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MIDWEST PEREGRINE FALCON RESTORATION, 1994 REPORT

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NOTICE: We are now using a new color banding scheme, part of a continental program. All peregrines banded in our area in 1994 got a bicolored band, black over red, on the left leg. Wild-produced birds got a purple anodized USFWS band on the right leg; hacked birds have a gold anodized USFWS band on the right leg. With this arrangement, we still can tell at first sighting whether a bird is hacked or wild in origin and whether the bird was banded as part of the Midwest project, since the purple and gold USFWS bands are unique to our area.

As in the past, some of the black/red bands have the lower (red) character on its side; these we show by using a star (*) to indicate the tipped-over letter or number, for example, 2/*E or H/*4. Last year we used a caret (^) instead of a star (*); the change was made to conform with the continental scheme.

Five females hacked in Kentucky in 1993 had the black/red bands put on inverted (red/black) to designate sex; please do not do this because it complicates reading bands in the field, already difficult enough.

INTRODUCTION

Weather in the Midwest was generally fine in spring and summer of 1994, in contrast to the foul weather in 1993. Peregrine Falcons (*Falco peregrinus*) responded by producing at least 116 young in the wild (including two augmented in Winnipeg); 95 were banded and 21 more were not because of remote locations or other logistical problems. An additional 48 captive-reared birds were hacked in our area, 15 by the Indiana DNR, three in Minnesota and six in Arkansas by the Raptor Resources Project, and 24 on the Lake Superior North Shore by the Ontario Ministry of Natural Resources, the Thunder Bay Field Naturalists, and the Canadian Wildlife Service.

Of the 699 hacked peregrines in our database to date, 298 (43%) were females, 401 (57%) males, significantly different from the expected 50:50 ratio. Of the 255 wild-produced banded young peregrines, 132 (52%) were females, 123 (48%) males, not a significant departure from 50:50.

Roughly 660 peregrines were released in the 12 years from 1982 through 1993, an average of 55 hacked birds per year; these releases and their progeny established the present population, which makes the production of 116 wild young in 1994, more than twice the annual average of releases, all the more impressive. The population should continue to grow at a substantial rate in the

next few years, before leveling off at carrying capacity, whatever that turns out to be.

Through 1994 in the Midwest, our records show 173 nestings (includes successful and failed nestings; defined by the laying of eggs), as follows:

Nest site	No. of nestings	Young fledged	Young fledged/nest	Nests failed
Buildings	97	224	2.3	15
Cliffs	52	67	1.3	15
Smokestacks	12	33	2.7	0
Bridges	12	24	2.0	3
Totals	173	348	2.0	33

From this sample, it appears that smokestacks and buildings are the most productive sites, cliffs and bridges least productive. In fact, the Cline Avenue bridge (actually a highway overpass) in East Chicago IN, makes the bridge sample look better than it really is, accounting for all but five of the bridge young.

At Cline Avenue: 6 nestings, 19 young fledged, 3.2 yg/nest, 0 failures. Over the past three years, female Egore 57V has fledged 13 young at Cline Avenue. Perhaps we should not count this site as a "bridge" since the young do not have to fledge over water, the chief hazard at typical bridge sites.

Also, cliff sites are more productive than shown above, because for nine of the 52 cliff nestings, we do not know the outcome; some surely fledged young.

How many pairs of peregrines are nesting undiscovered in the Midwest? Tom Cade guessed 10% for the East. In Minnesota, we think the open pits on the Iron Range are most likely to have undiscovered pairs. Walls of the pits range up to 400 feet and include sheer cliffs as well as unconsolidated slopes. Access is difficult because the pits are privately owned, fenced, and usually hold lakes that make it hard to get a look at the cliffs. One new pair (pair 12) was found on the Iron Range this year, while another pair (pair 52) either disappeared or, more likely, moved to an undiscovered new site. Next year we plan to survey the Iron Range by helicopter, hoping to equal the success of the helicopter surveys by the Thunder Bay Field Naturalists and Ontario Ministry of Natural Resources on the Lake Superior North Shore (pairs 37-42).

Undiscovered pairs may be anywhere, as suggested by an unbanded young male, fledged for perhaps a month or less and found with a broken wing, one mile north of New Ulm, Minnesota, on July 19, reported by John Schladweiler, MN DNR. New Ulm is about 300 miles from the nearest source of unbanded young that we know about, namely the 1994 brood at Hull Rust Mine, Hibbing, Minnesota. The New Ulm bird probably came from a nest within 50 miles of where it was found. One tends to think first of searching for undiscovered pairs on tall structures or cliffs, but the several nests of peregrines under bridge roadways in the Midwest should also be remembered.

Our banding data provide the basis for a mathematical estimate of the number of young produced in undiscovered nests in 1994, and thus an estimate of the number of undiscovered nesting pairs. Bruce Fall, General Biology program at the University of Minnesota, made the calculations. For those with a mathematical bent, his reasoning is given in an appendix at the end of this

report. Others may be satisfied with the outcome: Bruce calculates that four young were produced in undiscovered nests in 1994, which translates to two undiscovered nesting pairs, assuming two young per nesting pair. It is important to understand that the small sample sizes of unbanded breeders make the estimate of undiscovered breeding pairs vulnerable to small random changes. A conservative estimate is that the number of undiscovered pairs does not exceed eight and is not less than two (see appendix for details).

Some highlights of the 1994 season:

--At Cline Avenue at Lake Michigan, East Chicago, Indiana, five young were banded and fledged, a first for our region. Five egg clutches have been reported before, but not all hatched, much less fledged (pair 26).

--In Chicago, the number of nesting pairs jumped from two in 1993 to four this year, with still another new pair on territory but not nesting.

--From a nest under a highway bridge in St. Cloud, Minnesota, only about 40 feet above the Mississippi, one youngster landed in the middle of the river on his first flight, swam by flapping to a log, climbed aboard to rest and preen for about an hour, tried again to fly ashore, fell in once more, and finally swam to land. At last report he was doing well, with a little help from human friends (pair 8).

--At Palisade Head, Minnesota, we saw an apparent instance of overt siblicide, not previously reported for peregrines. The smallest of four chicks, about 16 days old, was bloody dorsally from its shoulders back from a multitude of small wounds presumed to have been inflicted by its nest mates. We removed the obviously doomed chick but it died within a few hours (pair 10).

--At the State Capitol in Madison, Wisconsin, male Calvin 48T lured in six females, at least four unbanded, but none stayed. At Froedtert Malt, Milwaukee, male Leopold C/D established a new territory and attracted no fewer than five females, in sequence. Some may have been Arctic-bound migrants, but number four was Tihehip 5/3, fledged wild in Chicago in 1993; she was driven out by an aggressive unbanded juvenile female in early May, who did not nest; she remained until early June (pair 54).

One disappointment was the disappearance for the breeding season of MF-1, the Minneapolis Multifoods Tower female who fledged 25 young from 1987 through 1993. See pair 44 for details.

1994 POPULATION STATUS

SUCCESSFUL BREEDING PAIRS

(Pairs fledging young)

1. Mayo Clinic, Rochester, Olmsted County, Minnesota. Male Chase 06T and female Minnsoar (Ariel) 75V both overwintered here and nested for the third year. Four eggs were laid by April 10 and four young, one male and three females, fledged around June 15. One young female was found dead on the Plummer Building, Mayo complex, in late July, according to Ted Bartel, Mayo. Excellent closed circuit TV coverage in the busy main Mayo concourse attracted much favorable attention.

2. North Central Life Tower, St. Paul, Ramsey County, Minnesota. Meg 12R again overwintered here and nested for the seventh year; her mate was Spanky 04T for the third year. Four eggs were laid by April 10, two, one each sex, hatched by May 14 and fledged around June 20.

3. NSP King Power Plant, Bayport, Washington County, Minnesota. Female Mae 31V again spent the winter here, as in past years. She paired with an adult male with a black band on his right leg, but not further identified; they had four eggs by April 15, hatched two young by May 15 and fledged a male and a female in late June.

4. Montgomery Ward, St. Paul, Ramsey County, Minnesota. Maverick 05T failed to return in spring after nesting four years here. Female Comet 11V returned for the fifth year. In early March, a new male, Jondalar 54Z, released in La Crosse in 1992, joined Comet, but was killed by a car while eating a pigeon on the shoulder of nearby I-94 on March 8. Comet remained on territory and, after a long wait, was joined on April 17 by a one-year-old male, Lindee 1/*A, who was fledged wild from the North Central Life Tower in St. Paul, only 3.5 miles to the east, in 1993. Lindee 1/*A is mild mannered, in contrast to the notoriously aggressive Maverick. By May 2, four eggs were being incubated, three hatched by June 6, and two females and a male fledged on July 16.

The Montgomery Ward tower, scheduled for demolition in winter, 1994-95, will apparently stand one more year; a nest box has been placed by the Raptor Resources Project on the Hamline Highrise, a tall apartment building often visited by the Montgomery Ward peregrines, one-half mile to the north.

5. Colonnade Building, Hwy. 100 and I-394, Minneapolis, Hennepin County, Minnesota. The same peregrines, four-year-old female 81V and five-year-old male 31T, nested again in the box on the 15th floor ledge on the northeast corner of the building. Male 31T wintered here again; both adults were seen at the nest box in early March, but female 81V was also seen with Will 04Y in the Multifoods Tower nest box, 4 miles to the east, on two days in early March, just before MF-1 returned (see pair 44). Four eggs laid in the Colonnade nest by April 20 all hatched by May 22. All four young fledged between June 28 to July 2, but one was killed colliding with the glass building within a day of fledging. Another was found dead on September 9 in nearby Edina, Minnesota, poisoned by Fenthion, active ingredient in the commercial product "Rid-A-Bird," according to the USFWS Madison lab. Both Colonnade adults were seen near the building on October 16.

6. NSP Blackdog Plant, Eagan, Dakota County, Minnesota. Male 55X, fledged wild from the Montgomery Ward Tower, St. Paul in 1991, was back for the second year, paired with a new female, 90R, augmented to a wild brood at NSP Sherco, Becker, Minnesota, in 1992. Three young were fledged around June 28.

7. NSP Sherco Plant, Becker, Sherburne County, Minnesota. Dan Orr, NSP biologist, reports that female 36R, back for the third year, paired with a new male, 79Z, fledged wild in 1992 from the Montgomery Ward Tower, St. Paul, Minnesota. They produced four eggs, hatched three on May 24, and fledged two males and a female around July 5. Later in the summer, the young female was found dead in a building at the plant.

8. University Bridge, St. Cloud, Stearns County, Minnesota. Peregrines were seen in this vicinity in 1992 and 1993, but the first evidence of nesting came in early April, 1994, when Al Grewe and his students at St. Cloud State University saw courtship and copulation between two falcons obviously attracted to the highway bridge. After many hours of watching, Kent Sundseth identified the male, St. Pauli Boy 76Z, fledged wild from the North Central Life Tower, St.

Paul, Minnesota, in 1992. Jeff Loso read the band on the female, Olivia 26R, fledged wild from the Multifoods Tower in Minneapolis, Minnesota, in 1991. By April 28, the peregrines seemed to be incubating on the top of a bridge pier under the roadway, out of sight from either bank of the Mississippi River.

Two male young were banded by Bob Anderson and Pat Redig on June 20 with the help of a "snooper" (like a "cherry-picker" but goes down and under rather than up) provided by the Minnesota Department of Transportation, thanks to Steve Cavanaugh and Steve Foss. Anderson reports that the scrape was on an old pigeon nest only about 40 feet above the river. According to Grewe, one young fledged on June 30, landing in the middle of the river on an early flight. It swam to some logs, climbed aboard, preened and rested for more than an hour, again fell in the river attempting to fly ashore, and this time swam to land, where Grewe placed it in a box on a nearby SCSU building, from which it fledged successfully. Grewe reports that the distance swum by the young falcon, across a good current, is more than 800 feet! No one knows what happened to the second youngster, but a good guess is that it drowned while fledging. The bridge piers rise clean from the water, providing no perch and making the first flight of young peregrines very hazardous. The bridge supports many nesting pigeons and Cliff Swallows.

9. Bong Bridge, Duluth, St. Louis County, Minnesota. For the fifth year, peregrines were present here. Bong female 34R nested for the fourth year, paired for the second year with male Pagan 22Y, hatched at the Rouchleau Pit, Virginia, Minnesota, in 1987. Pagan's presence here in 1993 is based on a partial reading then of the black band on his left leg, silver right (reported erroneously in the 1993 report), although Dave Evans did not fully read the black band until 1994. One young survived to banding on June 9, but was not seen by Evans on a visit to the bridge in late June. Its fate is unknown.

10. Palisade Head, Lake County, Minnesota North Shore. Dudley Edmondson identified female Fridge 43R, seventh year here, and male Demaray 71X, second year. The nest, not visible from above, was in a new place, a ledge at the northeast end of the palisade. In her seven years, Fridge has moved to a new ledge after two years, two years, one, one, and one. No old nest ledge has been reused, once abandoned. Four young were produced in 1994. When banded on June 17, one was bloodied dorsally from the shoulders back, apparently picked by its siblings. We removed it from the brood to rescue it, but it died within a few hours. Overt aggressive siblicide in peregrines seems not to have been previously reported, although death by starvation as a result of intrabrood competition is routine. The remaining three young fledged in early July. Laurie Walewski and Peter Smerud, Wolf Ridge Environmental Learning Center, Finland, Minnesota, did the climbing to the Palisade nest ledge and at Finn Church cliff, next pair.

11. Finn Church cliff, 2 miles northeast of Tofte, Cook County, Minnesota. Algoma 77V and an unbanded male, probably her mate from 1993, nested here for the second year. Tordoff found the nest with four small young on June 4; these were banded on June 17 and presumably fledged in early July.

12. Hull Rust Mine, Hibbing, St. Louis County, Minnesota. Norman and Delores Ebert first found this pair in April, noting courtship feeding. After much searching, they located the nest on June 22, when whitewash below the nest on the cliff became conspicuous. Four young, two of each sex, fledged between June 25 and 30. On July 9, Dave Evans, Jim Goin, the Eberts, Jeff Tordoff, and Bud Tordoff trapped the adult male, 39T, hatched at Hill Annex Mine, Calumet, Minnesota, in 1989. The Eberts think the adult female has a silver band on her right leg, but she was not seen on July 9. The young were not banded.

The Hull Rust Mine is a huge open-pit mine, about three miles by two miles, with many cliffs, a lake, and difficult access. It is likely that this is not a first nesting by these adults, considering the age of the male, successful fledging of four young, and the early timing of the nesting effort. Many other old mine pits on the Iron Range offer suitable cliffs. Search by helicopter is probably the most efficient way to locate additional pairs and we plan to try this next year.

13. Minnesota Power and Light Boswell Energy Center, Cohasset, Itasca County, Minnesota. Daryl Councilman, MPL, reports that the same pair, female red X/H, hatched at Nipigon, Ontario, in 1991, and male 74X, fledged wild at the Rouchleau Pit, Virginia, Minnesota, 1991, nested for the second year, fledging three male young in early July. Hatching was in early June.

14. Firststar Center, Milwaukee, Milwaukee County, Wisconsin. Greg Septon reports that female Sibella 20V, sixth year at this site, and male Bill 74T, fourth year, produced four eggs by late March, hatched all four by April 28, and fledged two males and two females the first week of June. One young female was killed a day after fledging. Another youngster broke its coracoid, and is recovering at The Raptor Center. Sibella has produced 20 young (two augmented) in six years, six with McArthur 03Y and 14 with Bill 74T, and is still going strong. If she lives at least two more years, she is a good bet to beat MF-1's record of 25 fledged (five augmented) at the Minneapolis Multifoods Tower.

15. Edgewater Generating Station, Sheboygan, Sheboygan County, Wisconsin. The third year of nesting at this site was by the same pair, five-year-old female Silverstreak 42V and four-year-old male Max 70T, according to Greg Septon and Jim Marks. Four eggs were laid by April 14, all hatched, and three young, two males and a female, fledged in late June.

16. Landmark at the Lake, Milwaukee, Milwaukee County, Wisconsin. At this new site only a mile from the Firststar Center, the female, an adult, is unbanded and the male is Omni 76T, hatched in Madison, Wisconsin, in 1990, reports Greg Septon. Four eggs were laid by May 7, three young, two males and a female, fledged around July 18. One young was found dead on June 20.

17. Book Building, Detroit, Wayne County, Michigan. Judith Yerkey, Detroit peregrine coordinator, reports that four-year-old female Judy red AD paired again with three-year-old male Pop, for the third year. Again, both adults over-wintered in Detroit. Four eggs were laid in early April, three young, two males and a female, hatched May 9 to 11, fledged on June 20, and dispersed in the first half of August. One young male was found injured at Temperance MI in early August, treated at TRC, released in Detroit on September 9, gone on September 10. Judy read the black USFWS band on Pop in December 1994; he was fledged wild from the Gulf Tower, Pittsburgh PA, in 1991 (see pair 55 for the other wild-produced bird from this nest site to come to Detroit).

18. Porcupine Mountains Wilderness State Park, five miles west of Silver City, Ontonagon County, Michigan. Peregrines have nested here for five years. Joe Rogers reports that this year at least two young were fledged; Joe was able to band one just before it flew, the first banded at this site. The adult female has a black band on her left leg, silver right, indicating origin by hacking; the adult male's identity is unknown.

19. Pictured Rocks National Lakeshore, near Munising, Alger County, Michigan. In 1993, peregrines were seen here in May, but shifted to Grand Island where they may have nested (see pair 43, below). In 1994, a pair nested

near the hack site used in 1989 and 1991, and fledged two young, one of which was found dead after fledging. The adult female is 29W, hacked in 1992 at Grand Island, Michigan; the male was unidentified. The National Park Service judged the nest site as inaccessible and the young were not banded.

20. Woodman Tower, Omaha, Douglas County, Nebraska. John Dinan and Ross Lock report that new adults were here this year, female 84R, released in Kansas City in 1992, and male 54T, released in Omaha in 1989. Female 84R gained the territory by killing previous occupant female 33R in a battle on March 29. Three eggs were laid by May 17, three hatched near June 18, but only one survived to fledging, a female.

21. Firststar Bank, Cedar Rapids, Linn County, Iowa. Laura Jackson, IA DNR, reports that female 49R nested for the second year, again with a male wearing a black band on the left leg, probably the same male that was here in 1993 but the band has not yet been read. They produced four eggs, hatched four young by May 21. One female died at about 20 days in the nest; one female and one of the two males fledged the last week of June. The other male was pulled, treated for frounce, and released to join his siblings on July 5.

22. American Republic, Des Moines, Polk County, Iowa. Laura Jackson sent this summary: a pair of adult falcons nested for the third year at this site. Both wore black bands on the left leg, indicating release by hacking in the Midwest. The male was 93_; the female may have been the same bird (13R) that nested here in 1993 and wintered in Little Rock, Arkansas, but this is uncertain. On April 18, an egg rolled off an unmodified ledge on the east side of the building and the pair abandoned the nesting attempt. It was later discovered that there were three additional eggs in two separate cubbies on the east side of the building.

After two weeks, the birds then moved to the same modified ledge on the west side used in 1993, where they hatched three young around June 4 and fledged two males and a female during the week of July 11.

23. 125 S. Wacker, Chicago, Cook County, Illinois. The oldest female peregrine in the Midwest, Harriet, released in Minneapolis in 1985, and the oldest male, her mate Jingles, released in Chicago in 1986, are still going strong. This is Harriet's eighth year nesting at this site and the sixth year for Jingles. They produced four eggs in late March, hatched three young by May 2, and fledged all three, two males and one female, around June 10, according to Mary Hennen.

24. Hyde Park, Chicago, Cook County, Illinois. Mary Hennen reports the first nesting at this site, after intermittent occupancy of the territory since 1990. The female is 22R, hacked in La Crosse, Wisconsin, in 1991; the male, an adult, has a black band on the right leg, 7_T, silver left. They produced three eggs in early April, one hatched, and one young fledged, a female, on June 25.

25. 5821 Broadway, Irving Park, Cook County, Chicago, Illinois. This territory also has a history of occupancy but no known nesting for several years. Mary Hennen reports that female 2/8, a one-year-old augmented in 1993 at Edgewater Generating Station, Sheboygan, Wisconsin, paired with an adult male 95T, hacked in Cedar Rapids, Iowa, in 1990, laid three eggs by mid-April, hatched two and fledged two female young in late June, a fine start for a new pair with a young female. Not named earlier, these two adult peregrines have been dubbed Eleanor and Franklin by observers at the site.

26. Cline Avenue at Lake Michigan, East Chicago, Lake County, Indiana. John Castrale, Indiana DNR, reports five young were fledged from this site, a record for the new Midwest population. Female Egore 57V and male Marty 53Z (identified by reading '53' on the black band plus enough of the FWS band to clinch it!) had three eggs by March 29 and five young by May 20. The young, two males and three females, fledged in mid-June.

This is the third year at this site for Egore 57V, the first for Marty 53Z, fledged wild at NSP King Power Plant, Bayport, Minnesota, in 1992. The site has been occupied for six years. The male here in 1993 was found injured, later died, near the site on March 24, 1994; he was Kennicott 88T, hacked in 1990 at Glen Ellyn, Illinois; his black band was reported in the 1993 report as either '58Y' or '58T', now corrected.

27. U.S. Steel, Gary, Lake County, Indiana. The same pair, female Suzy Q 52P and male Vulcan 79T, nested again, the fifth year for the site and for Suzy Q, the second for Vulcan. They had no eggs March 25, two on the 28th, three on the 30th and 31st; three hatched by May 6, and three young fledged, two males and a female, in mid-June. A fourth egg was retrieved on May 13.

28. Commodore Perry Motor Inn, Toledo, Lucas County, Ohio. Peregrines have nested on this vacant building for seven years; female red 3C7 for the entire time, but with at least three different males. The 1994 male apparently had a black/red band on its left leg and is definitely not Solo 20Y, who was here in 1991 and 1992. Mark Shieldcastle thinks there may have been a different male here in 1993, based on behavior but has no confirming identification. Three young fledged, unbanded because access to the building is prohibited. Bill Roshak, Ohio DNR, furnished this report.

29. Terminal Tower, Cleveland, Cuyahoga County, Ohio. Sara Jean Peters and Steve Wilcox, Ohio DNR, report some domestic drama. Male Szell 67Z returned for his sixth year, second nesting with female Zenith 23W, his mate of 1993, now two years old. Two adults were seen on February 2, suggesting that Szell and Zenith both overwintered here. In late March, female Sunrise 55R moved in, presumably during a temporary absence of Zenith. Sunrise, originally hacked in Cincinnati in 1991, was in Detroit in 1993; Judy Yerkey reported her in Detroit on March 21, 1994, then she was seen by Sara Jean Peters in Cleveland from March 24 to March 31, when her band was read. A major territorial battle occurred on April 2, probably the date of Zenith's return from her sojourn. Both females locked talons at the nest ledge, then fell struggling to a fourth floor roof, leaving Sunrise, who dropped a soft-shelled egg in the fracas, able only to fly weakly. She recovered, left town, and was seen again back in Detroit by April 12, according to Judy Yerkey (see pair 46 for the rest of Sunrise's season).

Szell and Zenith produced four eggs by about April 22, all four hatched around May 27, and four males fledged around July 8.

30. Rhodes State Office Tower, Columbus, Franklin County, Ohio. Female Aurora red C/3 returned for the second year, paired with a new male, unbanded. They had three eggs by April 14, hatched all three around May 16, and fledged three female young around June 28, according to Dan Huss.

31. 535 S. Kansas Avenue, Topeka, Shawnee County, Kansas. Jerry Horak, Kansas Department of Wildlife and Parks, reports nesting at this site for the second year. Female 28R, released at Des Moines IA in 1991, paired again with male 56Z, released at Kansas City MO in 1992, producing four eggs; three hatched around May 14 and two females and a male fledged around June 25. One female was found dead after falling from the nest ledge; she had obviously been ill and was behaving abnormally. The other female fledged, but was lethargic, unresponsive,

and was captured and taken to Kansas State University where it died from an oral infection. The initial problem for both birds was probably frounce. The young male thrived. Joanne Brier keeps daily track of these birds.

32. Southwestern Bell, St. Louis, St. Louis County, Missouri. Walter Crawford reports that the same pair, the female now four years old and the male five, nested for the fourth year, producing three young from four eggs. One young died from frounce, two fledged around June 6 but one of these, a female, died in a building collision nine days later.

33. Park Plaza, St. Louis, St. Louis County, Missouri. Female 2/3 paired again with male 93T, producing four eggs by April 29; one egg disappeared and ultimately one young male fledged in June, according to Mike Cooke.

Robert Nero supplied the following information on Manitoba falcons with a U.S. connection.

34. Delta Winnipeg Hotel, Winnipeg, Manitoba. Male red 5P9 paired again with female 52V, hacked in Cedar Rapids, Iowa, in 1989, the sixth season for him, the third for her. They fledged four young, one augmented.

35. Mary Speechly Hall, University of Manitoba, Winnipeg, Manitoba. Five-year-old male black 1/X, son of Maud and grandson of MF-1, paired for the third year with female red E/H; they fledged four young, one augmented.

36. McKenzie Seeds Building, Brandon, Manitoba. Male red 7/3, released in Brandon in 1991, paired with female black O/B, 1991 daughter of Maud, granddaughter of MF-1; they fledged four young.

Ted Armstrong, Ontario Ministry of Natural Resources, and Harold Kish and Nick Escott, Thunder Bay Field Naturalists, reported the following six territories in Ontario north of Lake Superior, surveyed by helicopter.

37. Pie Island #1. Three young, unbanded, near the 1993 nest site, June 30.

38. Pie Island #2. One young, unbanded, June 30. New nest site, 1994.

39. Sibley Peninsula. Three young, unbanded, June 30.

40. Mt. McKay, near Thunder Bay. Two young, unbanded, June 30. New nest site, 1994.

41. Lake Superior Park, east end of Lake Superior. Two young, unbanded, June 11. Near 1993 nest site.

BREEDING PAIRS, OUTCOME UNKNOWN

42. Nipigon River, Ruby Lake. One adult seen in helicopter survey, nest not located. This is the fourth year this territory has been occupied, but nest establishment or nesting success is not known for any year.

43. Grand Island, north of Munising, Alger County, Michigan. Over 14 miles of lakeshore cliffs make this island in Lake Superior difficult to survey. Joe Rogers spent three days here by kayak and six days bushwacking. He repeatedly saw both male and female adult peregrines and is confident he found a nest site used in 1993, but was unable to determine possible nesting outcome in 1994.

UNSUCCESSFUL BREEDING PAIRS

(Eggs laid, no young fledged)

44. Multifoods Tower, Minneapolis, Hennepin County, Minnesota. After seven consecutive successful nestings, MF-1 (Muffin) faltered, then disappeared. Her mate was Will 04Y, for the sixth season. In 1993, MF-1 laid late and in a peculiar pattern, with a week between eggs 2 and 3. This year, she was gone for a period in late winter. The Colonnade female 81V visited the Multifoods box on at least two days in early March and was courted by Will. MF-1 returned, took over, and laid three eggs April 14 to 24. She incubated sporadically until April 30, appearing much less interested in the eggs than in earlier years. She was not seen after April 30, despite regular checks of the nest, until November 25, when she reappeared in the box; her whereabouts over the summer are unknown. In her career thus far, MF-1 has fledged 20 young of her own and five more augmented. She has descendants nesting in at least seven places in 1994.

A new unbanded female, very buffy, almost chestnut, on her face, breast, and belly, appeared at the box on April 29. The new female courted Will, who remained committed to incubating the eggs. As he sat, she would enter the box, bow, and ee-chip in his ear. Once when he left the eggs, she looked at them intently, stepped over them as though to settle on them, but then began to scrape, kicking the eggs around in the process. After a couple of days, it became clear that Will was not up to the job alone, so we removed the eggs on May 3. All were dead. The new female remained on the territory until May 9, after which the box was not known to have been visited by any adult until autumn. In October, adult peregrines were seen around the Multifoods Tower on several occasions and on November 25, MF-1 was in the nest box, as noted above.

On July 27, we learned that two peregrines had been seen regularly for about two months at the Minneapolis City Hall, an old stone building with one tower about 12 stories tall and a clock tower about 20 stories tall, about six blocks from the Multifoods Tower. Tordoff read the male's band; he is Will 04Y; the female, an adult, is unbanded and very buffy on the face and underparts, certainly the same female that was with Will at the Multifoods Tower in May. If they attempted to nest at City Hall, the nesting failed. Both birds remained strongly attached through August to the smaller of the towers, which has lots of nooks and cubbyholes for potential nest sites. Robert Davis keeps an eye on the birds at City Hall; he saw a male peregrine and the buffy female there as late as October 18.

45. Blatnik Bridge, Duluth, St. Louis County, Minnesota. Dave Evans reports that the same pair as in 1993, male red 6P3 and female 85R, were present. He is eight years old, she is two. They produced two eggs on a girder on a part of the bridge scheduled for sand-blasting and painting as part of a major renovation. We removed the eggs, hoping to hatch them artificially, but all died in transit. The pair apparently did not attempt to reneest, or if they did, they failed. They remained on territory the rest of the season. The 1994 nest site is actually a few yards in Wisconsin, but the adults center their activities around a cement silo on the Minnesota end of the bridge. Last year they were attached to a site on the bridge on the Minnesota end. To simplify our records, we will record them as Minnesota birds unless they move their territory eastward.

46. Detroit Edison Connor Creek Power Plant, Detroit, Wayne County, Michigan. After female Sunrise 55R returned from her unsuccessful foray to Cleveland by April 12, she moved to this site, about five and a half miles east of the Book Building, and paired with male Solo Jr. 92R, fledged wild from the Commodore Perry Motor Inn, Toledo, Ohio, in 1992. They nested in the top of an

abandoned coal conveyor, out of sight from the ground. From their behavior, Judy Yerkey concludes that they laid eggs by May 2, hatched them around June 6, and lost the brood to extreme heat and humidity on June 15.

47. Trap Hills, Bergland, Ontonagon County, Michigan. For the fifth year, peregrines nested here. Joe Rogers reports that the first effort failed; apparently no renesting was attempted.

48. Wacker and Michigan, Chicago, Cook County, Illinois. This new pair, the "river pair," appeared in April, laid three eggs by late April, but lost them in a rainstorm in early May. Mary Hennen reports that a box has been put up for them for future use. The male is unidentified; the female has a black band on her left leg, _2V, silver right.

49. Kansas City, Jackson County, Missouri. John Meyer reports that an unidentified pair laid three eggs on a projecting roof top by April 26, but lost them in a thunderstorm on May 1. There are eight nest boxes in the Kansas City area and four falcons hatched in Kansas City are nesting in other states.

50. Springfield, Sangamon County, Illinois. Vernon Kleen, IL Department of Conservation, reports that an unidentified female and male 40X, released in Kansas City, Missouri, in 1991, laid two eggs by April 15. The nesting failed when washed out in a rainstorm on April 20.

51. PNC Building (renamed, formerly Central Trust Tower), Cincinnati, Hamilton County, Ohio. Denis Case reports that three-year-old female Falcar 57R from Indianapolis and four-year-old male Falcor 29X from Cincinnati, both back for the second year, produced four eggs by May 3. The nest failed by June 9, possibly because of disturbance during building maintenance.

NON-BREEDING TERRITORIAL PAIRS

52. Rouchleau Mine, Virginia, St. Louis County, Minnesota. Jerry McHugh and Jeff Lightfoot, MN DNR, report that peregrines were present at the old cliff hack box by early April, but were not seen again. Probably the pair moved to a new site somewhere in the vicinity, but we have no proof of this.

53. Wolf Ridge Environmental Learning Center, Finland/Lake Superior north of Kennedy Creek, Lake County, Minnesota. Two adult peregrines were at Kennedy Creek in April, when Dudley Edmondson saw a green band on the male's left leg, presumably the male here for the past three years. He was not able to identify the female, but Tordoff saw her well on June 4; she matches the sketches of Blueberry 20P made here in past years. Both adults were present at Kennedy Creek on June 4, but the site appeared abandoned on June 17. Peter Smerud said that two peregrines were present and very vocal at nearby Wolf Lake, WRELC, for several days prior to June 17. The old raven nest used by the falcons at Kennedy Creek has now disappeared.

54. Froedtert Malt, Milwaukee, Milwaukee County, Wisconsin. Male Leopold C/D, released in Kenosha, Wisconsin, in 1992 and seen there in 1993, established a territory in early spring and attracted at least five females in sequence. Some may have been migrants headed for higher latitudes, but the fourth was Tihehip 5/3, fledged wild in Chicago in 1993; she was replaced by another juvenile, an aggressive unbanded female, in early May. This bird remained until early June but did not nest.

55. Fisher Building/New Center, Detroit, Wayne County, Michigan. Judy Yerkey reports that male Cuyahoga 04N, hatched in Akron, Ohio, in 1992, paired with female b/r 6/H, wild-produced in Pittsburgh, Pennsylvania, in 1993, at this site, held by Sunrise 55R in 1993. No eggs were laid, but the pair remained into August. In late August, a new male appeared after Cuyahoga was last seen on the 17th. The new male, 27T, hatched at Rouchleau Pit, Virginia, Minnesota, in 1989, was identified by Judy Yerkey on August 31; his five-year-old black band was worn and barely readable. Female 6/H (color band on right leg and upside down, thus looking like r/b H/9) was still present on September 12.

56. Monroe Edison Power Plant, Monroe, Monroe County, Michigan. Judy Yerkey reports an adult male, black band right, silver left, and a one-year-old female, red right, silver left, were found here in the first week of May, but not reported to her until mid-June. Their behavior indicates pairing, but no nesting was attempted. They were last seen July 15.

On August 30, a male, right red 3/W, hatched at Maple, Ontario, in 1992, was found here stunned from colliding with a building; he died at The Raptor Center on September 2.

57. Lakeview and Irving Park, Cook County, Chicago. This is a new pair; neither adult is yet identified. They did not nest in 1994, according to Mary Hennen.

58. South Bend, St. Joseph County, Indiana. John Castrale reports Patriot 31Z, released in Indianapolis in 1991, injured and rehabilitated at TRC and released in 1993 at South Bend, remained all winter and on two occasions was seen in flight with an adult female. He was not reported after late May. Male Harmony 2/*5, also hatched in South Bend in 1993, appeared on March 15 and was seen through late July. There was no evidence of nesting.

59. Akron, Summit County, Ohio. Sara Jean Peters reports that juvenile female Buckeye 3/1, hatched in Akron in 1993, was present all season; she was joined by an unidentified adult male on May 31. The pair was still present in July.

60. Lazarus Building, Dayton, Montgomery County, Ohio. David Graham, Ohio DNR, reports that female 7/D, fledged wild in 1993 from the USF&G Building, Baltimore, Maryland, paired with male Mercury 21X, who nested here in 1993. They did not nest. A female, S/E, was found dead here on April 26; she was hatched in Lexington, Kentucky, in 1993.

61. Gold Coast, Cleveland, Cuyahoga County, Ohio. Peregrines present here off and on all season; status not known.

62. Metro Health, Cleveland, Cuyahoga County, Ohio. A pair was present here early in the season, but their status is not known, according to Steve Wilcox, Ohio DNR.

SINGLE TERRITORIAL FALCONS

63. NSP Monticello Plant, Monticello, Wright County, Minnesota. One peregrine was here early in the season and a second was also seen on a couple of occasions, but no bird was present as regularly as in 1993, according to Dan Orr, NSP biologist.

64. La Crosse, La Crosse County, Wisconsin. Pat Skewes, Wisconsin DNR, reports that Libby 2/2, who nested here unsuccessfully in 1993, returned on May 23 but did not attract a mate. She was still present until about August 23.

65. State Capitol Building, Madison, Dane County, Wisconsin. Tim Ellestad says that the male Calvin 48T returned on April 23. As in 1993, he attracted a series of females, six this year, at least four unbanded; none stayed. Calvin's problem seems to be a late return from wherever he winters. He arrives after most other peregrines in the region are already nesting. He then lures in females bound for higher latitudes, who are ready to accept courtship feeding and even to copulate, but not to stay. He was seen by Ellestad in early October.

66. Davenport, Scott County, Iowa. Although a peregrine wintered in town, no birds attempted to nest.

67. Indianapolis, Marion County, Indiana. Female 7/*3, hatched in Lexington, Kentucky, in 1993, appeared in downtown Indianapolis on March 23, 1994 and stayed through October, according to John Castrale. At least two other peregrines were seen from time to time, none positively identified.

SUMMARY OF PEREGRINE NESTING IN 1994

Summing up the natural breeding in 1994, 62 pairs were known to be on territories, 51 pairs (82%) laid eggs, 41 pairs (78% of the nesting pairs) were successful in fledging 116 young (including two augmented in Winnipeg), 2.8 young per successful pair, 2.3 per nesting pair, 1.9 per territorial pair.

Of the 62 territorial pairs, 15 (24%) were on cliffs, 38 (61%) were on buildings, five (8%) on smokestacks, three (5%) on bridges, and one (2%) under a highway overpass. Twenty-four of the 38 building pairs succeeded, as did the highway pair. One bridge pair fledged two young, one may have fledged one, and one failed. The four smokestack pairs fledged 11 young. Of the 15 cliff pairs, one failed, 12 are known to have succeeded, and the outcome is unknown for the other two. Of the 116 young known fledged in the wild, all were banded except four at Hull Rust Mine, Hibbing, Minnesota, one at Porcupine Mountains, Michigan, two at Pictured Rocks, Michigan, three at Toledo, Ohio, and 11 at the five western Ontario eyries. Additional unbanded young may have been fledged at Grand Island, Michigan, at Nipigon River, Ontario, and, of course, at unlocated nests.

PEREGRINE RELEASES IN 1994

Two young were fostered to wild broods in Winnipeg, Manitoba. Both fledged successfully and are counted in our totals as "wild-produced."

Minnesota

Fifteen miles east of Ely, Lake County. Three male peregrines were released by the Raptor Resources Project in August. All became independent successfully.

Indiana

Evansville. John Castrale reports that 15 young peregrines (plus Screech 2/*L, released in South Bend in 1993, injured and rehabilitated at TRC) were

released by the Indiana DNR. All survived; by mid-September, seven remained in downtown Evansville.

Arkansas

Little Rock. Six falcons, three each sex, were supplied by the Raptor Resources Project for release here by the Arkansas Department of Natural Resources; all survived to independence.

Ontario

North Shore of Lake Superior. Twenty-four peregrines from the Canadian Wildlife Service were released by the Ontario Ministry of Natural Resources along Lake Superior: 12 on the Sibley Peninsula with the help of the Thunder Bay Field Naturalists, and 12 at the east end of the lake near Sault Ste. Marie, according to Ted Armstrong, Ontario MNR. All survived to independence.

The Minnesota and Arkansas releases were arranged independently by Robert Anderson, Raptor Resources Project; the banding data are, however, in our data base.

To sum up production for 1994 in the original Midwest area, 116 young were fledged by wild pairs and 42 young were released from captive pairs, for a total of 158. Of the 42 hacked young, all lived to independence, a remarkable record! In Arkansas, six young peregrines were hacked; again, all survived to independence.

GENETIC ANALYSIS

We continued collecting blood in 1994 from all released young (except those sent to Arkansas) and from all wild young banded, and from wild breeders not previously sampled. The goal is to measure inbreeding, outbreeding, genetic variation, changes in occupancy of territories, dispersal of adults and young, success of the different genetic stocks introduced, and long-term development of genetic structure in the new midwestern population. No new laboratory work was done in 1994; the blood specimens have been added to the permanent tissue collections at the Bell Museum of Natural History, University of Minnesota, where they remain available for genetic and other analyses in the future.

PLANS FOR 1995 AND BEYOND

The 62 territorial pairs in 1994 are nine more than in 1993, a 17% increase, and 22 more than the regional goal set in 1988. Here is what we said in the 1989 report (p.11): "A reasonable prediction for the Midwest might be 20 to 22 pairs in 1990 [it was actually 23], 26 to 30 in 1991 [actually 30], 32 to 36 in 1992 [37], with the goal of 40 pairs reached in 1993 [53] or 1994 [62]." Production of wild young jumped from 76 in 1993 to 116 in 1994, an increase of 53%. The number of young fledged in the wild has been roughly doubling every two years. Clearly this rate of increase cannot continue for long, but a steady annual output of 150 wild young may be reached in a few years. The absence of pairs on the cliffs of the Mississippi and its tributaries remains a major disappointment, but even here there is hope. According to Tom Cade, in the East this year, a pair of peregrines nested on a cliff in a rock quarry near Storm King Mountain in the lower Hudson Valley, the first recent nesting on a cliff in New York south of the Adirondacks. Maybe this is a first step to regaining the lowland river cliffs from Great Horned Owls.

It seems likely that every tall structure and probably every substantial cliff in the Midwest will be visited by peregrines in the next few years, as the birds locate and occupy viable nesting sites. Already we are beginning to see the stability of nesting territories typical of established peregrine populations, as in the Twin Cities of Minnesota where peregrine territories have changed very little over the past several years. Old birds die, young birds replace them, and the territory lives on. Early on, a lot of one-year-old peregrines nested; now most breeders are adults and so are most replacements and birds establishing new territories.

Production and survival of young now is substantially more than needed merely to replace lost breeders, but new territories are being established only at a moderate pace (17% increase from 1993 to 1994, for example). The likely outcome is that the population of non-territorial birds will grow, leading to quicker replacement of lost breeders, usually by adults, and increasing difficulty for one-year-old birds to compete for territories. Within a decade, the peregrine population should be close to carrying capacity for the region, with a substantial population of non-breeders waiting for their chance; in other words, a typical healthy population of Peregrine Falcons. Last year we predicted an eventual stable population of 75 to 100 pairs for the Midwest, closer to 75 if the river cliffs remain vacant, closer to 100 if the cliffs are retaken from the owls. Maybe this prediction is too conservative, as were our predictions about rate of population growth.

Our major immediate tasks remain the same. We must try to:

- Identify all breeders.
- Band all wild young produced.
- Collect and analyze blood from all young produced.
- Manage city pairs so that production of young, enthusiastic cooperation of building managers, and public appreciation of the falcons are all fully enhanced.
- Try to find effective ways to help peregrines re-establish themselves on the river cliffs and on suitable cliffs elsewhere in the region.
- Collect, coordinate, and circulate information among the Midwest peregrine workers through reports, meetings, and regular informal contacts.

ACKNOWLEDGEMENTS

The Midwest Peregrine Project is a cooperative effort involving many people and organizations. The University of Minnesota provides the overall coordination and administration of the project through Dr. Pat Redig of the Raptor Center and Dr. Bud Tordoff of the Bell Museum. Financial and logistical support for the Minnesota part of the effort is provided by Minnesota DNR Nongame Wildlife Program, Minnesota DNR Parks and Recreation, Endangered Species Office and Minnesota Cooperative Fish and Wildlife Research Unit of the U. S. Fish and Wildlife Service, U.S Forest Service, Minnesota Falconers Association, Iron Range Resources and Rehabilitation Board, Wolf Ridge Environmental Learning Center, Mayo Clinic, Northwest Airlines, BCED Minnesota, and The Shelard Group. Each cooperating state and agency has, in addition, its own list of cooperators. Falcons are obtained from private falconer/breeders, listed in the appendix. Falcons were supplied through us to the Indiana releases on a contract basis. The day-to-day devoted care that makes hacking falcons successful was provided by the hack site attendants listed in the hack site reports.

Appendix

BREEDERS SUPPLYING PEREGRINES FOR 1993 RELEASES

Robert Anderson, Hugo, Minnesota

Don Hunter and Victor Hardaswick, Centerville, South Dakota

1994 CONTRIBUTORS TO PEREGRINE RESTORATION IN MINNESOTA

BCED Minnesota

Big Game Club Special Projects Foundation

Mayo Clinic

Minnesota DNR Nongame Wildlife Program

Minnesota Department of Transportation

Minnesota Falconers Association

Northwest Airlines

University of Minnesota Graduate School Faculty Grant-in-Aid

The Shelard Group

U. S. Fish and Wildlife Service

U. S. Forest Service

Bruce Fall, General Biology program at the University of Minnesota, devised the following estimate of the number of undiscovered nesting pairs of peregrines in the Midwest in 1994.

APPENDIX. ESTIMATE OF THE NUMBER OF UNDISCOVERED BREEDING BIRDS.

An estimate of the number of undiscovered breeding birds in the region in 1994 can be derived from ratios of known banded and unbanded young and adults, if several assumptions are made. This analysis assumes no dispersal from or into the Midwestern population; we know this is not strictly true but the number of such dispersers seems to be very small and ignoring them greatly simplifies the calculations.

The current (1994) *breeding population* consists of the following:

- known wild-produced banded breeders (B_B), from known nests
- known wild-produced unbanded breeders (B_U), from known nests (B_{UK}) and undiscovered nests (B_{UU})
- known hacked, banded breeders (B_H)
- undiscovered breeders including banded and unbanded, wild-produced and hacked (B_{und})

The *source* of these breeding birds is entirely from the following categories of young (at fledging):

- wild-produced banded young (Y_B), sum of all years through 1993
- wild-produced young, known but unbanded (Y_{UK}), sum through 1993
- wild-produced young, unknown and unbanded (Y_{UU}), sum through 1993
- hacked banded young (Y_H), sum through 1993

Of all the wild-produced banded young fledged through 1993, some proportion has died, some proportion is breeding but undiscovered, and some are alive and not breeding (e.g., one-year-old birds and some others). The remainder are breeding birds whose whereabouts are known. Even though there are some complex life table parameters involved (e.g., different mortality rates for young and adults, and an annually increasing breeding population), there is no reason to expect differences *among* the groups Y_B , Y_{UK} and Y_{UU} with respect to mortality and “undiscovered” rates. If this assumption is true, the following relationships should hold:

$$\frac{B_B}{Y_B} = \frac{B_U}{Y_{UK} + Y_{UU}} \quad (1)$$

Even though the *values* of the ratios (e.g., B_B / Y_B) may change over time, the *ratios* should remain equivalent. The unknown in this equation is Y_{UU} , the total number of unbanded wild-produced young (at fledging) through 1993 from undiscovered nests.

Rearranging equation 1 and solving for the unknown Y_{UU} :

$$Y_{UU} = [(Y_B) (B_U) / B_B] - Y_{UK} \quad (2)$$

Real values for these parameters are as follows (for 1994):

- B_B (known, wild-produced banded breeders, 1994) = 24
- B_U (known, wild-produced unbanded breeders, 1994) = 5
- Y_B (sum of wild-produced banded young through 1993) = 177
- Y_{UK} (sum of known wild-produced unbanded young through 1993) = 30

Plugging these values into equation 2:

$$Y_{UU} = [(177) (5) / 24] - 30 = 7$$

Thus, the estimate of the total number of unbanded wild-produced young from undiscovered nests through 1993 is about 7 individuals. With an average brood size of 2, these estimated 7 young might have originated from 3-4 successful undiscovered nests—either the same pair for 3-4 years, or 3-4 different pairs for one year only, or a combination of the two.

These data permit an estimate of the number of undiscovered, unbanded wild-produced young during the 1994 breeding season, and thus an estimate of the number of undiscovered 1994 nests. Let:

$$N_B = \text{number of banded wild-produced young, 1994}$$

N_{UK} = number of unbanded but known wild-produced young, 1994
 N_{UU} = number of unbanded young from undiscovered nests, 1994

Real values for these parameters are:

N_{UK} = 20
 N_B = 95

It seems reasonable to assume that the ratio of undiscovered young (N_{UU}) to known young ($N_B + N_{UK}$) in 1994 is the same as the ratio of undiscovered young to known young summed over all years through 1993, or:

$$\frac{N_{UU}}{N_B + N_{UK}} = \frac{Y_{UU}}{Y_B + Y_{UK}} \quad (3)$$

Rearranging equation (3) to solve for N_{UU} and substituting the real values:

$$N_{UU} = [(Y_{UU}) (N_B + N_{UK})] / (Y_B + Y_{UK})$$

$$N_{UU} = (7) (95 + 20) / (177 + 30) = 4 \text{ (undiscovered wild-produced 1994 young)}$$

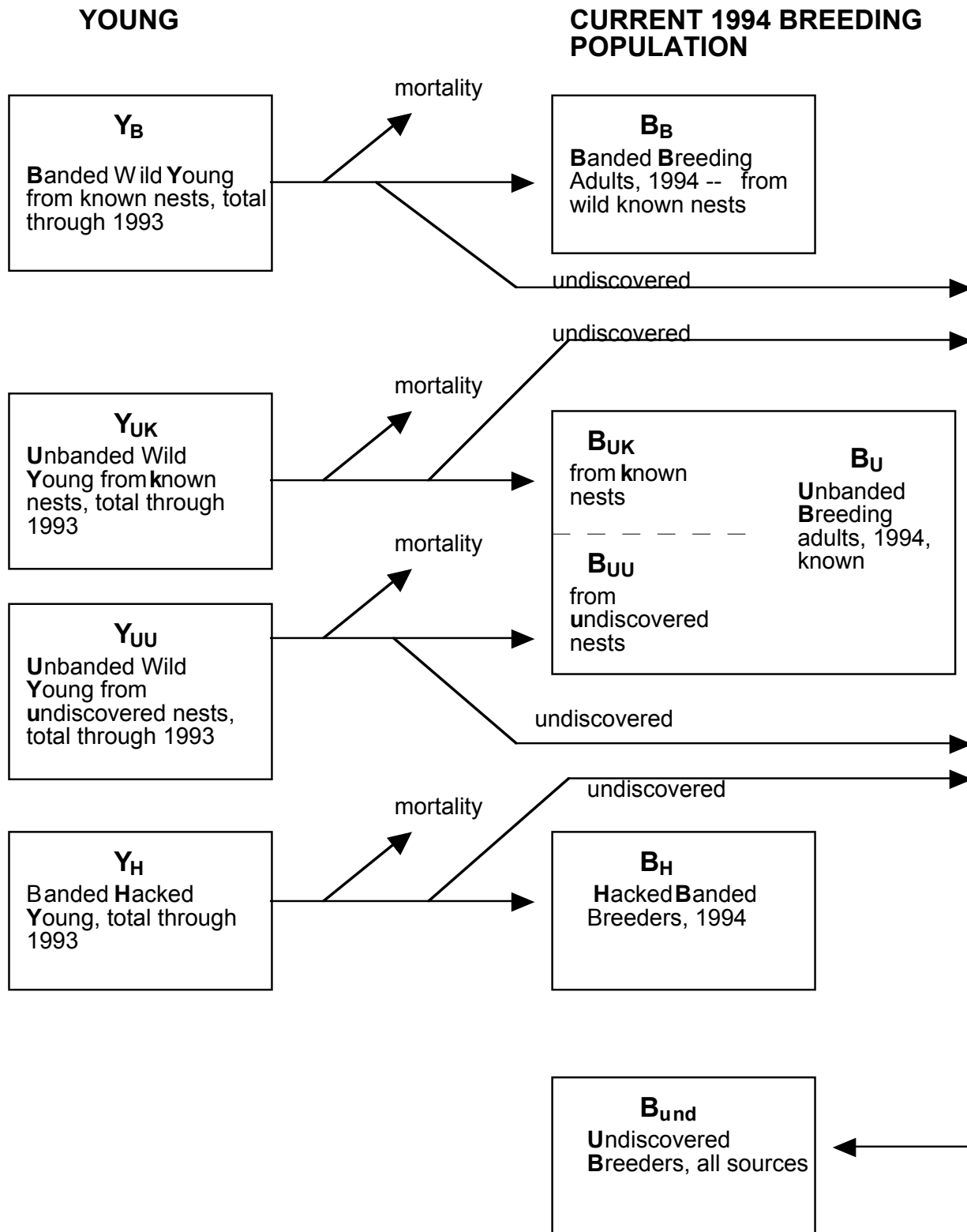
With an average brood size of 2, the number of undiscovered pairs that fledged young in 1994 is estimated to be $4 / 2$, or 2 (this is the box labeled B_{und} in the flow diagram).

Both the estimate of the number of undiscovered young through 1993 (Y_{UU}) and the estimate of the undiscovered young produced in 1994 (N_{UU}) are quite sensitive to changes in the number of known unbanded 1994 breeders (B_U). In the following table, different values of B_U are presented along with the resulting estimates of Y_{UU} and N_{UU} . The parameters B_B , Y_B , Y_{UK} , N_B and N_{UK} are all kept constant (at the true, known values). Even if all the assumptions are valid, the estimates of Y_{UU} and N_{UU} are based in part on the known number of unbanded breeders (B_U), which is a very small value; a small change in this parameter will have a large effect on the estimated values. For $B_U = 5$ (the actual value), the estimates of Y_{UU} and N_{UU} are 7 and 4, respectively. If B_U were 6, Y_{UU} and N_{UU} would double, to 14 and 8, respectively. If B_U were 4, those same values would become negative. Thus, chance events that might affect the survival of just one individual will have a substantial effect on Y_{UU} and N_{UU} . Still, there is some value even in “ballpark” estimates. The estimated number of unknown 1994 young (N_{UU}) might reasonably be as small as none, or perhaps as large as 16—thus, 0 to 8 nests, or 0% to 15% of the 51 known nests. Perhaps Tom Cade’s estimate of 10% undiscovered nests for the East is not far off for the Midwest.

B_U	B_B	Y_B	Y_{UK}	Y_{UU}	$N_B + N_{UK}$	N_{UU}
4	24	177	30	-0.5	115	-0.3

5	24	177	30	7	115	4
6	24	177	30	14	115	8
7	24	177	30	22	115	12
8	24	177	30	29	115	16

SOURCE OF ALL BREEDING BIRDS



PEREGRINE POPULATION GROWTH IN THE MIDWEST

Year	Hacked yg.	Terr. pairs	Nest. pairs	Succ. pairs	Young fldgd	Yg/t pair	Yg/n pair	Yg/s pair
81-86	102	4	1	0	0	0	0	0
87	68	6	3	1	1	.17	.33	1.0
88	84	13	8	6	12	1.1	1.5	2.0
89	116	16	12	9	22	1.4	1.8	2.4
90	83	23	16	13	33	1.4	2.1	2.5
91	110	30	22	17	36	1.2	1.6	2.1
92	104	37	32	23	68	1.8	2.1	3.0
93	20*	53	43	33	87	1.6	2.0	2.6
94	42*	62	51	41	116	1.9	2.3	2.8

Total through 1994, 729 hacked young; 375 wild young.

Note; "Young fledged" includes all young surviving to first flight from nest.

* Does not include peregrines released in Tennessee, Alabama, and Arkansas, in order to make comparisons with earlier years meaningful.