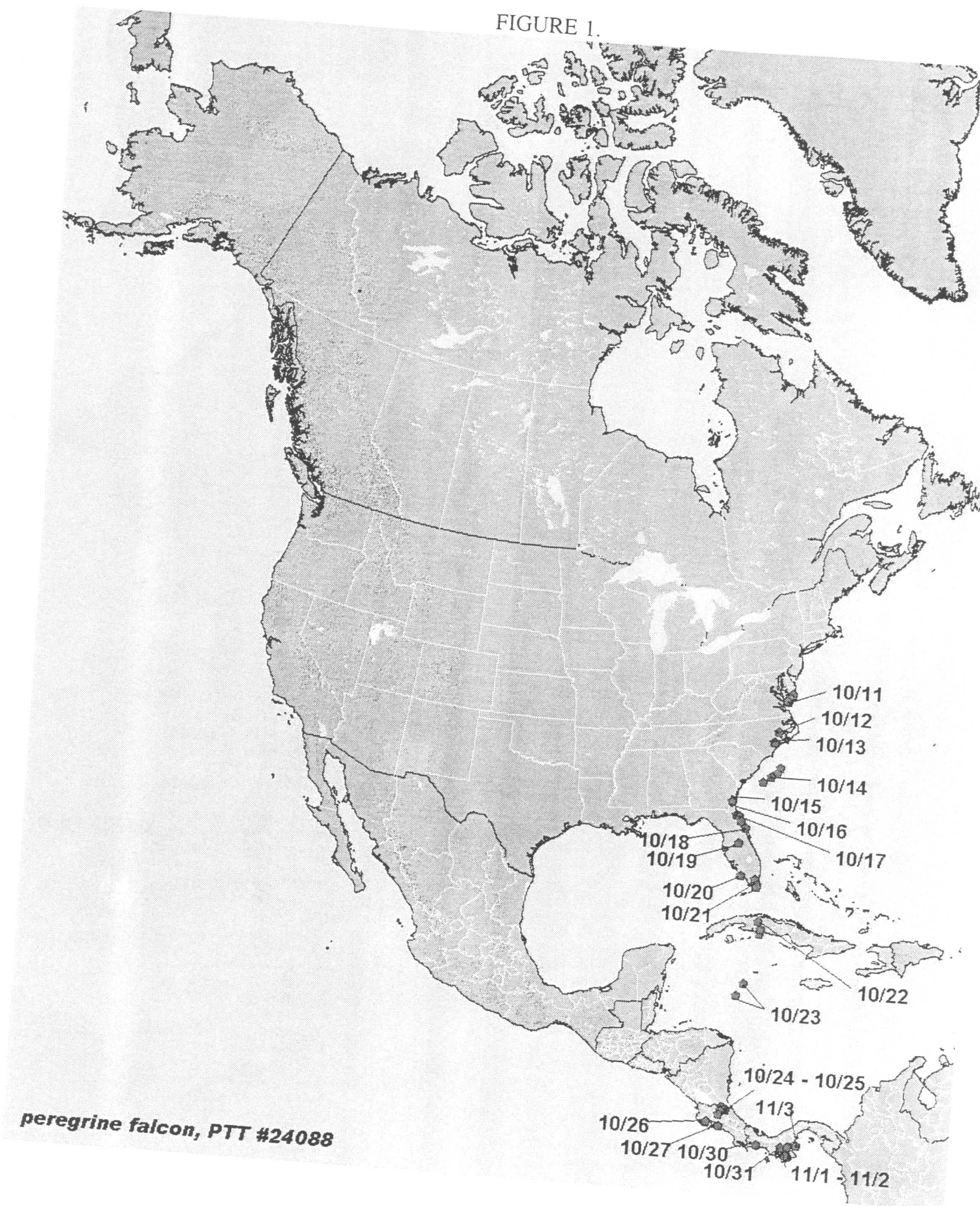


FIGURE 2.

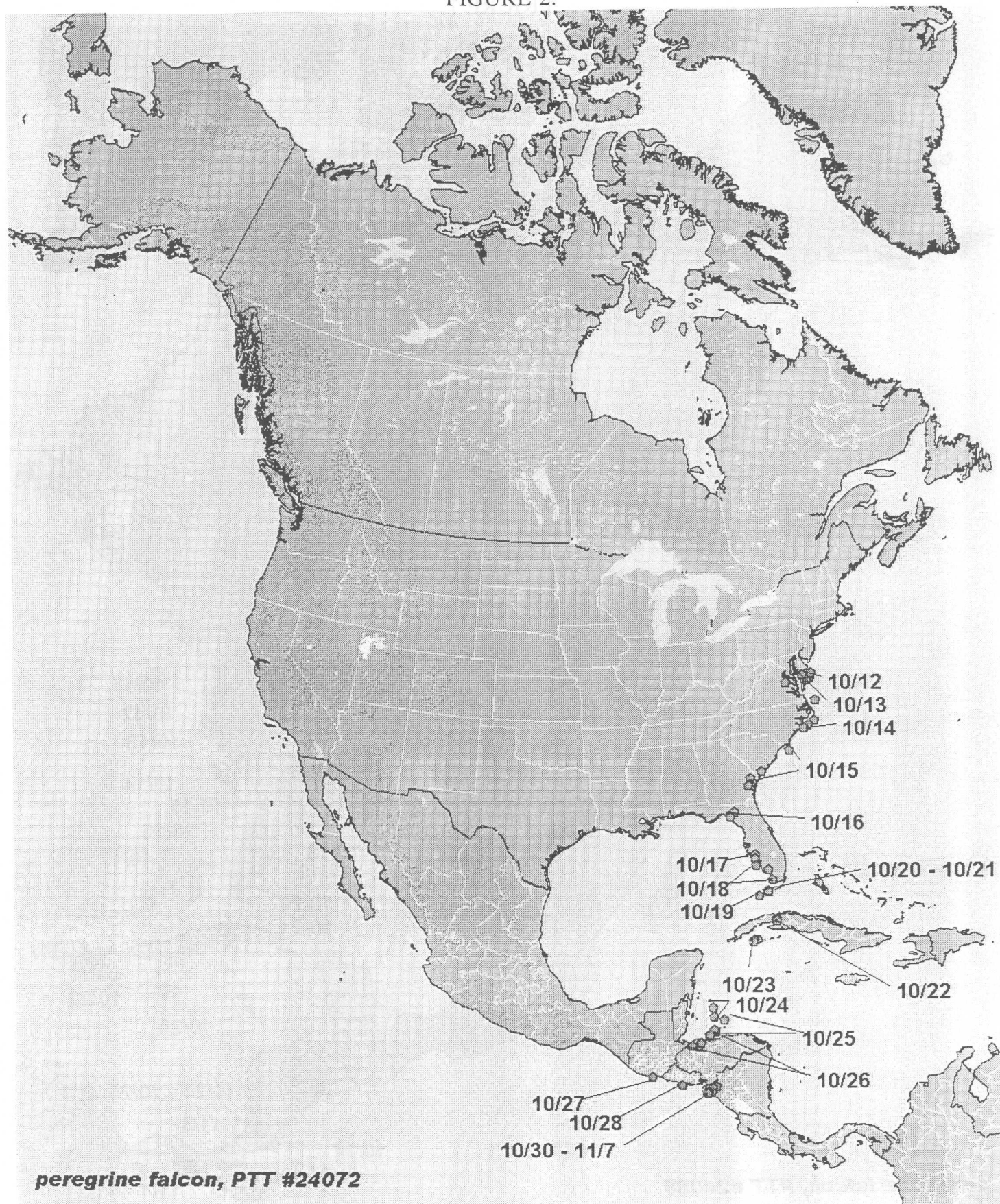


FIGURE 3.



peregrine falcon, PTT #24090