

RECOVERIES OF PEREGRINE FALCONS MIGRATING THROUGH
THE EASTERN AND CENTRAL UNITED STATES, 1955-1985

M.A. Yates¹, K.E. Riddle², and F.P. Ward³

¹Yates Consultants, 7818 Woodyard Road, Clinton, MD 20735,

²University of Texas Cancer Center, Veterinarian Resources Div, Bastrop, TX 78608 and

³Chemical Research and Development Center, Edgewood Area, Aberdeen Proving Ground, MD 21010-5423

ABSTRACT

We analyzed western hemisphere bandings and recoveries of peregrines on file with the Bird Banding Laboratory from January 1955 through June 1985. Greenland records were included. Captive-bred peregrines (and their progeny) and individuals in captivity more than one week were excluded. This study focused on east and Gulf coast migrants. The dominant northern population represented in east coast recoveries is that of Greenland, which accounted for more than half of the falcons banded as nestlings recovered there. Alaskan peregrines dominate Texas Gulf coast recoveries. Canadian Arctic populations are associated with a broad-front southerly migration. Very little interchange among banding stations was found between peregrines banded on the east and Gulf coasts. Recoveries of autumn migrant peregrines banded in Wisconsin indicate a substantial inland migration passing through the area from Alabama to the southern Atlantic coast and mostly sharing wintering areas unique to east coast migrants. East and Gulf coast migrants share wintering areas in most of Central and South America, but east coast birds have not been recorded wintering between Honduras and the U.S. border. Gulf coast migrants have not been encountered in the northeastern one-third of South America or in the West Indies/Antilles corridor. Mortality records of 88 peregrines banded as juveniles were examined; data indicate that about 63% did not survive through completion of their first spring migration north.

SPACE >

Extensive banding and recovery records available for peregrine falcons provide insights to the dynamics of fall and spring migrations of various geographic subgroups, their wintering areas, and survivorship. The east and Gulf coasts have long been recognized as areas of major autumn concentrations

of migrating peregrine falcons (Falco peregrinus) (Enderson 1969). Respective focal points of these migrations are Assateague Island, MD/VA and North and South Padre Islands, TX, which together provide the bulk of bandings and recoveries. The study area at Assateague Island was described by Ward and Berry (1972), and Padre Island by Hunt, et al. (1980) and Weise and White (1980). North and South Padre Islands are also the only known major focal point in the western hemisphere of migrating peregrines in the spring (Ward, et al. 1978). In this analysis of bandings and recoveries on file with the Bird Banding Laboratory of the U.S. Fish and Wildlife Service (USFWS) we attempted to: determine origins, wintering areas, and migration routes of east and Gulf coast migrants; measure their fidelity to migratory routes; characterize routes southward and wintering areas of peregrines passing Wisconsin (another area of concentration in autumn); and estimate age-specific mortality through recoveries of banded peregrines.

METHODS

Several visits were made during July and August 1985 to the Bird Banding Laboratory, Office of Migratory Bird Management, USFWS, Laurel, MD 20708. Computer listings of bandings and recoveries were obtained; bandings were available in computer files only back to 1955. We considered only recoveries since then as well, because by that time very few eastern peregrines (F. p. anatum) were being banded. We eliminated from consideration bandings and recoveries of captive-bred peregrines and their progeny, known eastern F. p. anatum, and individuals held in captivity more than one week. Also eliminated were live recoveries of peregrines in the same study area of banding during the same migratory period. Using these guidelines, all bandings and

recoveries were tabulated for the east coast (ME, NH, VT, MA, CT, RI, NY, NJ, PA, DE, MD, VA, W, NC, SC, GA, FL), Gulf coast (TX, MS, LA, AL), and Wisconsin. Records were also listed for peregrines banded elsewhere and recovered on the east and Gulf coasts. Birds banded in Canada and recovered anywhere south of Canada were listed, as were birds banded in Greenland and Alaska and recovered on the east and Gulf coasts. Finally, records were listed of peregrines banded in the age classes of nestling and hatching-year which were later recovered dead. Listings requiring further clarification were researched with the files at the Bird Banding Laboratory. Because the complete 1984 banding summaries were not yet available, we used the totals on record and added 1984 bandings in NJ, MD, VA, NC, FL, and TX that were not on file but for which we had documentation. Bandings and recoveries were mapped; descriptions and conclusions were derived from analysis of these maps and listings.

RESULTS AND DISCUSSION

The data base included a total of 4,477 bandings for the east and Gulf coasts and Wisconsin; of these banded peregrines 4.65% were recovered (Table 1).

Recoveries on the east coast of peregrines banded elsewhere indicate the Greenland population (as suggested by Shor, 1970) figures heavily in the fall migration through this flyway. Of 23 peregrines banded as nestlings and recovered on the east coast, 12 (52.2%) were from Greenland. Origins of the rest were distributed fairly evenly across the Arctic from Quebec to Alaska, with only 2 (8.7%) coming from Alaska (Table 2, Fig. 1). Of 105 recoveries of peregrines banded on the east coast, 48 were recovered away from the east

coast (Fig. 2). Thirteen of these 48 were north of the U.S. border; 8 of those 13 (61.5%) were in Greenland, 2 (15.4%) were in Keewatin, NWT, and one (7.7%) each in Manitoba, Saskatchewan, and Alaska. The 29 recoveries south of the U.S. border were distributed through the West Indies and Antilles, Central America, and most of South America to 38 degrees south latitude in Argentina.

Recoveries on the Gulf coast of peregrines banded elsewhere indicate the Alaska population dominates in this flyway. Of 29 peregrines banded as nestlings and recovered on the Gulf coast (all in LA and TX), 17 (58.6%) were from Alaska. Only 3 (10.3%) Greenland nestlings were among the Gulf coast sample. The remaining recoveries were distributed fairly evenly from the Yukon to Northwest Territories, Canada (Table 2, Fig 3). Of 86 recoveries of peregrines banded on the Gulf coast, only 19 were recorded at locations other than Texas (Fig. 2). The one recovery north of the U.S. border was in Franklin, NWT. The 13 recoveries south of the U.S. border were distributed through the Gulf coast of Mexico, Central America, and the southwestern 2/3 of South America to 33 degrees south latitude in Uruguay. Although east and Gulf coast migrants share many wintering areas, east coast migrants have not been recovered between Honduras and the U.S. border. Gulf coast migrants in turn have not been recorded in the northeastern 1/3 of South America or the Antilles/West Indies.

Banding recoveries indicate that peregrines display fidelity to a particular flyway. Despite the fact that many peregrines are banded on the east and Gulf coasts and chances of live recoveries are optimal due to intense trapping efforts in these areas, few records of interchange between flyways exist. No peregrine banded on the Gulf coast has ever been recovered on the

east coast, and of 105 recoveries of peregrines banded on the east coast, only 4 (3.8%) occurred on the Gulf coast. Three of these were banded on the east coast in autumn and were recovered in Texas on a subsequent spring migration. This suggests that only a small proportion of the east coast sample may participate in a "loop" migration. All available data indicate that separate and distinct autumn migratory populations pass through the east and Gulf coasts. Hunt, et al. (1975) state that the Texas Gulf coast autumn migration peaks on 6 October, while the peak on Assateague Island (despite some 10 degrees difference in latitude) is 4-6 October (Ward, et al. 1985). Recoveries of peregrines banded in Canada show that they are associated with broad-front migrations south (Fig. 4 and 5). The Alaska and Greenland recoveries also indicate variability because peregrines from the same natal locale do not always use the same flyway on migration. Indeed, siblings fledged together from the same cliff may not do so. For example, in 1983 three of four nestling peregrines banded at the same eyrie in Greenland were recovered on autumn migration. Two were encountered on the coasts of VA/NC and one in northeastern Iowa (Mattox 1983). However, available records indicate that once an individual selects its migratory route, it is unlikely to deviate from it on subsequent migrations. Further support for this conclusion lies in the fact that over half of the subsequent recoveries of east coast-banded peregrines occur on the east coast. Using the same criteria, the Gulf coast figure is over 75%.

North and South Padre Islands, Texas have been identified as the only known major point of concentration in the western hemisphere of migrating peregrines in springtime. Field work at South Padre Island in 1978 disclosed

a substantial migration of peregrines in April and May. It was subsequently determined that peregrines utilize the habitat as a staging area during the migration north (Hunt, et al. 1981). Radio telemetry studies indicate that on departure from Padre Island peregrines begin a direct course to their northerly destination (W.G. Hunt, J. Chase, pers. comm.). Other than the 3 records of autumn-banded east coast peregrines recovered in Texas during spring migration, data indicate that these migrants are simply survivors of the same individuals passing the Texas coast during fall migration. Fully half the recoveries of peregrines banded in Texas involve encounters in April and May at Padre Island. Spring field work at Assateague Island in 1972, 1973, 1974, and 1976, in Panama in 1973 and 1974, at Dry Tortugas, FL in 1974, 1975, and 1983, at Cumberland Island, GA in 1976, and at Sandy Hook, NJ in 1977 and 1978 resulted in less than 15 peregrine sightings and only one capture (Ward, et al. 1978). Analysis of recoveries provides no evidence of a springtime concentration of east coast migrants similar to that described for Gulf coast migrants.

The peregrines migrating through Wisconsin in autumn appear to comprise a separate but not distinct group. From Wisconsin, they tend to follow a south to southeast course. Of 17 recoveries (Fig. 6), only one occurred in Texas. East coast encounters totalled 5, and there were also recoveries in Ohio (2), Illinois (1), Tennessee (2), Missouri (1), and Alabama (1). Recoveries south of the U.S. border totalled 4, and 3 of these occurred in areas associated with recoveries of east coast migrants in which no peregrine banded on the Gulf coast has ever been recovered. In addition, it appears from recoveries that the Wisconsin migrants sustain higher mortalities than east or Gulf coast

migrants. Only 4 of the 17 recoveries of peregrines banded in Wisconsin were live encounters, compared to at least 2 of every 3 recovered peregrines banded on the east and Gulf coasts. Although intense banding efforts on the latter flyways would be expected to account for this difference, it must be noted that the percentage of recoveries is actually higher among the Wisconsin migrants.

Eighty-eight records of individual peregrines banded as nestlings or hatching-year migrants and later recovered dead were analyzed. Individuals banded as adults were not considered because exact ages were not available for most. This method of counting bodies was used as the most direct way to measure age-specific mortality. For the most part, the method utilized here also eliminates the biases attendant to estimating mortalities from recoveries discussed by Newton (1979), especially because we are not attempting to establish a yearly mortality rate (non-age-specific) for the entire population. The major assumption is that all mortalities have an equal chance of being found and reported. It was determined that 55 (62.5%) of the 88 individuals did not survive to complete their first northward spring migration. The remaining 33 (37.5%) were recovered dead after their first year (Fig. 7).

Because it might be expected that individuals banded as nestlings endure a higher first-year mortality than those banded on migration, these samples were further separated and analyzed. Only 58% of 38 nestlings were first-year mortalities, while 66% of 50 migrants did not survive. Two possible explanations are: 1) numbers of migrant peregrines captured contain a higher percentage of less viable individuals and this is what makes them more

susceptible to trapping; it would then follow that records of peregrines banded as nestlings represent the only true picture of the population's age-specific mortality under this method; 2) the number of records available is simply insufficient in terms of drawing any meaningful conclusions. A larger statistical base would be critical to an accurate representation of yearly mortality beyond the first year.

The recoveries of two peregrines banded on the Maryland portion of Assateague Island warrant special mention. A female banded as an adult on 7 October 1965, was recovered alive on the Virginia portion of Assateague Island on 2 October 19⁷⁵~~65~~; thus she was at least in her twelfth year at the second encounter. A hatching-year male banded on 25 September 1975 was recovered alive at Nuniluk Bluff, Alaska on 15 July 1984. This same peregrine was then shot and killed in Alagoas State, Brazil in December 1984. In addition to providing the upper extremes of longevity in the records analyzed, these returns and others less noteworthy bring us to a final point. We have previously stated that peregrines display fidelity to their chosen migratory routes. The first individual above made a minimum of twelve southerly migrations and was captured twice on migration; the second individual was captured on southerly migration once in ten trips. Other recoveries demonstrate the same fact; i.e., individuals observed and captured on migration constitute only a fraction of the actual migratory population.

SUMMARY

Origins of east coast autumn migrant peregrines are heavily weighted toward Greenland, while Gulf coast migrants are more often of Alaskan origin. Migrants of any origin may appear on any flyway, and tend to display

fidelity to that same flyway on subsequent southerly migrations. Many wintering areas are shared by east and Gulf coast autumn migrants, but members of each group also winter in areas unique to their migratory population. A significant northerly migration occurs along the Texas Gulf coast in springtime, but there is no indication of a similar concentration at that time of east coast migrants. Peregrines banded on autumn migration in Wisconsin comprise a separate but not distinct migratory population which mixes more on wintering grounds with east coast autumn migrants than with Gulf coast counterparts. Band recoveries suggest a 63% mortality of young peregrines before completion of their first northward migration, although a slightly different interpretation of data analyzed could lower that estimate to 58%. And finally, recoveries suggest that only a fraction of autumn migrants are observed or captured in any given year.

ACKNOWLEDGEMENTS

We gratefully acknowledge the contributions of W.G. Hunt and B.S. Johnson, whose initial analysis of recoveries in 1981 was an invaluable resource. Kathy Klimkiewicz of the Bird Banding Laboratory was extremely helpful and much more receptive to our urgent needs than her busy schedule dictated. Mark Fuller provided manuscript review in record time. Assistance in various forms by the following was most timely and appreciated: J. Chase, K. Titus, and the remainder of the Bird Banding Laboratory staff. Most importantly, we salute those individuals who for decades banded peregrines and reported recoveries.

Among our colleagues in these efforts, we wish to acknowledge by name Bob Berry, Jim Rice, Lou Woyce, Dan Berger, Bill Clark, Tom Nichols, Dan Slowe, Bill Mattox, Skip Ambrose, Richard Fyfe and his Canadian collaborators, and Jim Weaver. To those not listed due to lack of space, our debt is no less great. And finally, our sincere thanks go to Bill Seegar, not only for his banding and recovery contributions but for manuscript review, support, and friendship.

LITERATURE CITED

- Enderson, J.H. 1969. Coastal migration data as population indices for the peregrine falcon. In Hickey, J.J. (ed). 1969. Peregrine Falcon Populations. Univ. Wisc. Press, Madison.
- Hunt, W.G., R.R. Rogers, and D.J. Slowe. 1975. Migratory and foraging behavior of peregrine falcons on the Texas coast. Can. Field-Nat. 89 (2): 11-123.
- Hunt, W.G., F.P. Ward, B.S. Johnson, C.M. Anderson, and G.P. Vose. 1980. A study of the spring passage of peregrine falcons at Padre Island, Texas, using radio telemetry. Unpublished report to the USFWS.
- Hunt, W.G., F.P. Ward, and B.S. Johnson. 1981. Peregrine falcon migrations: continuing studies. Unpublished report to the U.S. Army. 43 pp.
- Mattox, W.G. 1983. Greenland peregrine falcon survey 1983 field report. 27 pp.
- Newton, I. 1979. Population Ecology of Raptors. Buteo Books, Vermillion, South Dakota. 399 pp.
- Shor, W., 1970. Banding recoveries of Arctic migrant peregrines of the Atlantic Coast and Greenland populations. Raptor Res. 4(4): 125-131.
- Ward, F.P. and R.B. Berry. 1972. Autumn migrations of peregrine falcons on Assateague Island, 1970-71. J. Wildl. Mgmt. 36: 484-492.
- Ward, F.P., S.J. Belardo, and S. Williams. 1978. Report on 1978 spring migration studies of peregrine falcons at South Padre Island, Texas. Unpublished report to the USFWS. 5 pp.
- Ward, F.P., W.S. Seegar, M. Yates, K. Titus, and M. Fuller. 1985. Characteristics of the migration of peregrine falcons at Assateague Island, 1970-1984. Proceedings, International Peregrine Conference Twenty Year Anniversary Meeting, Sacramento, CA.
- Weise, B.R. and W.A. White. 1980. Padre Island National Seashore: A guide to the geology, natural environments, and history of a Texas barrier island. Univ. Texas, Austin, Bur. Econ Geology. 94 pp.

TABLE 1
NUMBERS OF PEREGRINES Banded AND RECOVERED
1955 - 1984*

	EAST COAST												GULF COAST				WISCONSIN	TOTAL
	MASS	RI	CT	NY	NJ	PA	MD	VA	NC	GA	FLA	TOTAL	AL	LA	TX	TOTAL		
TOTAL Banded	5	1	4	64	274	20	684	897	142	97	215	2,403	59	2	1,703	1,764	310	4,477
TOTAL RECOVERED	0	0	0	8	21	2	32	28	2	7	5	105	0	0	86	86	17	208
% RECOVERED	0	0	0	12.5	7.7	10.0	4.7	3.1	1.4	7.2	2.3	4.4	0	0	5.1	4.9	5.5	4.65

*1984 BANDING TOTALS INCOMPLETE

TABLE 2
**PEREGRINES Banded AS NESTLINGS AND
 RECOVERED ON THE EAST AND GULF COASTS
 JANUARY 1955 - JUNE 1985**

<u>ORIGIN</u>	<u>RECOVERED ON EAST COAST</u>		<u>RECOVERED ON GULF COAST</u>	
	<u>NO.</u>	<u>%</u>	<u>NO.</u>	<u>%</u>
GREENLAND	12	52.2	3	10.3
QUEBEC	2	8.7	0	0
KEEWATIN, NWT	3	13.1	2	6.9
FRANKLIN, NWT	1	4.3	1	3.5
MACKENZIE, NWT	1	4.3	4	13.7
ALBERTA	0	0	1	3.5
YUKON	2	8.7	1	3.5
ALASKA	<u>2</u>	<u>8.7</u>	<u>17</u>	<u>58.6</u>
	23	100.0	29	100.0

FIG. 1

RECOVERIES ON EAST COAST OF
PEREGRINES Banded ELSEWHERE
1/1955 - 6/1985



FIG. 2

RECOVERIES ELSEWHERE OF PEREGRINES
BANDED ON THE EAST AND GULF COASTS
1/1955 - 6/1985

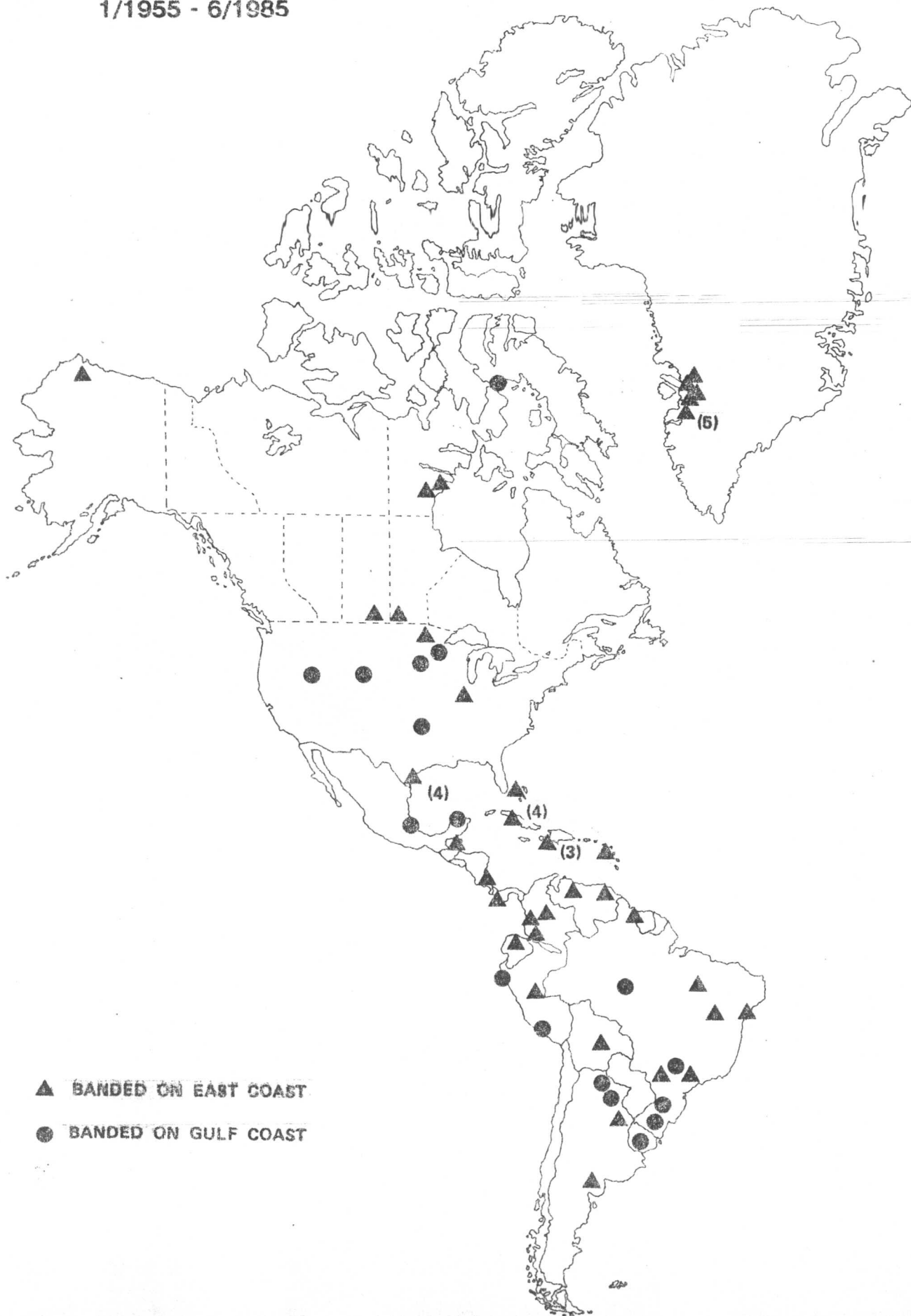


FIG. 3

RECOVERIES ON GULF COAST OF
PEREGRINES Banded ELSEWHERE
1/1955 - 6/1985



FIG. 4
PEREGRINES Banded in CANADA
AND RECOVERED SOUTH OF CANADA
1/1955 - 6/1985
(EXCLUDING MACKENZIE, NWT)



FIG. 5
PEREGRINES Banded in MACKENZIE,
NWT AND RECOVERED SOUTH OF CANADA
1/1955 - 6/1985



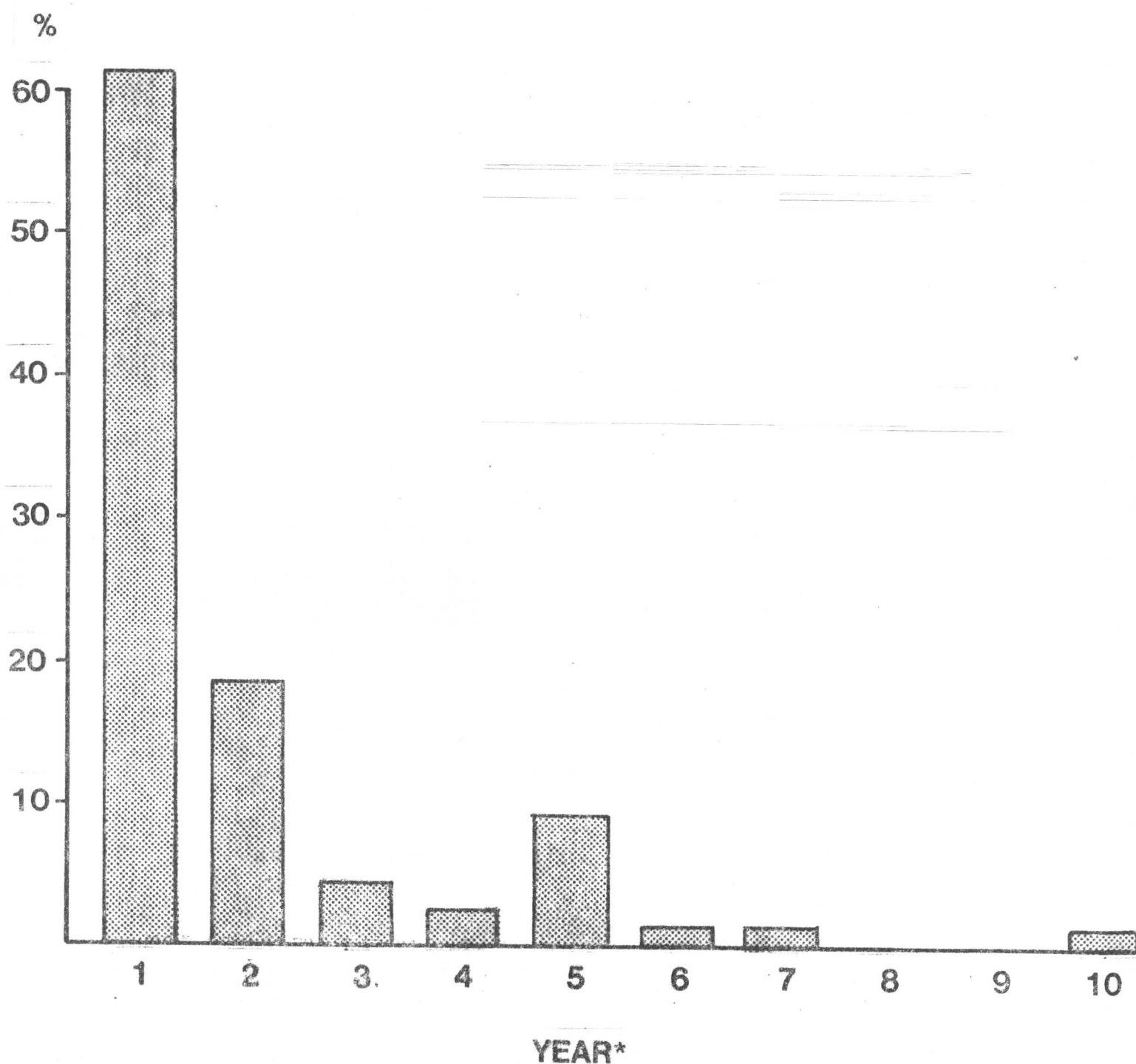
FIG. 6

RECOVERIES ELSEWHERE OF PEREGRINES
BANDIED IN WISCONSIN
1/1955 - 6/1985



FIG. 7

PEREGRINES Banded as Nestlings or Hatching-Year Birds and Recovered Dead (88 RECORDS)



*INDIVIDUAL IS CONSIDERED TO HAVE SURVIVED YEAR IF IT COMPLETES NORTHWARD MIGRATION TO BREEDING GROUNDS IN SPRING