

# 1996 PEREGRINE FALCON MIGRATION STUDIES AT ASSATEAGUE ISLAND, MD/VA

CONDUCTED UNDER:

USFWS ENDANGERED SPECIES PERMIT PRT-697823

VIRGINIA ENDANGERED SPECIES COLLECTION PERMIT ESP9638

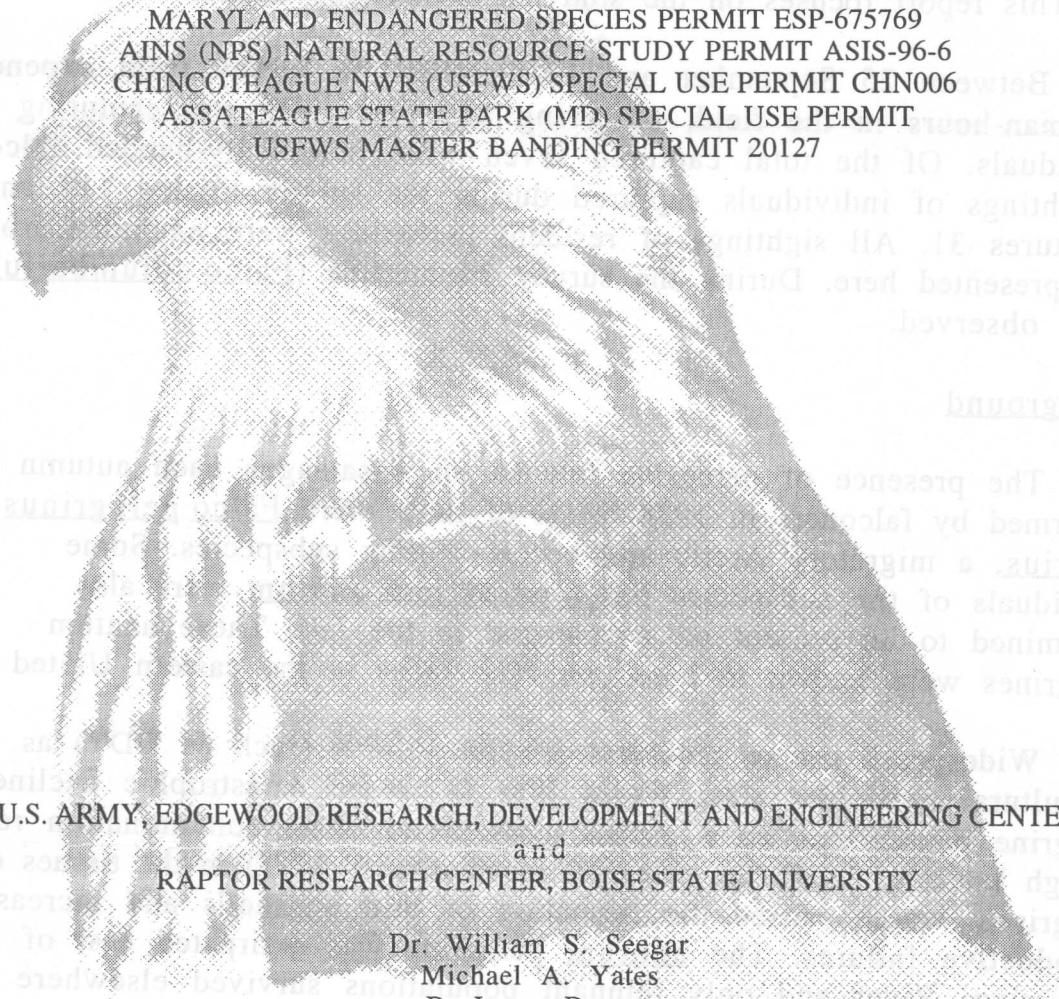
MARYLAND ENDANGERED SPECIES PERMIT ESP-675769

AINS (NPS) NATURAL RESOURCE STUDY PERMIT ASIS-96-6

CHINCOTEAGUE NWR (USFWS) SPECIAL USE PERMIT CHN006

ASSATEAGUE STATE PARK (MD) SPECIAL USE PERMIT

USFWS MASTER BANDING PERMIT 20127



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## Summary

As part of a continuing research program for the U.S. Army, Edgewood Research, Development and Engineering Center, 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 25 September and 17 October the survey team expended 374 man-hours in the field, observing 568 peregrines and capturing 192 individuals. Of the total captured seven were previously-banded falcons. Resightings of individuals captured during the survey totaled 113 and recaptures 31. All sightings of resident peregrines were excluded from data presented here. During the survey 74 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 25 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. We also recorded the location of each peregrine sighting using portable Global Positioning System (GPS) receivers for integration with the Assateague Island National Seashore Geographic Information System (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 past four field surveys we have deployed Platform Transmitter Terminals (PTT's) on a small sample of adult females, which were tracked and located globally by polar orbiting satellites of the Tyros N series. Presently the efficacy of this technology is being demonstrated on Assateague through the support of the Department of Defense's Legacy Environmental Program. Before each falcon was

released the crop and cheeks were marked with picric acid. This yellow dye 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 568 peregrines sighted (table 1) was 8th highest in the 27 years of the survey, and the number of sightings per 10 man-hours (table 2) was the highest ever. The 192 peregrines captured tied our 1993 total for 5th highest, and the number of captures per 10 man-hours was also the highest ever. Contributing factors to our extraordinary productivity in 1996 were: 1) preponderance of weather patterns conducive to sightings and captures, 2) fewest total hours expended in 20 years, with dates far outside the prime migratory period excluded, and 3) occasional suspension of survey activities during less than optimum conditions in order to preserve the integrity of aging survey vehicles.

The seven recoveries of previously-banded falcons are still being analyzed. Two of these, immature males, were banded as nestlings in the summer of 1996 by our survey teams near Kangerlussuaq, Greenland. One second-year female had been banded by us as an immature female on 3 October 1995 at Assateague. Three others were individuals from the recently-established population in the eastern United States.

Adults comprised 10.37% of all individuals sighted (table 3). This is the lowest percentage since 1983, but is no cause for concern since the high percentage of immatures sighted does not exist in a vacuum. If the young have been produced, it follows that the adults which produced them also exist. 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 must comprise close to a quarter of the migrants, yet this year we confirmed the observation of only six. Recent advances in the downsizing of PTT's (to about 19 grams) by Microwave Telemetry, Inc. have allowed us to instrument three adult males in 1996, at Padre Island and in Greenland. Initial data indicate that adult males complete their migration within a much more abbreviated period than other age and sex cohorts, and that much of the trip is made at sea. In addition, weather during the migration 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 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). More individuals were sighted and captured here than on any other sector. Captures by unit effort were also highest here, and sightings by unit effort were second only to the Wash Flats. Due to development and public use, the Assateague State Park is seldom utilized by migrant peregrines. The Big Levels, once a huge washover area of beach to bay sand flats and prime peregrine habitat, is now lost to vegetative encroachment through barrier dune construction in the 1950's. This barrier dune has not been maintained in many years and is no longer intact, but vegetation is well-entrenched and it may take many more years for the forces of nature to return this sector to its natural state. Productivity figures here mean nothing, since only 25 minutes were expended in 1996.

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) intensive public use with four-wheel drive vehicles of the Maryland Beach, and 2) increased use by peregrines of the Refuge Beach due to frequent unavailability of the Wash Flats. The Hook's suitability for observing and capturing peregrines continued to decline due to vegetative encroachment, loss of beachfront and public use. Since most time spent here was immediately after first light and before intensive recreational use became a factor, production figures are somewhat artificially enhanced.

The Wash Flats, in its natural state, was a larger version of the Big Levels. Construction and maintenance of the stabilized barrier dune system have resulted in dramatic vegetative growth. During the past 27 seasons alone more than half of the open area has been lost as good hunting and resting habitat for migrant peregrines. The remainder is often under water, but even when dry is more a mud flat now than a sand flat. Standing water in 1996 severely limited our (and the migrant peregrines') access to the area. Although still the sector on which the most falcons were sighted by unit effort, many of these falcons were observed flying by and not utilizing the area to hunt and rest. The CNWR's current policy of not

maintaining the barrier dune north of D-Dike may foster a more natural progression of barrier island geomorphology. This sector could return to its natural state, but only after many years and only if the interior dikes are also allowed to erode.

On 14 October 1993 two adult female peregrines were equipped with PTT's tracked and globally positioned by the Argos/Tyros 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 which 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.

During the 1996 survey we installed PTT's on three adult female peregrines. Two of the individuals, fitted on 9 and 11 October (figs. 1 and 2), were in or near Cuba on 3 and 4 November respectively. The other, fitted on 12 October, was apparently affixed to a previously-unbanded member of the new eastern peregrine population; she remains at various locales in the vicinity of Assateague.

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.

This fall we captured a previously-banded adult female from the eastern population on territory in the Wash Flats. This individual, her mate, and a resident on the north end have been excluded from all statistics reported above. At least eight different females have now held the Wash Flats territory in the past 16 surveys; perhaps more since we have not been able to capture the resident each year. This represents an astronomically high rate of turnover for breeding adult females on territory. This high replacement rate may be an artifact of the stress involved in defending a breeding territory located on migratory habitat for Arctic peregrines. In addition, the presence of resident territorial peregrines on the Wash Flats may have some impact on tundra peregrines and their ability to access this area to hunt and rest during migration. This factor, coupled with the previously-noted loss of natural habitat in the area is cause for concern. During the 1970-1980 surveys more peregrines (by unit effort) were sighted and captured on this sector than on any other during 9 of 11 years. From 1981-1996 Wash Flats sightings exceeded those of other areas only 10 of 16 years and captures only 3 of 16 years. As previously noted, many falcons sighted on this sector now are not using the area but are simply observed migrating through because of the vista afforded the observer by the terrain. This year's pair was present

sporadically and four territorial encounters were observed between the female and migrants despite limited time spent on this sector.

### 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 their wintering biology. Given the available technology, Assateague remains the ideal laboratory from 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 still enjoys the protection afforded endangered species, and 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

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TABLE 1.

| ASSATEAGUE AUTUMN PEREGRINE SURVEY<br>1996 TOTALS (EXCLUDING RESIDENTS) |          |          |            |           |  |
|-------------------------------------------------------------------------|----------|----------|------------|-----------|--|
|                                                                         | Observed | Captured | Recaptured | Resighted |  |
| Imm. Male                                                               | 150      | 69       | 3          | 29        |  |
| Imm. Female                                                             | 282      | 95       | 26         | 78        |  |
| Adult Male                                                              | 6        | 2        | -          | -         |  |
| Adult Female                                                            | 44       | 26       | 2          | 2         |  |
| Unidentified                                                            | 86       | -        | -          | 4         |  |
| Total                                                                   | 568      | 192      | 31         | 113       |  |

**TABLE 2.**  
**ASSATEAGUE AUTUMN PEREGRINE SURVEY**  
**1970-1996 TOTALS**  
**(EXCLUDING RESIDENT PEREGRINES)**

|      | man-hours<br>expended | peregrines<br>sighted | peregrines<br>sighted per<br>10 man-hours | peregrines<br>captured |
|------|-----------------------|-----------------------|-------------------------------------------|------------------------|
| 1970 | 310.0                 | 66                    | 2.13                                      | 23                     |
| 1971 | 221.1                 | 120                   | 5.43                                      | 35                     |
| 1972 | 325.6                 | 41                    | 1.26                                      | 8                      |
| 1973 | 360.7                 | 136                   | 3.77                                      | 47                     |
| 1974 | 360.7                 | 59                    | 1.64                                      | 22                     |
| 1975 | 332.8                 | 186                   | 5.59                                      | 40                     |
| 1976 | 336.8                 | 176                   | 5.23                                      | 48                     |
| 1977 | 468.2                 | 209                   | 4.46                                      | 75                     |
| 1978 | 436.2                 | 259                   | 5.94                                      | 64                     |
| 1979 | 427.4                 | 598                   | 13.99                                     | 127                    |
| 1980 | 451.1                 | 512                   | 11.35                                     | 110                    |
| 1981 | 564.7                 | 347                   | 6.15                                      | 89                     |
| 1982 | 632.3                 | 591                   | 9.35                                      | 121                    |
| 1983 | 637.2                 | 562                   | 8.82                                      | 116                    |
| 1984 | 724.9                 | 547                   | 7.55                                      | 150                    |
| 1985 | 683.0                 | 483                   | 7.07                                      | 147                    |
| 1986 | 704.1                 | 838                   | 11.90                                     | 230                    |
| 1987 | 607.4                 | 327                   | 5.38                                      | 112                    |
| 1988 | 671.7                 | 409                   | 6.09                                      | 132                    |
| 1989 | 601.2                 | 813                   | 13.52                                     | 203                    |
| 1990 | 509.3                 | 659                   | 12.94                                     | 248                    |
| 1991 | 630.3                 | 743                   | 11.78                                     | 227                    |
| 1992 | 558.8                 | 340                   | 6.08                                      | 116                    |
| 1993 | 593.2                 | 595                   | 10.03                                     | 192                    |
| 1994 | 557.3                 | 467                   | 8.38                                      | 133                    |
| 1995 | 485.4                 | 525                   | 10.82                                     | 139                    |
| 1996 | 374.3                 | 568                   | 15.17                                     | 192                    |

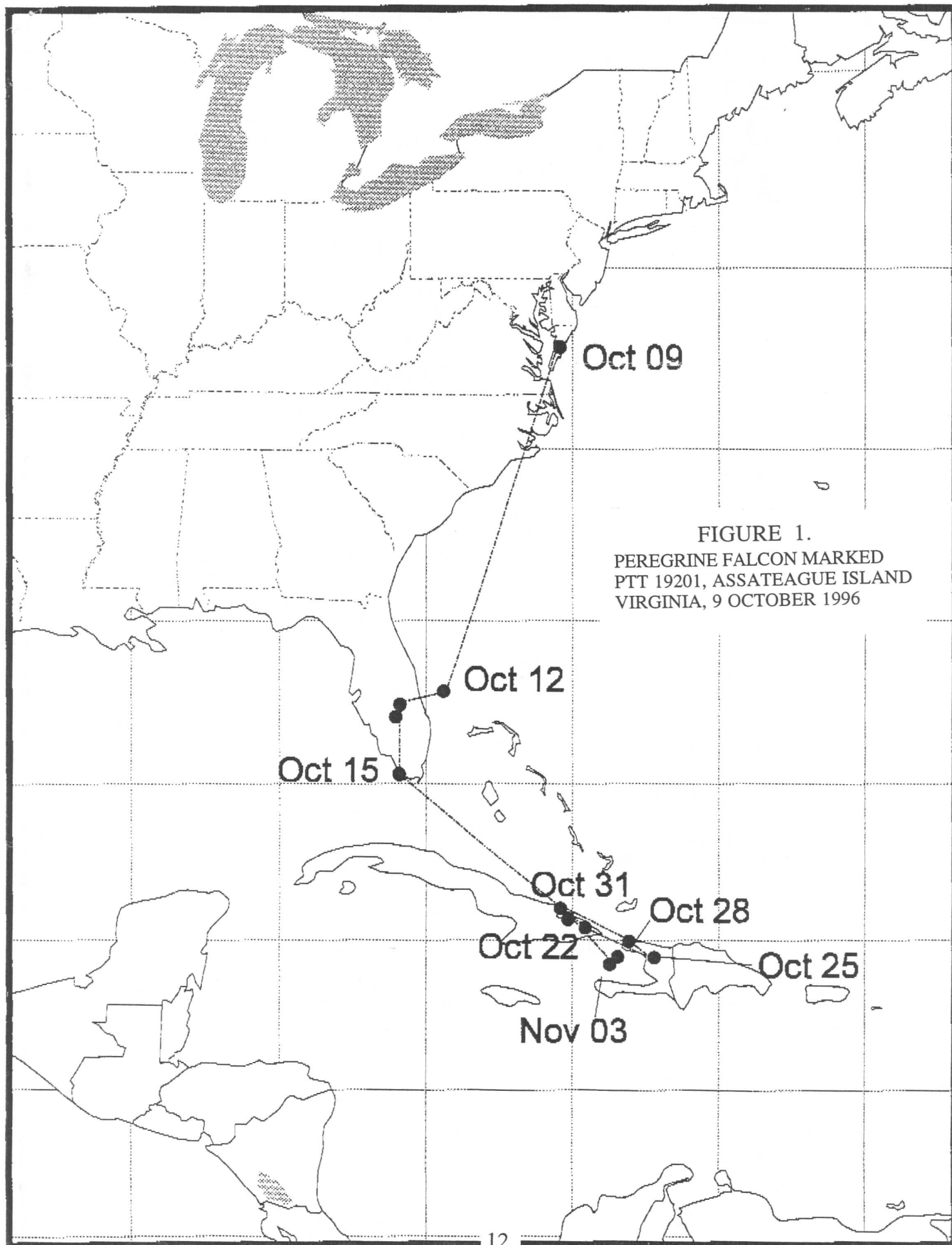


**TABLE 4.**  
**ASSATEAGUE AUTUMN PEREGRINE SURVEY**  
**1996 PRODUCTIVITY BY SECTOR**

|                   | sighted | sighted per<br>10 man-hrs | captured | captured per<br>10 man-hrs |
|-------------------|---------|---------------------------|----------|----------------------------|
| McCabe Tract (MD) | 160     | 17.66                     | 59       | 6.51                       |
| State Park (MD)   | 2       | 6.67                      | 1        | 3.33                       |
| Access Road (MD)  | 5       | 6.31                      | -        | -                          |
| Maryland Beach    | 61      | 12.28                     | 25       | 5.03                       |
| Big Levels (MD)   | 1       | 23.81                     | -        | -                          |
| Refuge Beach (VA) | 157     | 14.86                     | 57       | 5.39                       |
| Wash Flats (VA)   | 130     | 19.64                     | 40       | 6.04                       |
| Service Road (VA) | 8       | 3.79                      | -        | -                          |
| Hook (VA)         | 44      | 14.75                     | 10       | 3.35                       |

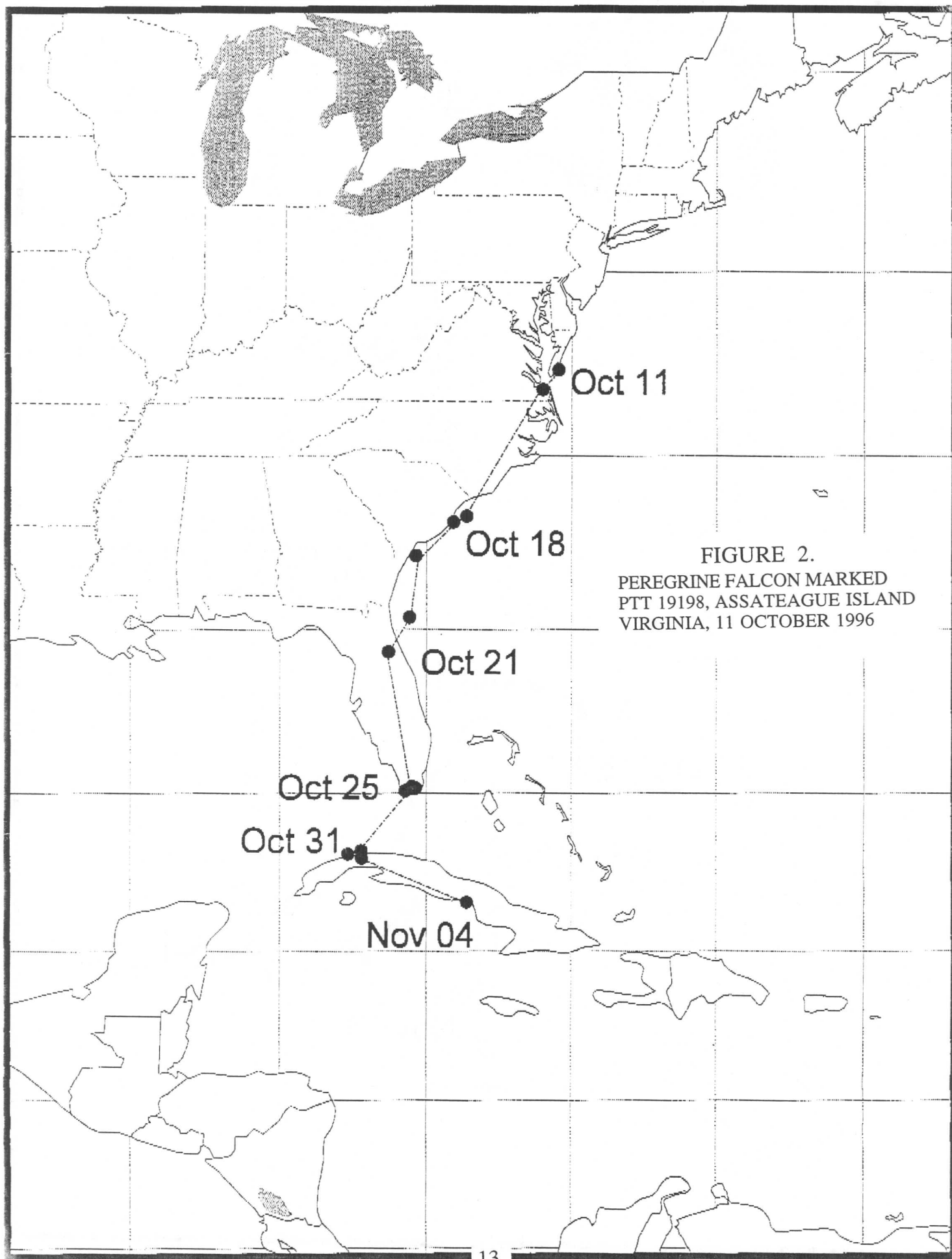


FIGURE 2.  
PEREGRINE FALCON MARKED  
PTT 19198, ASSATEAGUE ISLAND  
VIRGINIA, 11 OCTOBER 1996