U.S. Fish and Wildlife Service

FINAL ENVIRONMENTAL ASSESSMENT AND MANAGEMENT PLAN

TAKE OF MIGRANT PEREGRINE FALCONS FROM THE WILD FOR USE IN FALCONRY, AND REALLOCATION OF NESTLING/FLEDGLING TAKE

DIVISION OF MIGRATORY BIRD MANAGEMENT

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U.S. FISH AND WILDLIFE SERVICE
Division of Migratory Bird Management

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ABSTRACT

- In this Environmental Assessment (EA), we consider only the take of wild first-year migrant (passage) peregrine falcons for use in falconry.

- For the purposes of this assessment, we identified three management populations of peregrine falcons in North America and Greenland: (1) Northern, consisting of peregrine falcons of the American (*Falco peregrinus anatum*) and Arctic (*F. p. tundrius*) subspecies originating at natal sites at or north of 54° N latitude; (2) Western, consisting of all American peregrine falcons originating from natal sites at or west of 100° W longitude and south of 54° N latitude and all Peale's peregrines (*F. p. peale*i); and (3) Eastern, consisting of all peregrines (*F. p. anatum* and individuals of all other subspecies released there for management purposes) originating from natal sites east of 100° W longitude and south of 54° N latitude.

- Our management goal is to allow a reasonable harvest of migrant Northern peregrines while simultaneously (1) not increasing cumulative harvest of the U.S. portion of the Western or the Alaskan segment of the Northern population to a harvest rate (the percentage of fledged young in a given year that are removed by falconers) greater than 5% (following the framework established in USFWS [2006]); and (2) having minimal impact on non-target populations by holding take of peregrines from the Canadian portion of the Western population and the Eastern population to a harvest rate of less than 1%.

- We considered eight alternatives for the harvest of passage peregrines. At the request of the Association of Fish and Wildlife Agencies, one alternative considered a harvest of passage peregrines limited to areas of the United States south of 31° N latitude and east of 100° W longitude from 20 September through 20 October annually.

- We analyzed the likely effects of harvest under the eight alternatives using band recovery data for peregrines that had been banded as nestlings and reencountered during their first year, and the best available conservative estimates of population size for each management population. From these data sets, we estimated the proportion of each management population's first-year cohort that potentially would be exposed to harvest risk annually under each alternative, and, assuming harvest was in proportion to availability, the likely makeup of harvest.

- The preferred alternative is to allow an annual take of up to 116 nestling and post-fledging first-year peregrine falcons from the nesting period through 31 August west of 100° W longitude (including Alaska), and allow an annual take of up to 36 first-year migrant peregrine falcons from 20 September through 20 October from anywhere in the U.S. east of 100° W longitude. The reallocation of previously authorized take of nestlings and recent fledglings is necessary to accommodate take of migrants that originate in the western United States.

- The preferred alternative also assumes an annual falconry harvest of up to two migrant peregrine falcons in Canada and up to 25 in Mexico. We believe this is consistent with the current harvest in the two countries.

INTRODUCTION

Wild-caught migratory peregrine falcons (*Falco peregrinus*) were used regularly by North American falconers for the practice of falconry (Ward and Berry 1972) from 1938 until 1970, when two harvested subspecies were added to the list of Threatened and Endangered Wildlife and Plants (Title 50 of the Code of Federal Regulations [CFR] Part 17.11) by the U. S. Fish and Wildlife Service (hereafter USFWS or Service) (1998). The decline of peregrines worldwide has been strongly tied to widespread application of several chlorinated hydrocarbon pesticides, among them DDT and Dieldrin (Nisbet 1988). Restrictions on the use of these pesticides in Canada and the United States, in 1970 and 1972 (USFWS 1998) respectively, resulted in the slow recovery of peregrine populations (Kiff 1988). The Arctic peregrine (*F. p. tundrius*) was removed from the federal endangered species list in 1994 (USFWS 1998). Even though most migratory peregrines taken by falconers were *F. p. tundrius*, resumption of harvest outside Alaska was precluded by the designation of all free-ranging peregrines in the lower 48 states as endangered by similarity of appearance to the American peregrine falcon (*F. p. anatum;* the subspecies of peregrine that occupied much of interior and sub-arctic North America), which remained listed as endangered (USFWS 1998).

In 1995, the USFWS initiated a review of the status of *F. p. anatum* (USFWS 1998), which eventually concluded the subspecies warranted de-listing. Removal of *F. p. anatum* from the federal list of Threatened and Endangered Wildlife and Plants occurred in 1999 (USFWS 1999a). In anticipation of this action, in September 1998, the International Association of Fish and Wildlife Agencies (IAFWA, now the Association of Fish and Wildlife Agencies, or AFWA), acting on behalf of all 50 state wildlife agencies, established a working group to determine if the resumption of a harvest of peregrines by falconers in the lower 48 states was biologically justifiable, and if so, to recommend acceptable biological and implementation criteria for the harvest. The AFWA working group polled state wildlife agencies and found support for a resumption of the harvest, but with the caveat that peregrines from breeding sites in the eastern United States and southeastern Canada be protected from take (Taubert *et al*. 1999). The basis for this caveat was that concerns remained for the status of the species in this geographical segment of its range at the time of delisting (Millsap *et al*. 1998).

The AFWA working group evaluated banding data through 1999 for peregrines and constructed a proposed harvest framework that provided considerable protection for peregrines originating from areas of concern in eastern North America (Taubert *et al*. 1999). The recommended AFWA framework was to (1) allow the falconry take of up to 5% of the estimated production of young at peregrine falcon nest sites west of the 100th meridian; and (2) to allow the take of up to 5% of the estimated production of young by high-latitude peregrines, but with the harvest only occurring in the area

east of the 100th meridian and south of 31° N latitude during the period 25 September through 15 October. This area and time-frame were chosen because the AFWA's analyses indicated that harvest under these restrictions would minimize the risk of harvest of first-year migrant peregrines that originate in the eastern U.S. and southeastern Canada. A majority of the affected States supported this harvest framework, therefore, the recommendations were adopted by AFWA and forwarded to the USFWS.

In October 1999, we published a notice of intent to develop two separate Environmental Assessments (EAs); one for the take of wild nestling *F. p. anatum* west of the 100th meridian, and another for the take of autumn migrants, primarily *F. p. tundrius* (USFWS 1999b). In 2001, we published an assessment of the potential falconry take of nestling *F. p. anatum* west of the 100th meridian (USFWS 2001). The recommended alternative in that EA, which closely resembled the AFWA proposal, was implemented in May 2001. We withdrew the assessment in 2002 in response to a legal challenge of the action, and harvest was not allowed that year. We issued a revised EA in 2004 (USFWS 2004), and the harvest of nestling peregrine falcons resumed that year. Subsequent legal challenges to that action were resolved in favor of the USFWS.

This Final Environmental Assessment (FEA) constitutes the second action proposed by the USFWS in the 1999 Notice of Intent. This FEA presents and evaluates the likely consequences of eight alternatives for implementing a harvest of first-year autumn migrant (passage) peregrine falcons.

PURPOSE AND MANAGEMENT OBJECTIVES

We consider the effects of a harvest of first-year autumn migrant peregrine falcons from the wild for use in falconry. Specifically, we evaluate estimated impacts to biologically- and geographically-defined peregrine falcon populations that would result from a harvest of autumn migrants in different geographic regions of the U.S. The harvest would be by licensed falconers, who operate under falconry regulations at Title 50 of the Code of Federal Regulations (50 CFR 21.28 and 21.29). We use the terms "harvest limit" and "harvest rate" to define harvest throughout this FEA. We define "harvest rate" as the proportion or percentage of the number of fledged young removed by falconers in a given year. We define "harvest limit" as the number of individual peregrine falcons that falconers could potentially harvest at the maximum allowable harvest rate.

Based on the preferences in the preponderance of comments on the Draft Environmental Assessment (DEA) and the Service's goal to maintain peregrine falcon populations at a healthy level, our preferred alternative will be that which affords maximum potential harvest opportunity over the largest geographic harvest area while simultaneously adhering to conservative, biologically-derived limits on the harvest of some geographic populations of the peregrine, as described below. More specifically,

our explicit management goal in the EA is to allow take of up to the maximum safe harvest of first-year peregrines of the Northern management population (see the Biogeography and Distribution section for population descriptions), while simultaneously (1) not exceeding the updated harvest limits for the U.S. portion of the Western management population or the Alaskan segment of the Northern management population established in USFWS (2006); and (2) having minimal impact on non-target populations by holding harvest of peregrines from the Canadian portion of the Western population and the Eastern population to harvest rates less than 1%. The maximum safe harvest for the Canadian portion of the Western population and the Eastern population segments is based on Millsap and Allen (2006), who concluded a 1% harvest rate was not likely to negatively impact any of the raptor species evaluated, including peregrine falcons. The management goal is also to achieve relative sexual parity in the harvest (a sex ratio no greater than 60:40 in either direction, as measured against the harvest limit), and a geographic distribution in harvest proportional to relative population size.

This assessment does not specifically consider the harvest of nestling peregrine falcons from nest sites east of the 100th meridian in the U.S., although one evaluated alternative would allow such a harvest.

NEED FOR ACTION

Possession of a trained raptor listed under 50 CFR Part 10 for falconry or propagation is authorized only by a permit issued under the federal regulations at 50 CFR 21.28 and 21.30. Currently, take and possession of migrant wild peregrine falcons by falconers is prohibited by specific language on the face of each falconer's permit. This limitation was enacted following the delisting of *F. p. anatum* to ensure that resumption of harvest was implemented in a deliberate manner after consideration of all possible impacts to the species. In 1999, AFWA requested that the USFWS undertake an analysis of possible harvest of migrant Northern peregrines. This FEA completes that review, and serves as a management plan for harvest.

SCOPING AND PUBLIC PARTICIPATION

We published a Notice of Intent to Prepare an EA on harvest of nestling Western *F. p. anatum* and migrant Northern peregrine falcons in October 1999 (USFWS 1999b). Substantive comments received in response to that notice were considered in the preparation of our Draft Environmental Assessment (DEA, (USFWS 2007b), for which we published a notice of the availability on November 13, 2007 (USFWS 2007c). We considered comments on the DEA when we prepared this final Environmental Assessment.

ISSUES RAISED IN RESPONSE TO THE DRAFT ENVIRONMENTAL ASSESSMENT

We reviewed suggestions and comments provided to us after we published the DEA in November 2007 (USFWS 2007c). In this section, we respond to comments on the DEA.

Commenters on the DEA were divided in their support for the proposed alternatives. Most state wildlife agencies and some Canadian provincial wildlife agencies in eastern North America supported Alternative 3, but with added restrictions designed to further minimize likelihood of harvest of peregrine falcons from the eastern management population. Some individuals and Canadian provincial and native community wildlife agencies supported Alternative 1, arguing that the loss of even a single individual from some local peregrine falcon populations in eastern Canada was not acceptable. Conversely, most falconers, falconry groups, and many species experts supported Alternative 6, but with elimination of constraints designed to protect certain management populations from harvest, arguing that such protections were unnecessary and overly burdensome.

Below, we summarize issues raised in the comments, give examples of some of the comments received (in italics), and provide the Service's responses.

Issue. Many commenters reported errors or discrepancies in the population size and productivity estimates used in the analyses.

"Sub-populations in N Alberta, Porcupine River, Peel River, Lake Yukon, and Mackenzie Valley, NWT are all part of the northern management area. They have been included in the Western Population in table 1 and table 2 by error. Under the Northern Population in Table 1, the estimate for the sub-population = Northern; Canada; G. Holroyd, pers. comm. already includes the sub-populations just [mentioned]. This error results in an over-estimation of the Western population."

"…the number of pairs estimated in Table 1 and in the text do not match."

"The listed source for arctic Alaska is wrong: the value 225 is the mid-point of an estimate by Cade (1960), and the number of known pairs was 158 (Swem and Ritchie, personal communication)."

"The two values for mainland British Columbia total 12, but the number of pairs was 18 in 2000 (see p 104, Rowell et al 2003)."

Response. We corrected these errors in the text and Tables 1, 2, and 3, and redid analyses as necessary.

"Several populations of the pealei *subspecies are also incorrectly included [in the western management population]….The largely nonmigratory pealei populations should comprise a fourth management population."*

Response. *We concur that as a largely non-migratory subspecies F p. pealei could warrant separate consideration as a unique management population. However, under the revised preferred management alternative we try to make it clear that post-fledged young peregrines that have dispersed from natal areas may be captured by falconers within the Western management population until 31 August, and we anticipate that some mixing of free-flighted U.S. anatum and pealei could occur during the harvest period. Additionally, the DEA and FEA groups peregrines by management population regardless of subspecies because the three subspecies are not always distinguishable morphologically in the hand, and members of different subspecies often behave similarly relative to factors that would affect potential exposure to harvest. For example, using banding data, migration biology of F. p. tundrius is not distinguishable from that of high-latitude F. p. anatum. Outside the breeding season, subspecies intermix on migration and on the wintering grounds, making it impossible to tailor regulations to specific subspecies. For these reasons, we decided to retain the pealei subspecies within the Western management population.*

Issue. Many commenters raised concerns about the use of banding data to infer probability of capture of individuals from the different management populations.

"Band records from 1937 to 1970 describe a species (especially in the case of anatum) which no longer exists."

"…the authors felt that they could compensate for the skewed datasets by manipulating the records. For example, returns from banding stations were excluded from the distributional analysis."

"Why does it matter where the first year falcons are in winter…[if] harvest is held to the peak of fall migration?"

"Unfortunately, the existing band recovery data that are used to link potentially harvested birds with specific Peregrine Falcon breeding populations are so severely biased that predictions of population level impacts of the different proposed alternatives are difficult to believe (given the reliance of impact assessments on band recovery analyses)."

"As an example of the skewed data and conclusions I refer you to the available radio telemetry research. I know of 28 anatum that have carried transmitters during their first season. Eight of these birds provided no info about winter ranges by reason of transmitter failure or mortality. Thirteen wintered north of 31° north lat. The

remaining seven all wintered south of 31°. They were all in the chosen trapping zone during the proposed harvest period."

"We are requesting that you provide the actual numbers and locations involved in the location of origin (capture) assessments. For example, the "n" number of banded/recaptures for the East is provided, but not the total number in the banded population, nor the locations and dates of banding stations used in the analysis. Given the small percentage of total number of falcons banded each year, even in states where peregrines are listed, the utility of this statistic is questionable."

"To summarize, Peregrine Falcon band recovery data are biased by: 1) an unbalanced geographic distribution of original banding effort; 2) geographic biases associated with band recoveries; 3) the lack of information about most banded individuals; and 4) a lack of substantial banding effort in many areas with numerous peregrines.

For some analyses in the DEA, this small number of existing recoveries was further limited by excluding recaptures at migration banding stations, since these recoveries reflect intensive trapping efforts that bias probabilities of recovery towards these areas. While this approach makes some sense conceptually, it only addresses one very small source of bias in this dataset. The other major sources of bias, listed above, are not addressed, nor can they be (in other words, the inherent biases of banding data cannot be fixed by filtering some of this biased dataset during analysis).

Consequently, it is very hard to agree with the approach taken in the DEA (page 9) of summarizing this biased dataset and then treating distributions of latitudinal and longitudinal patterns in band recoveries as "probability distributions…that are representative of the actual distribution of peregrines from each management population." This assumption, which seems unsupportable, is central to the analysis of the "environmental consequences of the alternatives" beginning on page 15. Therefore, it seems possible that the predicted proportions of management populations that will be affected by each alternative are inaccurate and would be better viewed as unknown."

"It makes logical sense to use band-return data to estimate the proportion of Northern Canada and Greenland and of Northern Alaska peregrines that are exposed Longitudinally to migrant harvest since these falcons are known to migrate north to south along the Atlantic and Gulf coasts. However, is it logical to use band recovery data to estimate the proportion of these same peregrines exposed Latitudinally to migration harvest? It is known that these peregrines from the far North are strongly programmed to migrate to far South as verified by the band-recovery data plotted in Figure 4. In Table 3 you estimated that the proportion exposed Latitudinally of these peregrines as 0.72. This implies that 0.28 (28%) of these peregrines that had a band

return North of 31 degrees of North Latitude would not be exposed to migration harvest. However, in spite of their band returns, most of these falcons were probably still heading South and would in all likelihood pass South of 31 degrees of North Latitude and thereby be subject to harvest in Alternative 3. Therefore, the proportion exposed Latitudinally to migrant harvest for these two groups of peregrines should be 1.0 rather than 0.72 in Table 3."

Response. We acknowledged the shortcomings of the available banding data in the DEA, but argued that in spite of those shortcomings the banding data were the best data available, and were adequate for the general distributional analyses conducted. After careful consideration of the comments received, our position has not changed.

With respect to the specific issues raised above, of the 323 band reencounters for nestling peregrines from the Eastern management population during their first fall and winter, only 7 (2%) were hatched prior to 1970. Hence, our conclusions regarding movements and distribution of peregrines from the Eastern management population rely almost entirely on records from the contemporary population.

We concur that banding effort has not been uniform, and agree that as a result many local populations are not proportionally represented in the initial banding pool. We acknowledged this in the DEA. However, we believe it is reasonable to assume the pool of banded nestlings provide a coarse but meaningful indication of migration behavior of the management populations as a whole, given the broad geographic scale of those management populations. Accordingly, while we acknowledge uncertainty in the results, we continue to base our harvest limits in part on cumulative probability distributions estimated from band reencounters because we believe these are the best data available for this purpose, and we are required to use the best available data in our decision-making process.

As to why we did not rely more heavily on data from satellite-tagged peregrines, these data are largely unpublished and thus unavailable for complete review to determine their accuracy and applicability. However, using information provided by the commenter, the percentage of satellite-tagged peregrines from the Eastern management population exposed to harvest under Alternative 3 (35%, n = 20) does not differ significantly from the percentage inferred from banding data (21%, n = 106) (t-test for proportions, $t = 1.23$, df = 24, $P = 0.24$). Although the power of this test is low, it is sufficient to conclude that the satellite-tagging data we received during the comment period on the DEA do not lead to substantially different conclusions than the banding data. Given the larger sample size and more representative distribution of banding records, we maintain that the band return data set is more appropriate for our analyses that apply to the management populations as a whole.

We screened the banding data in an effort to moderate biases in the distribution of reencounters, but we agree with several commenters that screening does not eliminate bias. We did not include recaptures at banding stations in cumulative latitudinal frequency distributions because nearly 40% of recaptures were at nine raptor banding stations, and those stations were not evenly distributed relative to the range of latitudes

traversed by migrant peregrine falcons. If reencounters at banding stations had been included, frequency distributions would have reflected the disproportionate number of records from these nine locations clustered in a narrow latitudinal range within the coterminous United States. Because recaptures at banding stations were excluded, our latitudinal distribution assessment used reencounters reported largely by the general public. We recognize that band recoveries by the general public are biased toward areas of human habitation, but we believe this bias is less problematic relative to our objective because human settlements are fairly widespread latitudinally.

We used only winter reencounter records in the latitudinal analysis because fall records present an incomplete picture of the full migration. Where a peregrine was encountered on, for example, 10 October tells little about the full range of latitudes it might have crossed to reach its final wintering destination in November. By using winter records, we could conclude confidently that all latitudes between the natal and winter reencounter latitude were traversed during migration. The combined effect of excluding reencounters at banding stations and using only winter records can be seen in comparative results for the Eastern management population. The mean reencounter latitude for the Eastern management population using all fall and winter records was 37.4° N latitude. The mean reencounter latitude including only winter records was 34.8° N latitude. Deleting reencounters at banding stations, the mean was 34.3° N latitude. To not filter the data by excluding fall and banding station reencounters would have underestimated potential impacts of harvest under Alternatives 2 and 3 on the Eastern management population. In the case of the longitudinal distribution, we compared results from analyses that excluded and included reencounters at banding stations and fall records, and found no substantial difference in the outcome, largely because most of the major raptor banding stations where peregrines were reencountered are along the Atlantic Coast. Thus, if anything, banding data overemphasize the proportion of the Western population that would be exposed to harvest in the eastern United States, a conservative bias in the context of this proposal. To maximize use of all available data, we included all records in the final cumulative longitudinal frequency distribution analysis.

We added a figure in the FEA that shows banding and recovery locations for records used in the analyses. We have not provided a detailed breakdown of banding and capture locations because we do not believe such a summary is useful relative to the amount of space it would require in the final EA. However, the full band recovery data file is part of the administrative record and can be viewed upon request.

Issue. Many commenters took issue with the scientific approach used in this analysis and assessment. Falconers, some states, one flyway council, and most species experts believed the population estimates and analyses were far too conservative and presented an unreasonable underestimate of harvest potential. Some eastern states and most Canadian commenters argued just the opposite - that the analyses were not scientifically rigorous, lacked objective peer review, and were biased in a pro-harvest manner.

"The Science in this document is suspect. If [the Service] believe[s] that this is a credible analysis, let them submit the study for independent peer review."

"For a far greater understanding of the depth of knowledge on the migrant, arctic peregrine, I ask that the Service pay special attention and be guided by the biological data presented in the expert declarations offered by William Seegar, F. Prescott Ward, Mike Yates, Thomas Maechtle, William Mattox, Ian Newton, J. Peter Jenny, James H. Enderson, Tom J. Cade, and Grainger Hunt. Because of their field research, they provide the Service with the knowledge and analysis of their data that, in fact, provides the greatest understanding of the historical and present status of the migrant peregrine. All of the experts conclude that the Service is inordinately conservative in its estimate of the migrant peregrine population, and that a fall harvest of even 5% of the first year migrants will be undetectable. I request that Service revise the numbers in the various population segments based on the date provided by experts to arrive at new population totals. The 5% harvest limit should be recalculated on the revised population totals."

"Assurances presented in the document that a limited number of peregrines would be taken from the "Eastern" population belies the fact that any harvest at this point in recovery is premature for Nova Scotia and the Inner Bay of Fundy populations. We challenge the argument and the science presented in the EA that harvesters could discriminate points of geographic origins of individuals from within the breeding range."

"The quality of data used in the DEA was less than ideal. Efforts are needed to improve the amount and quality of information regarding population size (especially of northern populations), productivity, survival, and movements. Increased banding efforts of nestling peregrines should be encouraged, especially to monitor the effects of take."

"The DEA does not, however, critically examine or explain why it should adopt Millsap and Allen's assumption that overall take should be limited to the greater half of maximum sustained yield or 5 percent. Moreover, it appears that Millsap and Allen's recommendation is somewhat arbitrary and overly conservative…."

"The four-young limit for the Canadian portion of the western population is unreasonably small because minimum population is based on surveys in one year that seldom searched beyond historical sites and the unjustified use of 1.14 young per pair for seven subsets where actual rates were unknown…"

"We appreciate the stated desire of the DEA to identify management populations and structure take to avoid impacts to non-target populations, but we are concerned that the assumptions about the level and origin of take may not be substantiated. The

maximum number of peregrine falcons proposed for U.S. harvest under this alternative is 105, but no scientific basis for this number is provided. We would like to see justification for this level of harvest."

"The choice of 50% of the estimated maximum sustained yield up to 5% of the young produced were offered in Millsap and Allen (2006) as a "practical guide" (p 1398). The authors simply suggest "vital rates are sufficient to justify up to a 5% harvest" of peregrines. The 5% limit was arbitrary and needs to be supported. If this cannot be done, then some other rate below the MSY can be used."

"Models are useful for prediction only when: 1) model structure and assumptions are reasonable for the population of concern; and 2) population parameter estimates are valid, with at least moderate precision. When either of these two conditions is not met, modeling may be useful to provide insight on population processes, but model results may yield unreliable predictions of population size. Although both model structure and parameter inputs are somewhat reasonable for peregrines, there are enough questions about both so that predictions of MSYs for falconry should be taken with a grain of salt…Skepticism of model predictions are adequately reflected in the DEA's final recommendations for harvest levels, which are very conservative relative to model predictions (proposed harvest levels of 5% or 1% of annual production compared with model predicted MSYs of 17% or 13%). This conservatism may adequately address some of the problems inherent with the modeling effort; however, only alternate models or empirical evidence to the contrary could be used to assess this."

"Further explanation is needed on the levels of harvest in the Abstract and Alternative Sections including harvest rates (e.g. annual, total). In addition, there are many harvest rates given throughout the document, making it difficult to follow."

"Conflict of interest exists in the initial proposal to harvest peregrines. The same group of individuals in the United States who have promoted the case through the International Association of Fish and Wildlife Agencies, authored the supporting argument for a harvest and the EA. The document does not adequately or accurately reflect objectivity, quality and confidence that can be accredited to the science, nor does it contain objective presentation of arguments, merits and value systems in opposition to the harvest."

Response. Our assessment of the sustainability of falconry harvest for a number of raptor species, including the peregrine falcon, was subjected to scientific peer review and published in a credible scientific journal (Millsap and Allen 2006). That assessment indicated that healthy peregrine falcon populations should be able to sustain a harvest rate well over 2 times the proposed level of 5%. Based on that analysis, the Service believes the scientific evidence supports the conclusion that a harvest rate of 5% for peregrines throughout North America is appropriately

conservative, sustainable, and would have no measurable impact on wild populations of the species and, as such, should not require costly and impractical population monitoring to document actual affects on populations. That same analysis concluded that harvest rates of up to 1% were likely to be inconsequential even to raptor populations in decline because of reductions in habitat or prey populations.

The cost of increasing harvest rates further toward MSY is the need to implement robust population monitoring, which for the peregrine would be extremely difficult logistically and financially. We believe that a conservative harvest rate well below ½ MSY is a defensible alternative. This approach has been adopted for the management of falconry harvest overall by the Service in our most recent FEA on falconry (USFWS 2007a), so its application here is not arbitrary, but instead is consistent with our treatment of other raptors for which we allow falconry harvest.

The additional constraints imposed by the Service on harvest by management population (limiting harvest to less than 1% for some management populations) were at the request of some of the wildlife management agencies that share management authority for this species with the Service. We respect the opinions of our management partners, and have addressed their concerns by imposing lower harvest limits for non-target peregrine falcon populations (from 5% to 1%, consistent with the Service's published analysis in Millsap and Allen 2006). However, to reiterate, the Service does not believe these constraints are *biologically* necessary in the face of our published assessment that a harvest rate of 5% for peregrines is sustainable and conservative. Accordingly, we find no value in subjecting the constraints or our approach in addressing them to additional scientific review beyond that afforded through the DEA comment process. Nearly all of the management agencies that requested the additional constraints that commented on the DEA, including the Atlantic and Mississippi flyway councils on behalf of their member states, did not object to the approach used by the Service to buffer non-target management populations from harvest. However, there was some concern over the quality of the data available on population size and movements. Our approach has not resolved the concerns of many Canadian provincial and native community wildlife management authorities, and we respond to this issue separately.

As to the lack of objectivity and credibility on the part of the author of the DEA, the document was subjected to intense internal review by other Service biologists and Department of Interior solicitors who had no historical involvement in the issue, and, as noted above, the principle scientific underpinnings were peer reviewed prior to being published in a credible scientific journal. We respectfully disagree with this comment.

"I have stated in providing data to several projects…that a conservative estimate of the current population of peregrine falcons in Greenland is 2,000 pairs (range 1,500 – 2,500)... Unless more accurate population estimates and data on productivity in Greenland are used, the conclusions and recommendations are made even more *conservative and fail to correspond with reality."*

"I also challenge the population estimates. These vary in some case by more than 400%. Such a large range is not an estimate at all, it is a guess."

"Considering the rate at which peregrine populations continue to increase, the data summarized in Table 1 are already outdated."

"Rowell et al 2003 is cited for 19 surveys of regional populations in Table 1. Two of these populations in 2000 remained unchanged from counts in 1995 (Mackenzie and Yukon Rivers) and one declined (Labrador and Newfoundland: snow and late counts were problems, and there was evidence 11 other sites were recently used). All other subsets showed increases, often substantial. These increases may not have stopped after 2000. Continuing growth should be accounted for in the maximum estimate column."

"In looking at the figures for the Northern population in Table 1, I would give the range for Interior Alaska as 700 to 800 pairs rather than 1000, for Arctic Alaska 400-500 pairs instead of 225 (there may be that many on the Colville River watershed alone), and for northern Canada 3000 to 6000 instead of 1143 to 4350, and 500 to 1000 for Greenland instead of 450 to 2000. My figures give a minimum total estimate of 4600 pairs, and 8,300 pairs for the maximum, with a median value of 6450 pairs. Using a low productivity of 1.3 young per egg-laying pair gives an annual production of 8385 fledglings in a total late summer population of 12,900 breeders, perhaps 10, 0000 floaters, and 8385 young of the year (total potential migrating population of 31,285 falcons)."

"In the DEA Table 3, the "Estimated migrant population size of the Northern - Canada and Greenland" is 2,375 first-year peregrines. This figure is the sum of the "Minimum number of young fledged per year for Canada and Greenland" taken from Table 2 and multiplied by 0.9. Also shown in Table 2 is the "Maximum number of young fledged per year for Canada and Greenland", which if added together and multiplied by 0.9 would equal 9,504. I must assume that both sets of figures have credibility or they would not be included in the DEA. I would like to suggest that the mean of the minimum and maximum numbers, which would equal 5,940 peregrines, be used for the "Estimated migrant population size of Northern -Canada and Greenland" in Table 3. While it could be argued that all estimates should be safe-sided, by restricting the take of passage peregrines to 5% of the "Estimated migrant population size" in Table 3, the take is already very safe-sided. Therefore, I suggest that you use the figure of 5,940 "Estimated migrant population size of Northern - Canada and Greenland" in Table 3 as representing the best available estimate based on the data in the DEA. This change would significantly increase allowable take of migrating peregrines. Alternately, if the total take were held to 132 peregrines, the

higher estimated pool of Northern peregrines would dilute (reduce) the incidental take of Eastern peregrines and thereby support the suggestion … to allow a take of some peregrines along the entire Atlantic coast."

Response. We acknowledge that there is considerable uncertainty with respect to population size and productivity for many peregrine falcon populations, and we concur that the best data available for some populations is dated and likely underestimates current population size. However, the initial AFWA request to the Service to allow a harvest of fall migrant peregrines specified that the approach should be conservative. Moreover, in our initial discussions with the Canadian Wildlife Service (CWS) regarding a possible harvest of migrant peregrines, CWS specifically requested that the Service use minimum known population numbers for northern peregrines to establish harvest quotas, if harvest was allowed. Our use of conservative numbers was deliberate - to ensure we do not overestimate harvest potential, in deference to the requests from agencies with which we share management responsibility for the species. Commenters who focus on the wide range between minimum and maximum population or productivity estimates are correct in the assertion that this reflects a great deal of uncertainty. However, we disagree that allowing harvest in the face of such uncertainty is inappropriate when we consistently use minimum known values to calculate harvest levels, and thus almost certainly underestimate actual harvest potential.

"Reproductive rates should not be based on a single year. Rates of 1.13 to 1.18 young per pair on territory applied to Alaskan and British Columbia falcons seem unrealistically low. As early as 1980-85 Alaskan peregrines averaged 1.6 or higher..."

"The rate of 1.8 young for Greenland is based on a small sample, much larger samples as available for western Greenland."

"Mattox and Seegar (1988) reported that the number of young per pair was 2.3 (range = 1.8 to 2.8) and 2.9 young per successful pair (Attachment 3). Our study area spanned optimum peregrine nesting habitat (nest site and prey availability), which explains the higher number of young per pair compared with SW Greenland (Faulk and Møl1er, 1988). I consider that the number of young per pair listed in Table 2 is too low, and should be corrected to ca. 2.0, and the minimum/maximum number of young fledged per year adjusted upwards."

Response. Recent productivity data for British Columbia were lacking so the value used is the average productivity for other locations in the Western management population with contemporary data (and this value has been corrected in the FEA). Productivity estimates for the Northern management population in Alaska are based on a long-term study of nesting peregrines on the Colville River that has been

conducted in recent years by the Service. The productivity estimate of 1.13 (now 1.14 based on a reanalysis of the data) is the average number of young fledged per nest site occupied by a pair of falcons during the period 1995 – 2005. Although the data set goes back much further, and if all years are included average productivity is higher, the Service believes the most recent 10-year period is the most appropriate time-frame to consider for this analysis. Upon consideration of the comments we received regarding productivity of Greenland peregrines, and given the peer-reviewed data provided in Mattox and Seegar (1998), we have revised our estimate of average production for peregrines in Greenland to 2.0 young per occupied nest site.

Issue. A number of commenters expressed concern that the considerable harvest potential of the Western management population was not fully realized under any of the proposed alternatives.

"The PFC NTC suspects that peregrine population status has changed over the seven-year time interval along with relative concern among managers about population status; consequently our comments reflect a desire to explore possibilities that might allow western states to authorize a higher level of harvest of peregrine falcons, including migrants, if they desire…. From the available data, there is very little reason to believe that significant numbers of migrant peregrines harvested prior to the middle of September and only harvested west of the Mississippi River would have originated from the western Canadian Province populations. Given this, it seems reasonable that the states west of the Mississippi River could establish limited seasons for the harvest of local migrant peregrines prior to September 20, taking into consideration the existing 180-day season regulation for falconry harvest. This approach would address the desire of the Canadian Government to protect their F. p. anatum population and provide flexibility for western states to manage a sustainable harvest of migrating/ passage peregrines. The maximum allowable harvest for western peregrine nestlings has not been met and the additional harvest of migrant peregrines, as long as the total numbers did not exceed the 5% level, would be biologically appropriate. This option may address issue #2, above, if implemented properly."

"If one of the non-preferred alternatives were to be implemented, the states would recommend more flexibility in the ability to regulate nestling versus migrant harvest. Given that the biological impact will affect the same cohort, the states should be allowed to manipulate their harvest based upon the needs of the falconer while maintaining the 5 percent harvest level in the west."

"FWS should examine alternatives not based on overly conservative or unnecessarily restrictive arbitrary assumptions about what level of overall nationwide take peregrine falcon populations can support, and should examine alternatives allocating overall nationwide take by geographical area, preferably on a flyway-by-flyway basis, depending on what level each flyway can support, in order to at least give

those falconers in the West and Midwest the opportunity, if they should choose to do so, to attempt to capture a peregrine falcon from the wild for use in falconry."

"…I would like to see the take of nestling (eyas) anatum peregrines for falconry in the western states expanded to include any fledged or first-year birds of any subspecies."

"Since southern Canadian peregrines are listed by the Canadian Wildlife Service as a species-at-risk and northern peregrines are not, with different rules governing falconry take for both populations, it seems like splitting Canada into northern and southern populations makes sense for the management of falconry take. Since there are different regulations for falconry in the Western US and the rest of the US, it seems like separating US states into Western and eastern management populations makes sense. Since the government of Greenland has expressed reservations about US falconry take, it seems sensible to make Greenland a separate management population. This would result in 7 different management populations…. Future efforts to describe the proportion of falcons taken for falconry using stable isotopes… could then focus on these 7 management units, which reflect a compromise between a true geographic discontinuity between the distribution of northern and southern birds and political divisions within these two regions. Although birds may disperse across politically defined management unit boundaries, these different political units have important differences in laws and concerns regarding falconry."

Response. We do not believe the available banding data can support subdivision of management populations, either biologically or administratively (such as to conform to flyway council boundaries). We have, however, used the available population data to assess the likely effects of harvest on, for example, the Canadian portion of the Western management population in an effort to asses and limit possible impacts of the proposed harvest.

After careful consideration, we agree that the proposed alternatives were unnecessarily restrictive relative to the harvest potential of the United States' segment of the Western management population, including both interior western United States *F. p. anatum* and coastal *F. p. pealei*. Banding data, though sparse, show that peregrines from the Canadian portion of the Western management population occur broadly in the western U.S. during migration and in winter. Accordingly we do not believe it is possible to allow a harvest in the coterminous western U.S. after 1 September (see Figure 6) that does not potentially result in incidental take of western Canadian peregrines. However, we believe a hybrid alternative, consisting of elements of Alternatives 1 and 6 from the DEA with some modifications, would provide greater use of the Western management population's harvest potential. Under the hybrid alternative (Alternative 7 in this FEA), we would allow harvest of resident peregrine falcons less than one year old from anywhere west of 100° W longitude from the nesting period through 31 August. By restricting the harvest period for resident peregrines from the Western management population to exclude fall

migration and winter, the risk of incidental harvest of western Canadian *F. p. anatum* is essentially eliminated.

"The DEA examines only take limits applicable to all subspecies of peregrine falcons. However, the DEA does not address whether take limits for each subspecies of peregrine falcon would be feasible and/or beneficial. The FWS should consider whether such limits, which could be narrowly tailored to address concerns related to each subspecies, could or should be implemented. For example, to the extent the FWS is more concerned about the take of Anatum peregrines than other subspecies, the DEA should at least consider whether it can examine alternatives that provide separate take limits for Anatum and other subspecies. Similarly, the Peale's peregrine falcon currently exists in particularly healthy numbers and has never been threatened or endangered anywhere in the United States. Therefore FWS should consider whether any restriction is justified with regard to Peale's peregrines and, if so, how restrictive those regulations really need to be to maintain healthy populations of Peale's peregrines."

Response. The DEA groups peregrines by management population regardless of subspecies because the three subspecies are not always distinguishable morphologically in the hand, and members of different subspecies often behave similarly relative to factors that would affect potential exposure to harvest. For example, using banding data, migration biology of *F. p. tundrius* is not distinguishable from that of high-latitude *F. p. anatum*. Outside the breeding season, subspecies intermix on migration and on the wintering grounds, making it impossible to tailor regulations to specific subspecies.

Issue. Many falconers, falconry groups, and some states preferred Alternative 6 to the DEA's preferred Alternative 3 in spite of the lower harvest threshold.

"I have reviewed the DEA and support the idea suggested in Alternative 6 allowing take of first-year migrant peregrine falcons from 20 September through 20 October from anywhere in the U.S. However, I believe that to limit the take to 34 birds annually is much too restrictive. The current population trend is higher and continues to show increases. Additionally, due to those increasing numbers, I guess that the east coast states have a lower concern about impacts to their "resident" peregrine populations being impacted. I would like to see a permitted take for falconry of at least 183 arctic peregrines. I base this on the DEA's words of "...our explicit management goal is to allow a harvest of up to 5% of minimum annual production of Northern peregrines, which is 183 migrants."

"While I generally support Alternative 3 in the DEA, would you please consider a modification to Alternative 3 whereby some hatching-year migrating peregrines could be harvested for falconry along the entire Atlantic coast as well as along the Gulf of

Mexico? I believe that this option represents the desire of most falconers in the Eastern U.S. The Eastern U.S. falconers played a key role in the successful reintroduction of the Eastern peregrine by developing the breeding techniques, actively participating in the breeding and release projects, and financially supporting the effort through the Peregrine Fund. Why penalize these falconers for their success by barring them from taking a modest and fully supportable number of migrating peregrines along their nearby coast? For example, in Maine we have a substantial migration of Northern peregrines along the immediate coast and most particularly over the off coast islands. These same falcons are headed South far below 31 degrees North Latitude. Why should Maine falconers drive all the way to Florida or the Gulf coast to trap a peregrine when we could trap the same bird here with a huge savings in gasoline, time and money?"

"Annual migration counts for the peregrine indicate that the tundrius population is robust and expanding. The tundrius peregrine appears to require no special protection beyond the restrictions of the current falconry regulations, i.e. only immature raptors may be taken and only two raptors may be taken per year per permittee. The proposed season for take (September 20 through October 20) is the period in which tundrius peregrine numbers far exceed anatum peregrine numbers in Maryland. If provided the opportunity, we could restrict the take of migrant peregrines in Maryland to the Atlantic coastal area, where most of the tundrius peregrine migration occurs and where there is a low probability of take of anatum peregrines."

Response. Under the new hybrid Alternative 7, we would allow harvest of fall migrant peregrine falcons anywhere in the United States east of 100° W longitude under the same constraints proposed for Alternative 6. Of course, each state would have to concur for harvest to actually be allowed in a particular state. Harvest west of 100° W longitude would be restricted to the period from nesting through 31 August. The combined effect of these constraints would be protection of non-target peregrine populations, and increasing allowable harvest toward threshold levels for target populations. Because we retain the constraints on harvest levels for non-target populations, the proposed harvest under this alternative remains considerably below the full harvest potential of the Northern management population.

Issue. Some commenters expressed concern over the reduction in allowable harvest to accommodate existing authorized and unauthorized take by falconers in Canada and Mexico.

"The reported but undocumented illegal take in Mexico should not count against the take allowed US falconers. Losses such as these are accounted for in the first-year survivorship estimates used in the preliminary modeling "

Response. At the request of CWS, we agreed to accommodate existing falconry harvest within the proposed harvest thresholds. We consulted with the management authority for the species in Mexico (Secretaría de Medio Ambiente y Recursos Naturales, or SEMERNAT), and they concurred with this approach. We continue to believe it is appropriate to accommodate all known falconry harvest from the management populations under review within the proposed harvest thresholds. However, in our reconsideration of this issue we concluded that it is possible to more precisely assess which management populations are likely to be affected by the existing harvest. Specifically, of the 323 band reencounters for peregrines from the Eastern management population, only three (1.2%) were reencountered in Mexico and none in Saskatchewan, suggesting exposure of individuals from this management population to harvest in western Canada and in Mexico is negligible. Accordingly, in the FEA, we consider the Eastern management population to not be affected by the existing migrant peregrine harvest in Canada and Mexico.

Issue. One falconry group expressed concern that the restrictions on migrant peregrine harvest proposed by the Service were excessive and reflected a lack of appreciation for the efforts of falconers in peregrine recovery.

"The recovery of the peregrine falcon to healthy levels is largely due to the actions and support of the falconry community including many of WRTC's members. Indeed, falconers have consistently led the way in raptor conservation and recovery of threatened and endangered species. In 1965, falconers concerned about the plight of the peregrine falcon participated in the International Peregrine Conference in Madison, Wisconsin. This conference highlighted the disappearance of the peregrine falcon and the need to conserve raptors. The falconry community itself was the driving force behind Migratory Bird Treaty Act ("MBTA") regulation of raptors, including the designation of "apprentice," "general," and "master" levels of falconry and institution of falconry and raptor propagation permits. Through a captive breeding program developed by falconers, the peregrine falcon population in the United States was returned to a healthy level, and the breeding principles developed by falconers have since been used to augment other raptor populations as well. The falconry community, as small as it may be, is a valuable ally in the quest to regulate and conserve raptors. The peregrine falcon is living proof. The FWS should work with, rather than against, the falconry community in crafting reasonable, scientifically sound regulations that allow falconers to practice falconry free from unnecessary restriction while meeting the FWS's conservation goals. The effort to allow regulated take of migrant peregrines for falconry purposes should be made in that spirit of cooperation."

Response. The Service appreciates the efforts of all our partners in the recovery of the peregrine falcon, falconers and non-falconers. We are very disappointed that some falconers believe the Service is working counter to their interest. Over the past five years, the Service has spent considerable time and effort in scientific studies that

provide support for the take of raptors from the wild by falconers, in regulation revisions that were requested by the falconry community, and in preparing management plans for the harvest of peregrines in the face of continuing concerns by the wildlife management authorities in several of the jurisdictions affected. We have strived to strike a balance between the interests of falconers and those of the management agencies and other organizations that remain concerned about the proposed harvest of peregrines. Given budget constraints, technical issues, and logistical limitations on our ability to conduct monitoring at a scale sufficient to actually measure the impact of the harvest, we believe the safeguards employed are appropriate, warranted, and will not overly compromise falconers' access to migrant peregrines.

Issue. Many commenters requested that no harvest be allowed unless accompanied by increased banding and population monitoring, several commenters requested a requirement that all peregrines wearing research bands are released, and one state asked for a requirement that all peregrines captured by falconers and released are banded with research bands.

"The DEA suggests periodic analyses of population monitoring data to determine if population trajectories have changed enough to merit revisiting harvest limits. As stated in the DEA, now that Peregrine Falcons have been delisted, the scale of breeding-season monitoring programs has been cut back. Similarly, post-delisting monitoring efforts for Peregrine Falcons in the lower 48 states of the US will continue for less than 10 more years. At this point, with the exception of relatively local monitoring programs, and periodic large scale survey efforts like the Canadian Peregrine Falcon Survey (Rowell et al. 2003), migration counts will provide perhaps the best source of population trend information for Peregrine Falcons. If falconry harvest is to be allowed it makes sense to continue to support this monitoring effort."

"The Ontario Ministry of Natural Resources prefers Alternative 1 (No action) until the PEFA population is considered more secure across eastern North America. If the U.S. Fish and Wildlife Service decides to allow the take of passage peregrines we request that the following actions be considered.

• U.S. Fish and Wildlife Service establish a 3-year pilot project to assess the origin of birds taken and potential population impacts, with regular analysis and review of results, before allowing the continued take of PEFA by regulation, and that as part of the pilot project the U.S. Fish and Wildlife Service:

• support increased banding efforts in the United States and Canada in an effort to determine the origin of captured birds;

• support increased monitoring of PEFA populations in the United States and Canada to ensure the take of birds for falconry does not impact populations;

• require the collection and regular analysis of feather samples from birds taken from the wild for stable isotope analysis to compliment banding efforts;

• ensure the documentation and release of all banded birds that are captured;

• make available all information on birds banded and recaptures, resightings and recoveries."

"The quality of data used in the DEA was less than ideal. Efforts are needed to improve the amount and quality of information regarding population size (especially of northern populations), productivity, survival, and movements. Increased banding efforts of nestling peregrines should be encouraged, especially to monitor the effects of take."

"Captured peregrines with leg bands should be released immediately after band information is collected."

"Migrant Peregrine Falcons taken for falconry-and later returned to the wild-should be banded in order to provide information about subsequent survival."

"Management" of a migrant harvest as proposed in the document presumes that: all provinces, territories and Federal Government support this objective; have public support; and have sufficient resources to monitor peregrine populations with sufficient rigor."

"There is another fatal flaw in the trapping plan. It is impossible to measure the impact of the trapping regimen peregrine populations. Moreover, even if a method could be devised, there is no mechanism in the plan to suspend trapping in case of trouble. Nor is there any consideration for adjusting the take according to the productivity of the season. In some seasons, for example, less than 30% of traditional nesting sites are occupied."

"We can address the expressed needs of the USFWS in adequately monitoring Peregrine populations during the proposed harvest. With adequate resources we can provide the required information on natal origins, regional migration phonology, population estimates, etc. We would welcome both the input of the USFWS in augmenting our protocols to specifically address its monitoring needs, and any available funding support to further those ends and continue to support the general welfare of Peregrine Falcons."

"Because additional measures to address potential over-harvest may be needed or desired in some areas where peregrines are listed as threatened or endangered, we originally had planned to recommend that take of peregrines be specifically prohibited for individuals banded with black/red or black/green secondary bands, used within the Eastern population zone, or other color combinations from populations in which the species is listed as endangered or threatened. While we believe that in some states this constraint would be in keeping with the goals outlined in the DEA, we realize that this approach biases banding efforts, especially as they relate to the use of band recoveries to determine population vital rates. In keeping with the FWS/Flyway Council model of regulating take of migratory birds, we request that in any final rule

the FWS allow maximum flexibility for the AF to propose measures as needed in the future within the AF to address issues regarding over-harvest of juveniles within individual or multiple states. We realize that harvest prohibitions in a particular area would not protect all peregrines originating from that area. However, like the FWS, the AF wants to maintain our role in recovering peregrine populations in all applicable areas within the AF. We believe this approach is consistent with allowable take and population recovery objectives."

"A further acceptable restriction would be to require that all banded peregrines trapped during the take period be immediately released. This restriction would exempt Eastern peregrines that had been banded to any take by falconers."

Response. The approach taken in the DEA is extremely conservative explicitly because we do not think it is practical to monitor the impact of the proposed harvest on populations. Target harvest rates are intentionally low enough that it is reasonable to assume no population-level impact will occur, consequently we do not believe increased population monitoring is required by the proposed action. Likewise, while we believe increased banding or satellite tagging following a well-designed study protocol would be helpful in a finer-scale assessment, the harvest levels proposed do not warrant mandating such work. If an increase in harvest rates above those considered here are desired by falconers or state management agencies, these or other comparable monitoring techniques should be considered as part of any future proposal. That said, the Service concurs that continued monitoring of peregrine falcon populations is desirable, and we believe migration counts, particularly at sites where large numbers of migrant peregrines can be counted following a consistent, standardized methodology, will be particularly valuable in assessing the overall health and trend of the Northern management population. For these reasons, we encourage the flyway councils representing the management agencies that requested the migrant peregrine harvest to consider supporting existing standardized fall migration counts at key peregrine concentration points.

The initial AFWA request for the Service to develop this proposal included, as an added constraint, the requirement to release captured peregrines wearing research bands. Because a higher proportion of peregrines from non-target populations are banded compared to target populations, this would further reduce the likelihood of non-target peregrines being captured. Based on initial conversations with the U.S. Geologic Survey Bird Banding Laboratory (BBL) staff, we decided not to propose this constraint because it would introduce a bias in the band recovery dataset for the peregrine, potentially complicating future data analyses. However, in response to the comments from Canadian provincial wildlife management authorities and two flyway councils, we reinitiated discussions with BBL. As a result, the Service and BBL have determined that the potential benefits outweigh the costs of such a constraint, and so the Service has included this requirement in the FEA and management plan. The Service does not have the resources to support additional banding efforts in the U.S.

or Canada. As with monitoring, we encourage the flyway councils representing the management agencies that requested the migrant peregrine harvest to consider supporting additional strategic banding where warranted in the U.S. and Canada, though we do not require this as a condition of moving forward with the proposed harvest.

With respect to the request to require research-banding of released peregrines after use in falconry, we believe it is unlikely sufficient numbers of these birds would be reencountered to provide meaningful inferences about post-release survival, etc. However, we agree that helpful anecdotal information could be obtained. We have decided not to include this as a mandatory element of the management plan, but we see no reason to object to states requiring such banding if and where practical.

Issue. Many commenters felt that the Service should have relied more heavily on existing migration count data and genetic analyses of effective population size to establish population size estimates for the proposal. Some commenters argued that migration count data show there are many more migrant peregrines than the Service's analysis concluded.

"Large movements of Peregrines continue to be counted on the Atlantic Coast and over and around the Gulf of Mexico, including 1500 to 2000 annually since 1999 in the Florida Keys (Lott 2006). The +4000 offshore oil and gas platforms in the Gulf of Mexico now attract millions of migratory birds, including thousands of Peregrines (Russell 2005). According to Russell (2001, 2005, personal comm.) and his coworkers all of these platforms are now used by Peregrines as brief stopovers (3-4 days) where they rest and hunt migratory birds, mostly at night. Extrapolations of counts at 10 platforms to the entire population of platforms gave estimates that 11,000 to 66,000 falcons could have used oil platforms in 1999, depending on assumptions about duplication of observed birds. During a three day period at the end of September, records of 45 individually identifiable falcons (a fraction of the total seen) were extrapolated to yield a minimum instantaneous point count of about 11,000 falcons at the platforms. The peak movement occurred between 1-5 October when 85 or 31% of all observed birds were counted. If that 31% equaled a total of 11,000 birds (a minimal estimate), then the total passage was 31,484 falcons, of which 60% or 21,290 were juveniles. [Note: the juvenile to adult ratio is about twice as high as reported in the Florida Keys.] An unknown number of migrants also pass around the Gulf of Mexico on its landward border; considering that fact and the apparently separate passage down the Florida Keys, the total movement could have been 40,000 birds minimum. These estimates do not include the falcons moving south to the west of 100° W Long and passing into mainland Mexico and the Gulf of California region. If they represent 20% of the continental migration, then add another 10,000 for a total migration of 50,000 Peregrines. Thus, these migration figures generally fit the upper population estimates based on number of breeding pairs."

"Recently, HawkWatch International, Hawk Mountain Sanctuary, and the Hawk Migration Association of North America have collaborated to produce a continental-scale analysis of raptor population trends from migration count data…. The first of these analyses was completed in 2006... Trend analyses were performed for 11 migration sites, two representing the Great Lakes region, two from the Appalachians, two from the northeast Atlantic Coast, four from the Gulf Coast, and one from the southern Rocky Mountains. Note that the four sites in the Gulf Coast region have only been active since the mid-to-late 1990s. Trend estimates for these sites are less precise than trend estimates from northern sites with 19-21 years of data. Given the relatively low coefficient of variation (CV) of migration counts in the Gulf Coast region, it is expected that trend estimates for Gulf Coast sites will acquire the precision necessary to detect significant trends (should they be present) within a few years. Sites with enough data to detect significant trends documented widespread significant increases for Peregrine Falcon populations in recent years…. Note that many of the sites …count a relatively small number of Peregrine Falcons. Counts at Curry Hammock State Park in the Florida Keys; Cape May, NJ; and Veracruz, Mexico record a much larger proportion of the range-wide population for this species than other sites. Two additional sites, Kiptopeke, VA, about 100 miles south of Cape May on the Atlantic Coast, and Kekoldi, Costa Rica, also count large numbers of Peregrine Falcons, and trend analyses will be performed for these sites as well…"

"This DEA ignores the abundant recent published data on coastal migrants. This is a significant shortcoming because those data strengthen the position that a harvest should be allowed. "

"Since 1970 we and our colleagues have invested a total of 46,242 man hours on migratory Peregrine Falcon surveys at both Padre and Assateague Islands in the autumn (both islands) and spring (Padre Island). We have meticulously recorded 55,198 sightings of Peregrine Falcons by age, sex, date, time and location. Of the falcons sighted we have captured 12,673 individuals. We have banded all new captures and reported those previously banded, sampled many individuals for studies on genetics, environmental contaminants and known and emerging pathogens (West Nile Virus, Avian Influenza and others). Many were tagged with VHF or satellite telemetry transmitters to elucidate local, regional and transcontinental movements and habitat requirements for the Tundra Peregrine in our hemisphere…. [T]he standardized average number of migrating Peregrines we have observed over the past 29 years is essentially the same as that Nye saw more than six decades ago, before DDT had serious adverse effects on the reproductive potential of the Peregrine Falcon in North America."

"Perhaps the best recent data to substantiate the population status of North American migrant peregrines is a 2007 paper by Johnson and Mindell. (Johnson JA, Mindell DP (2007) Temporal population genetic stability of Peregrine Falcons

migrating through Padre Island, Texas. 125th Stated Meeting of the American Ornithologists' Union. Aug 8-11, 2007, Laramie, WY.) wherein they examined tissue samples from migrant peregrines collected between 1985 and 2006 to determine the effective population size (number of breeders) based on a temporal genetic approach that estimates the population size necessary to account for allele frequency change over time due to genetic drift (random change in allele frequencies over time). This technique is often used for determining fisheries spawning stock size and then used to ascertain harvest quotas. Eleven micro satellite loci were used to estimate the effective population size of migrant peregrine falcons using similar methods. The results indicated that the rate of allele frequency change was low indicating that the samples came from a large effective population size (N_e) estimates ranging between 350 to 9,999 breeding falcons per generation with a confidence interval ranging between 137 to 10,000+ individuals. The fact that the method did not provide a precise estimate further suggests that the population is large with genetic drift playing little influence on allele frequency change. When populations are less then 1000 breeding individuals, this method is much more precise (i.e., smaller confidence interval)."

Response. We concur that migration count data provide useful information on the recovery and relative population trends for migrant peregrines. We reviewed and considered this information in the preparation of the DEA, but concluded that it did not help inform estimates of population size because counts of migrants from different sites are likely to be, to some unknown degree, duplicative. Further, no single independent site, or combination of sites, counted a substantial enough proportion of the migrant population to stand alone. Information gleaned from peregrine falcon use of oil platforms in the Gulf of Mexico is intriguing, but it has not been published or subjected to scientific review, hence its use to establish harvest thresholds would be premature. Recent population estimates based on estimates of effective population size also offer promise in establishing safe, lower limits for the size of the migrant population, but this work has not been peer-reviewed and published, and we do not believe it should be used as the basis for harvest thresholds. These approaches should be reviewed in the future as part of the periodic population reassessments called for in this FEA.

Issue. One commenter provided a summary of recent, unpublished work calling into question the validity of stable isotope analysis to determine the latitude of origin for birds. In contrast, other commenters felt that use of this technique to validate banding data was so important that the Service should conduct stable isotope analysis of feathers annually.

"In sum, the DEA suggests that stable isotope and genetic studies will be adequate to assign actual migrants taken for falconry to specific management populations. We view this as either: 1) an unlikely scenario for genetics; 2) an unlikely scenario using existing stable isotope approaches; and 3) a scenario of unknown merit using the

stable isotope approach suggested herein. In this setting, it seems that governments should probably not be assured that either of these methods will produce valid information to assess how levels of falconry take in the US are related to specific management populations."

"Given the importance of the proposed stable isotope or DNA analysis of collected feathers to evaluating the effectiveness in the management guidelines to target take to robust populations, we recommend that feather analyses as described in the DEA be conducted immediately each year, beginning in year one, following the collection season and that this information be provided to all interested parties so that management/take policies can be amended for the subsequent year. We understand that there is currently some question as to the validity of the stable isotope method. We recommend that all proposed monitoring approaches be additionally evaluated and that the most reliable method be standardized and employed. The AFC requests that the FWS coordinate and pay for these collection, analysis, and evaluation efforts."

Response. Given the evolving understanding of the value and applicability of stable isotope analysis, the Service does not believe an annual evaluation of feather samples is warranted. Rather, the Service will require the collection of feathers from harvested peregrines for three years, during which time we hope some of the scientific questions about the potential analysis approaches can be resolved. At that time, if warranted based on contemporary understanding of the limitations of the technique, the Service will conduct appropriate analyses to asses the likely natal origin of harvested peregrines.

Issue. Several commenters objected to the U.S. moving forward in allowing harvest until the management authorities of all affected countries supported the action.

"PEFA is one of Ontario's best known species at risk and the bird's recovery has had a high profile and been a high priority in Ontario for several decades. Recovery to date has resulted from significant collaborative efforts with a number of non-government organizations that remain cautious about the status of the bird due to their tremendous interest and investment in the program. The ministry anticipates negative reaction to potential harvest in the U.S. of young peregrines produced in Ontario."

"In all of this the Service has failed to accomplish or respect its original mandate. Worse, the failures of the Service have compromised the recovery effort in Canada. The Service is now poised to compound its errors. How can one consider a take of Canadian falcons when anatum is still a listed species and birds are still being hacked-back? We hack'em and you grab'em… is that the idea? Perhaps it is time for the Service to abandon its role as purveyor of fur, fish, and feather for a more modern vision: protector and preserver of wild life resources for future generations… Finally, I offer a word on the political ramifications of your pending rule. On behalf of all

Canadians I challenge your claim of divine right to manage non-American peregrine populations. You have a right to harvest all the American-born falcons you want to; but Canadians will not permit you to poach their birds."

"In conclusion, we appreciate the opportunity to review the document, but suggest that harvest of any age class of migrant peregrines originating in Nova Scotia should not be endorsed by the USFWS, or the Government of Canada based on this EA."

"Finally, we note that our neighbors and cooperators to the north, the Greenland Ministry of the Environment, have opposed the take of any of their first-year migrants because exploitation of this species is prohibited in Greenland. We suggest that concurrence from our neighbors to the north be sought prior to implementation of any policy which, as proposed, would draw heavily from their native populations. We would expect such treatment if the situation were reversed."

Response. The U.S. does not take its responsibility to coordinate management of transboundary species like the peregrine lightly. In the case of the harvest of migrant peregrines, the Service initiated contacts with Canada and Greenland in 1998, shortly in advance of receiving the initial proposal from AFWA. Based on informal coordination with the Canadian Wildlife Service and comments from Canadian provincial wildlife management authorities (in part), the Service imposed the following constraints on the harvest proposal: (1) we based take thresholds on known minimum, rather than extrapolated, population estimates; (2) we established extremely conservative harvest thresholds for low and mid-latitude Canadian *F. p. anatum* populations; (3) we have deducted Canada's existing migrant peregrine harvest and Mexico's estimated harvest from U.S. harvest thresholds for affected populations; and (4) we require all peregrines wearing research bands that are captured by falconers to be released. Greenland's expressed objection was to the take and personal possession of wildlife, not to the effects of the proposed harvest on Greenland's peregrine population, so no constraints have been imposed to reduce estimated take of peregrines originating from Greenland. We believe the additional constraints imposed on the harvest of migrant peregrines adequately address the legitimate biological concerns of Canadians, although we realize most provincial governments and Canadian citizens who commented will disagree. The U.S. respects the rights of Canada and Greenland to manage peregrines domestically as each sees fit, but as these birds enter into the U.S., Canada and Greenland must respect the U.S.'s rights to do the same, so long as the use of peregrines by the U.S. does not compromise the health of affected populations. The Service believes the extremely conservative nature of the proposed harvest will ensure that it poses no risk to the health of Canada's and Greenland's breeding peregrines.

"Because most migrant peregrines taken will be of northern origin, the USFWS should give extra consideration to Canadian and Danish (for Greenland populations)

concerns. Expansion of take in the United States will put pressure on Canadian officials to allow take in Canada."

Response. The Canadian province of Saskatchewan has allowed harvest of a small number of fall migrating peregrines for several years. Therefore, the U.S. will not set an international precedent by allowing harvest and is not likely to put pressure on Canadian officials to allow take in Canada.

Issue. One flyway council requested standardized protocols for determining the sex of captured peregrines, and another was concerned about the feasibility of regulating sex ratio in the harvest.

"We appreciate the objective of sexual parity intake as described in the DEA, and encourage the FWS to provide to all interested parties: a standardized protocol for morphologically sexing peregrines in the field on the basis of their sexual size dimorphism, and a mechanism or protocol for monitoring and coordinating take of birds during the season, to achieve the desired parity of harvest."

"What is unclear is how the western states will regulate sex ratio harvest if migrants harvested in the preferred alternative area skew the sex ratio. This will require a particularly challenging level of coordination and management activity, as it will be necessary to engage in substantial interaction among the states both before and during take periods in a given year. We are concerned about the level of effort that might be required to address perceived risks associated with imbalanced sex ratio management even though we believe those risks to be minimal."

Response. Criteria acceptable to the U.S. Bird Banding Laboratory for aging and sexing peregrine falcons will be the standard for determining the sex of harvested peregrine falcons. The Service appreciates the flyway council's concerns about how to ensure relative sexual parity in the harvest, but we are reluctant to prescribe a particular approach that might prove overly constraining on the councils. However, because the harvest is of live birds that can be sexed and released if necessary, it would be practical for participating states to issue an equal number of permits for birds of each sex. The Service recognizes that not all permits issued will result in the harvest of a peregrine, and as such, ensuring sexual parity in the actual harvest would be impossible. Accordingly, the Service has clarified that the requirement for sexual parity will be measured against the harvest limit, not the actual harvest. The entire harvest could consist of females as long as the total number of peregrines harvested does not exceed 60% of the established harvest limit. Even if the entire harvest in any given year consists entirely of one sex, the 60% limit, coupled with the conservative nature of the harvest limits, should ensure that the harvest will have a negligible effect on peregrine populations.

Issue. One state requested that falconers be required to report details of the acquisition and disposition of captured peregrines.

"Given this, the Department supports Alternatives 2, 3, and 5 as proposed by the United States Fish and Wildlife Service (USFWS). This support is contingent on two items. First, is the timely reporting by the USFWS of captured banded birds to the state wildlife management agency of the state where the bird was produced. Second, is the reporting of the date and location of release of these birds to the same agency."

Response. Falconers who capture peregrines will be required to submit a detailed report on paper or electronically on form 3-186A to the Service and to the pertinent state fish and wildlife agency. The 3-186A form will provide information on each peregrine captured or disposed of via release, transfer, or death.

Issue. One flyway council requested that the Service clarify the impact of the proposed migrant harvest on the existing harvest of nestling peregrines in the western United States.

"The Federal Register (FR) mentions reducing western states peregrine falcon (PEFA) nestling harvest. It is understood that this stipulation may be necessary to ensure that no more than 5 percent of any cohort is harvested in a given year per the 2004 FR Notice on the Take of Nestling PEFA. However, if the current harvest levels across the west are below the 5 percent mandate, the western states would like the final Environmental Assessment (EA) to clarify that states can maintain or even increase their current levels of nestling harvest as long as the projected 1 percent harvest of migrants is accounted for."

Response. Under many of the alternatives, some migrants from the Western management population are likely to be captured by falconers. We take this harvest into account by reducing the resident harvest commensurately, as shown in Table 3. The flyway council is correct that the existing nestling harvest in the Western management population does not approach the harvest limits, so we do not anticipate this reduction to be problematic. However, under the new Alternative 7 the added flexibility will probably increase harvest rate for the Western management population, but not to overall levels that exceed a 5% harvest rate.

Issue. Some commenters felt that strict regulation of the peregrine harvest was unnecessary because there are few falconers and even fewer who will want to trap migrant peregrines.

"As a general matter, falconers are a very small group and are not likely to take peregrine falcons from the wild in large enough numbers to materially impact any of the management populations. Of the approximately four thousand falconers in the United States with FWS-issued permits, many have no intention to take peregrine falcons from the wild regardless of what rules the FWS promulgates. As a result, the

true level of take by falconers in the United States is likely to be much lower than even the low number of practicing falconers in the United States would indicate."

"There are grounds for predicting that the harvest quotas will be undersubscribed. Most falconers do not fly peregrines. Colorado, for example, has for several years offered permits for nestling peregrines, but no one has yet taken one. Considerations in the EA, therefore, may be matters of principle rather than practicality."
Response. We recognize that demand for migrant peregrines may be low. If that is the case, then the upper limits placed on the harvest should not be a burden.

Issue. Some commenters requested that the Service delegate the authority to increase harvest thresholds in the future to the flyway councils.

"The Flyway Councils should continue to monitor both the population status and production of regional populations at intervals of three to five years, as well as the actual number of falcons taken within the permitted harvest limit. The Flyway Councils should be given the authority to make adjustments in harvest commensurate with population status and demand for take, to allow any take considered equitable and safe up to the 5% limit of annual estimated production. A take of 100 migrants seems a reasonable harvest for the start; it can then be adjusted upward, if demand for permits indicates a reason to do so."

Response. The Service believes a harvest of up to 5% of annual production of peregrines is biologically justified and sustainable based on analyses in Millsap and Allen (2006). The constraints limiting harvest to lower levels for some management populations are imposed at the request of some member states of the Atlantic and Mississippi flyway councils and CWS. To reduce the administrative steps necessary to increase harvest levels in the future, we have added Alternative 8 in the FEA, in which we analyzed adopting an across-the-board 5% harvest rate for all peregrine falcon management populations. This alternative could be implemented upon removal of the peregrine falcon from the Species At Risk list in Canada, and upon formal notification to the Service by both the Atlantic and Mississippi flyway councils that constraints to limit harvest of the Eastern management population are no longer necessary. If this occurs, the flyway councils may still have to coordinate harvest among states to ensure harvest is distributed appropriately among participating states, and so that no management population is overharvested.

Issue. One flyway council requested clarification on state import and export restrictions that might apply to harvested migrant peregrines, and other commenters offered specific suggestions for allocation of harvest.

"Allowing the harvest of migrants in a small portion of the U.S. may lead to larger issues of importation and exportation between the states. It is not indicated in the EA if the states within the preferred alternative area allow for exportation of raptors to other

states. We believe a table is needed depicting each state's regulations on importation and exportation of raptors, to include whether or not falconers in other states will be allowed to export birds from this area."

"Limit the take of passage birds to 10 birds for Florida and 10 birds for Texas."

Response. We neither restrict the import or export of raptors harvested by falconers within the U.S., nor falconers' ability to transfer raptors from one permittee to another. We see no reason to treat fall migrant peregrines differently than any other raptor in this regard, so we do not propose any species-specific restrictions. The Service does not monitor state falconry regulations relative to import and export and non-resident harvest, so we cannot provide the requested summary table of this information.

The flyway councils will determine the allocation of harvest among states within the broad harvest frameworks established in the FEA. While the Service will not interfere with the flyway council's discretion in this regard, we do encourage flyway councils to work together (perhaps through the National Flyway Council and in conjunction with the falconry community) to ensure states with the greatest harvest opportunity receive an appropriate share of the harvest allocation.

AUTHORITY AND RESPONSIBILITY

Regulations allowing the take of migratory birds are authorized by the Migratory Bird Treaty Act (MBTA) (16 U.S.C. Sections 703-712), which implements the four bilateral migratory bird treaties the U.S. entered into with Canada, Mexico, Japan, and Russia. The MBTA authorizes the Secretary of the Interior to allow people to hunt, take, possess, sell, purchase, and transport migratory birds if those actions are compatible with the provisions of the treaties (16 U.S.C. Section 704).

AFFECTED ENVIRONMENT

BIOGEOGRAPHY AND DISTRIBUTION

Three subspecies of peregrine falcon are recognized in North America: *F. p. pealei*, the maritime, or Peale's peregrine; *F. p. tundrius*, and *F. p. anatum* (White *et al.* 2002). Although *F. p. tundrius* is considered taxonomically distinct from *F. p. anatum* at the subspecies level, recent genetic work suggests little differentiation between these forms (Brown *et al.* 2007). In the interior of Alaska and northern Canada these subspecies may intergrade such that they overlap considerably in plumage and morphology, and both are strongly migratory, in contrast to *F. p. pealei* and *F. p. anatum* in temperate North America (White and Boyce 1988, Taubert *et al.* 1999). Because of genetic and phenotypic similarity and similar migratory behaviors,

it is difficult to separate high-latitude *F. p. anatum* from *F. p. tundrius* outside their respective breeding areas.

Peregrines from more temperate areas south of 54° N latitude migrate less markedly and many overwinter within their breeding range (Taubert *et al.* 1999). Peregrines in the eastern part of this range are perceived to have recovered more slowly than those in the west (Millsap *et al.* 1998), and for management it is desirable to distinguish between these two groups. For the purposes of this plan, we identified three management populations of peregrine falcons in North America and Greenland: (1) Northern, consisting of *F. p. anatum* and *F. p. tundrius* subspecies originating at natal sites at or north of 54° N latitude; (2) Western, consisting of all American peregrine falcons originating from natal sites at or west of 100° W longitude and south of 54° N latitude and all Peale's peregrines (*F. p. pealei*); and (3) Eastern, consisting of all peregrines (*F. p. anatum* and individuals of all other subspecies released there for management purposes) originating from natal sites east of 100° W longitude and south of 54° N latitude. The relationship between taxonomic and management populations is shown in Figure 1.

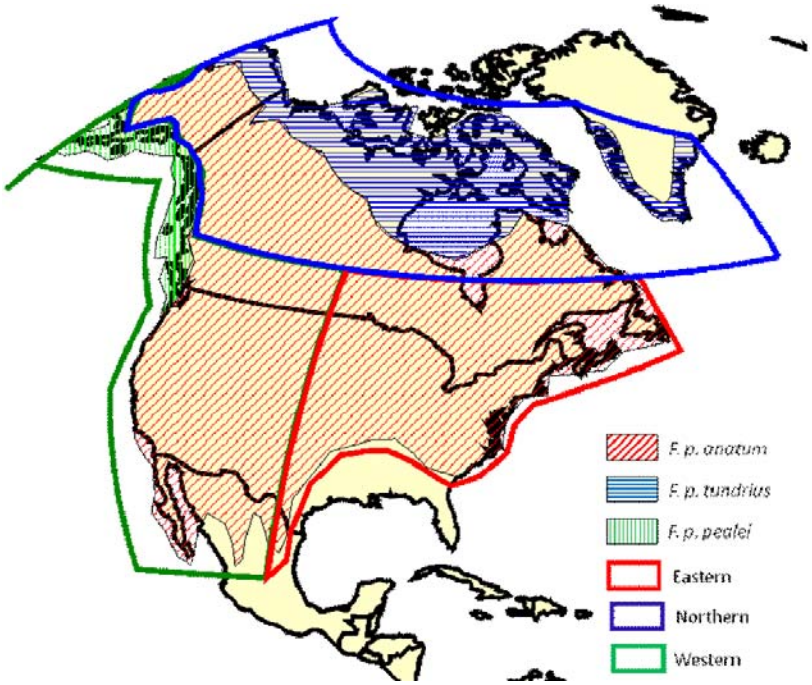

Figure 1. Relationship between taxonomic and management populations for North American peregrine falcons. Taxonomic subspecies boundaries follow White and Boyce (1988). In reality, the boundaries are uncertain and likely intergrade into one another. The red hatched area denotes the range of *F. p. anatum*, the green hatched area denotes the range of *F. p. pealei*, and the blue hatched area denotes that of *F. p. tundrius*. The heavy red line denotes the boundary of the Eastern management population, the heavy green line denotes the Western management population, and the heavy blue line borders the Northern management population.

POPULATION SIZE

Peregrine falcons are monitored regionally by a variety of surveys, but for most management populations the certainty of our knowledge of population size and productivity has decreased as populations have recovered, and monitoring has decreased. The ranges of recent available estimates of numbers of breeding pairs of peregrine falcons in each management population are provided in Table 1, along with source citations. Based on these data, we believe the Northern population consists of 2,701 to 8,075 pairs, the Eastern population consists of about 453 pairs, and the Western population consists of 1,389 to 1,840 pairs.

The number of young fledged per adult territorial pair, or productivity, is a common measure of reproductive success in raptors (Steenhof 1987). Ranges of regional estimates of productivity for North American peregrine falcons are given in Table 2. Based on data presented in Tables 1 and 2, we estimate that between 6,862 and 16,960 young peregrine falcons are produced annually in North America (Table 2). Estimates of numbers of young fledged may be positively biased because deaths of nestlings do occur after productivity counts are conducted, and pairs that fail to lay eggs are hard to detect and therefore lead to underestimates of the number of pairs that are actually present (Steenhof 1987). We know of no studies that provide widely applicable correction factors for these biases. To account for this bias here, we converted the best available annual survival rate estimate for nestling North American peregrines (54%, from Craig *et al*. 2004) to a daily survival rate estimate (99.83%), and then estimated what mortality for a 30-day period (a reasonable maximum of the period not accounted for in the annual survival rate estimate) would be (5%). We doubled that number to account for pairs that may have been missed due to early nest failures (to 10%). Therefore, for assessment purposes, we use a conservative, adjusted range for annual peregrine falcon production that is 10% lower than the range estimated in Table 2. After applying this 10% correction factor, we consider the range for annual production of peregrines in North America and Greenland for management purposes to be between 6,176 and 15,262 young fledged annually.

MIGRATION BIOLOGY

Taubert *et al*. (1999) identified migration timing and distance as important factors in harvest management for migrant peregrine falcons. We used band recovery records to estimate the fall and winter distribution of juvenile (less than one year old) peregrine falcons of known natal origin (those banded as nestlings) from these three populations. Banding and recovery locations of peregrine falcons used in this analysis are shown in Figure 2.

Banding data were not ideal for this analysis because the distribution of banding effort was not uniform or stratified in a purposeful way, and reencounters appeared biased toward fall raptor banding stations and areas of human habitation. Despite these biases, we believe banding records are useful, and offer the best available means for evaluating the possible environmental effects of this proposal. We used all available band recovery and reencounter data in the U.S. Geological Survey files; this

Table 1. Maximum and minimum population size estimates, based on most recent counts or projections, for North American peregrine falcon populations.

Minimum number of pairs	Maximum number of pairs	Population	Place	Source
1,000	1,000	Northern	Interior AK	Green *et al.* 2006
158	225	Northern	Arctic AK	Enderson *et al.* 1995
1,143		Northern	Canada	G. Holroyd, Canadian Wildlife Service, personal communication in Taubert *et al.* 1999
	4,350	Northern	Canada	Enderson *et al.*1995
400		Northern	Greenland	Enderson *et al.* 1995
	2,500	Northern	Greenland	W. G. Mattox, Conservation Research Foundation, personal communication in Taubert *et al.* 1999 as modified by comments in administrative record letter in response to DEA
2,701	**8,075**	**Northern**	**Total**	
336	336	Eastern	Eastern U.S.	Green *et al.* 2006
22	22	Eastern	Labrador and Newfoundland	Rowell *et al.* 2003
11	11	Eastern	Bay of Fundy, Nova Scotia, New Brunswick	Rowell *et al.* 2003
28	28	Eastern	S Quebec	Rowell *et al.* 2003
53	53	Eastern	S. Ontario	Rowell *et al.* 2003
3	3	Eastern	S. Manitoba	Rowell *et al.* 2003
453	**453**	**Eastern**	**Total**	
4	4	Western	S. Saskatchewan	Rowell *et al.* 2003
23	23	Western	S. Alberta	Rowell *et al.* 2003
1	1	Western	Interior British Columbia	Rowell *et al.* 2003
17	17	Western	Lower British Columbia, Victoria Island	Rowell *et al.* 2003
9	9	Western	Langara Island	Rowell *et al.* 2003
60	60	Western	Queen Charlotte	Rowell *et al.* 2003
20	20	Western	N. Vancouver and Scott Island	Rowell *et al.* 2003
7	7	Western	Triangle	Rowell *et al.* 2003
149	600	Western	AK coastal	Enderson *et al.* 1995
472	472	Western	Pacific	Green *et al.* 2006
367	367	Western	Rocky Mountain/Great Plains	Green *et al.* 2006
260	260	Western	Southwestern	Green *et al.* 2006
1,389	**1,840**		**Western Total**	
4,543	**10,368**		**Overall Total**	

Table 2. Productivity for regional population for North American peregrine falcons.

Number young per nesting pair	Minimum number of pairs[a]	Maximum number of pairs	Minimum number of young fledged per year	Maximum number of young fledged per year	Population	Place	Source for productivity Information
1.18	1,000	1,000	1,180	1,180	Northern	Interior AK[a]	Green *et al.* 2006
1.14	158	225	180	257	Northern	Arctic AK	T. Swem, USFWS files and personal communication
1.60	1,143	4,350	1,829	6,960	Northern	Canada	Rowell *et al.* 2003
2.00	400	2,500	800	5,000	Northern	Greenland	Falk and Moller 1987, Mattox and Seegar 1988
1.48	**2,701**	**8,075**	**3,989**	**13,397**	**Northern Total[b]**		
1.66	336	336	558	558	Eastern	Eastern U.S.[c]	Green *et al.* 2006
1.60	22	22	35	35	Eastern	Labrador and Newfoundland	Rowell *et al.* 2003
1.80	11	11	20	20	Eastern	Bay of Fundy, Nova Scotia, New Brunswick	Rowell *et al.* 2003
1.60	28	28	45	45	Eastern	S Quebec	Rowell *et al.* 2003
1.60	53	53	85	85	Eastern	S. Ontario	Rowell *et al.* 2003
2.00	3	3	6	6	Eastern	S. Manitoba	Rowell *et al.* 2003
1.65	**453**	**453**	**748**	**748**		**Eastern Total**	
1.70	4	4	7	7	Western	S. Saskatchewan	Rowell *et al.* 2003
1.53	23	23	35	35	Western	S. Alberta	Rowell *et al.* 2003
1.53	1	1	2	2	Western	Interior British Columbia[d]	Rowell *et al.* 2003
1.53	17	17	26	26	Western	Lower British Columbia, Victoria Island	Rowell *et al.* 2003
1.30	9	9	12	12	Western	Langara Island	Rowell *et al.* 2003
1.53	60	60	92	92	Western	Queen Charlotte	Rowell *et al.* 2003
1.53	20	20	31	31	Western	N. Vancouver and Scott Island	Rowell *et al.* 2003
1.53	7	7	11	11	Western	Triangle	Rowell *et al.* 2003
1.53	149	600	228	918	Western	AK coastal	Enderson *et al.* 1995
1.45	472	472	684	684	Western	Pacific	Green *et al.* 2006
1.49	367	367	547	547	Western	Rocky Mountain/Great Plains	Green *et al.* 2006
1.73	260	260	450	450	Western	Southwestern	Green *et al.* 2006
1.53	**1,112**	**1,112**	**1,700**	**1,700 Western (Known)[e]**			
1.53	**1,389**	**1,840**	**2,125**	**2,815 Western (Projected)[e]**			
1.51	**4,266**	**10,364**	**6,862**	**16,960 Overall**	**GRAND TOTAL**		

[a] 1.18, the more conservative estimate of productivity for the Interior Alaska regional population based on footnote 4 in Table 2, is used here.

[b] Number of Young per Nesting Pair in regional population and grand total summary rows is calculated as (∑ Minimum Number of Young Fledged per Year) / (∑ Minimum Number of Pairs). This approach was used because it provides the most conservative regional population estimate.

[c] Calculated from Table 1 in Green *et al.* 2006, combining data for the Midwestern/Northeastern and Southeastern regional populations (*i.e.*, 171+21 young fledged divided by 95+21 sites checked = 1.66 young fledged per site).

[d] Italicized values in the Number of Young per Nesting Pair column are regional population means, because specific regional population estimates of productivity were not available.

[e] Western (Known) only includes data from places with recent productivity estimates. Western (Projected) uses mean productivity from the Western (Known) places to estimate total production for the entire Western management population.

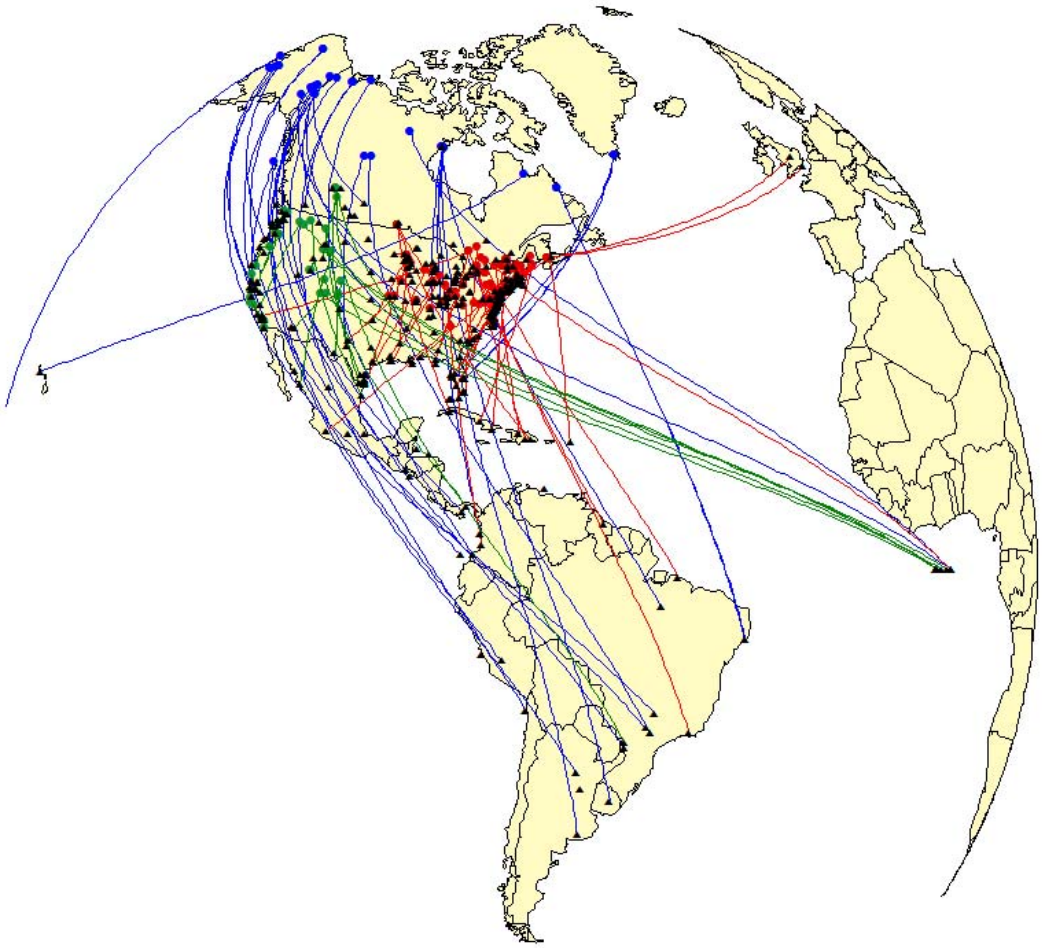

Figure 2. Banding and reencounter locations of peregrine falcons used in the analyses reported in this final environment assessment. Some banding and recovery locations include multiple individuals (total n=623).

initially incorporated all encounter records from 1937 through 2004, including recoveries for birds banded in Canada. In addition, W.G. Mattox (Conservation Research Foundation [CRF], personal communication) provided us with all band recovery data for peregrines banded in conjunction with several projects by CRF and The Peregrine Fund in Greenland. We pooled these datasets, and then filtered the composite to select records for peregrine falcons that had been banded as nestlings and that were encountered in their first year. We further screened this dataset to eliminate individuals with questionable encounter dates (such as month unknown or recovered as skeletons) or questionable reencounter locations (such as on ships at sea), and we filtered out all initially incorporated all encounter records from 1937 through 2004, including recoveries for birds banded in Canada. In addition, W.G. Mattox (Conservation Research Foundation [CRF], personal communication) provided us with all band recovery data for peregrines banded in conjunction with several

projects by CRF and The Peregrine Fund in Greenland. We pooled these datasets, and then filtered the composite to select records for peregrine falcons that had been banded as nestlings and that were encountered in their first year. We further screened this dataset to eliminate individuals with questionable encounter dates (such as month unknown, recovered as skeletons) or questionable reencounter locations (such as on ships at sea), and we filtered out all pre-migration and breeding season records (those records outside the months of September through March). Hereafter, we refer to this dataset as the peregrine band recovery dataset.

We inferred latitudinal and longitudinal patterns in the distribution of migrating and wintering peregrine falcons of each management population from cumulative frequency distributions of fall and winter band reencounters. We treated these frequency distributions as probability distributions, which presume frequencies of band reencounters are representative of the actual distribution of peregrines from each management population. Despite the aforementioned biases in banding data, we believe the results of these analyses are generally accurate at the coarse geographic scale of our analysis, and offer the best insights possible with available data into how migrating peregrine falcons from each management population are distributed during fall migration. We excluded records of peregrines recaptured at raptor banding stations from latitudinal distributional analyses because raptor banding stations were not evenly distributed, and including such recaptures heavily biased the probability distributions to a narrow range of latitudes within the continental U.S. where active trapping was ongoing. This bias was not as problematic for longitudinal analyses because most raptor banding stations that capture large numbers of peregrine falcons are along the Atlantic coast, and the primary bias (overestimating the proportion of the Western management occurring east of 100° W longitude) was conservative relative to our conservation objectives.

Migration distance increases with increasing natal latitude in North American peregrine falcons, as shown by regression analysis of distance between natal and winter reencounter latitude - longitude coordinates in the peregrine band recovery dataset (Figure 3). In this dataset, natal latitude accounts for 59% of the variation in migration distance in North American peregrines[1]. Mean post-September reencounter latitude differed among the three management populations as well (Figure 4); *post-hoc* analysis indicated mean post-September reencounter latitude for Northern and Western populations and Western and Eastern populations were not different from each other, but means for Northern and Eastern populations were different (1-way analysis of variance, $F_{2,367} = 7.426$, $P = 0.001$, Bonferroni *post-hoc* analysis, $P < 0.001$ for Northern vs. Eastern, $P = 0.162$ for Western vs. Eastern, and $P = 1.00$ for Western vs. Northern).

[1] This analysis probably underestimates the difference between management populations because some Northern peregrines might not have reached their final winter destinations in November, and others might have begun the return northward migration before the end of March.

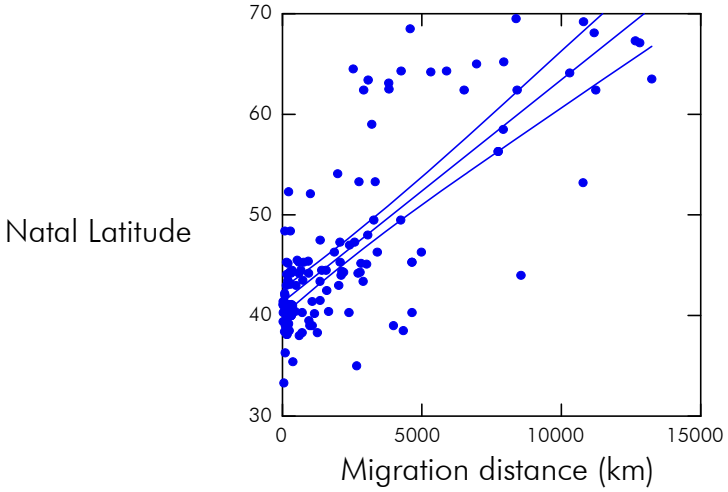

Figure 3. Linear regression analysis shows a strong positive linear relationship between natal site latitude and distance to wintering locale in North American peregrine falcons, based on 143 peregrine falcons that were banded in North America as nestlings and encountered during their first winter (1 November through 31 March). The regression line is bounded by the 90% confidence interval ($R^2 = 0.596$, slope = 0.002 [SE = 0.0001], $P < 0.001$).

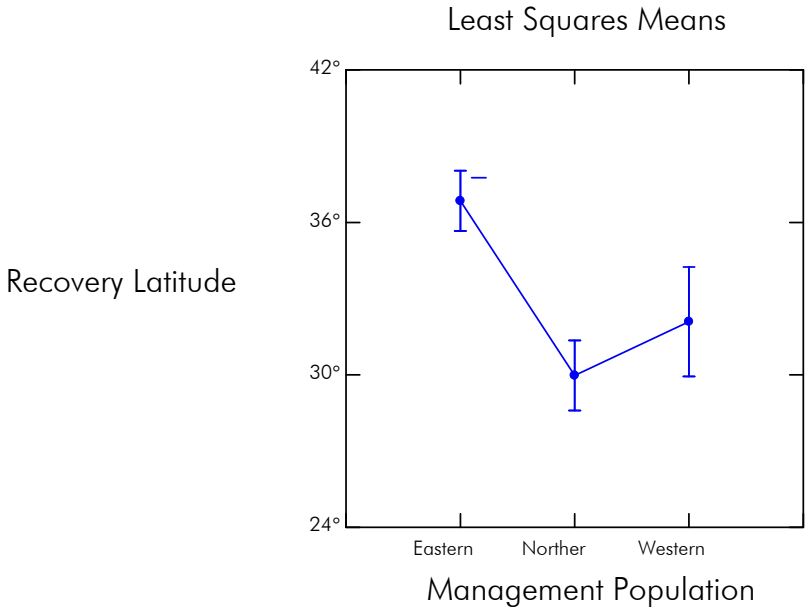

Figure 4. Mean (+1 SE) reencounter latitude of first-year North American and Greenland peregrine falcons initially banded as nestlings and reencountered during the period 1 September through 31 March, by management population. Peregrines captured at autumn raptor banding stations are omitted to avoid a bias toward trapping locales (Eastern $n = 181$, Northern $n = 134$, Western $n = 55$).

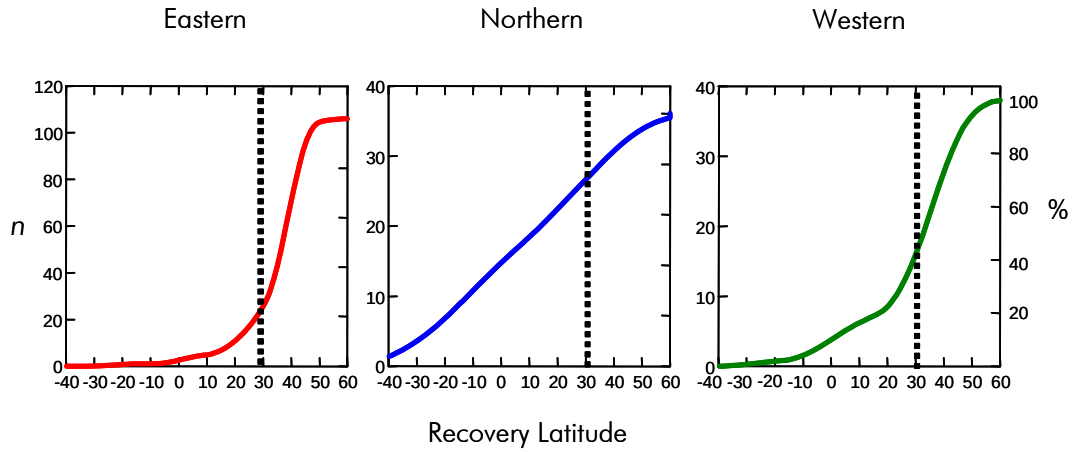

Figure 5. Cumulative kernel frequency distribution (tension[2] = 0.50) for band reencounters by latitude for first-year North American and Greenland peregrine falcons initially banded as nestlings and reencountered during their first winter (1 November through 31 March) by management population (Eastern n = 106, Northern n = 36, Western n = 38). The dashed lines represent the critical latitudes in the harvest alternatives.

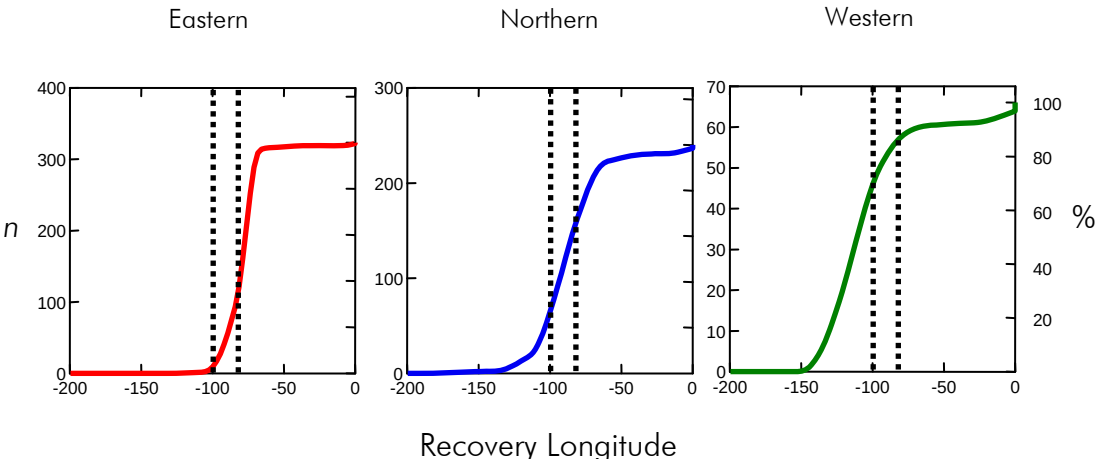

Figure 6. Cumulative kernel frequency distribution (tension = 0.50) for band reencounters by degrees W longitude for first-year North American and Greenland peregrine falcons initially banded as nestlings and encountered during their first fall or first winter (1 September through 31 March) by management population (Eastern n = 323, Northern n = 240, Western n = 66). This distribution was not substantially skewed by including peregrines captured at fall raptor banding stations, so those recaptures were retained in the analysis. The dashed lines represent the critical longitudes in the harvest alternatives.

Cumulative frequency distribution plots of winter reencounters by latitude suggest that about 72% of Northern and 40% of Western peregrines migrate to locations

[2] The degree to which a line adheres to the points in an x-y plot. A tension of 0.50 is a smoothed line through the data.

south of 31° N latitude, while about 80% of Eastern peregrines winter north of this latitude (Figure 5). Longitudinal plots of fall and winter reencounters indicate that very few Eastern peregrines occur west of 100° W longitude, about 65% of Western peregrines remain west of 100° W longitude, and about 88% of Northern peregrines range east of 100° W longitude (Figure 6).

Timing is an important consideration in a harvest of migrant peregrine falcons, because focusing harvest at the time of peak migration of Northern peregrines increases the likelihood of encounters with individuals from this management population (Taubert *et al*. 1999). To determine the timing of maximum passage of Northern peregrines in North America we used reencounter records from fall raptor banding stations, which generally operate throughout the period of migration for North American raptors (Hawk Migration Association of North America 2007). A cumulative frequency distribution of reencounters of Northern peregrines at banding stations (Figure 7) showed that about 92% of reencounters with Northern peregrines at banding stations occur from 20 September through 20 October. This finding is consistent with results of a recent peer-reviewed paper on the timing of peregrine falcon migration in North America (Worchester and Ydenberg 2008).

HARVEST BIOLOGY

Millsap and Allen (2006) concluded that the maximum sustained yield (MSY) for a harvest of passage peregrine falcons from a healthy, non-migratory population was about 17% of the first-year cohort. Millsap and Allen based their analysis on data from a long-term mark-recapture study of a Western *F. p. anatum* population in Colorado, USA (Craig *et al*. 2004). Vital rates might differ for more northern, highly migratory peregrine *F. p. tundrius*. Court *et al*. (1989) observed slightly higher rates of adult survival (81% for females, 85% for males) among *F. p. tundrius* at Rankin Inlet, Northwest Territories, Canada, compared to that reported from Colorado (Craig *et al*. 2004), but they did not estimate subadult survival and their estimate of first-year survival did not account for emigration. Based on this limited information, we concluded there is no evidence to suggest survival rates of Northern peregrines would differ substantially from that for *F. p. anatum* in Colorado. However, data in Table 2 suggest productivity may be lower, at least currently, for Northern peregrines. We re-ran Millsap and Allen's (2006) model for a hypothetical Northern peregrine falcon population with the following vital rates: number of suitable nesting sites = 1,000; average annual adult survival = 81% (from Court *et al*. 1989); average annual subadult survival = 67% (unchanged from Craig *et al*. 2004); average annual first-year survival = 54% (unchanged from Craig *et al*. 2004); and annual fecundity = 1.48 young fledged per occupied nest site (from Table 2). We did not adjust this productivity estimate downward because post- banding/pre-fledging mortality was accounted for in the juvenile survival rate estimates in Craig *et al*. (2004).

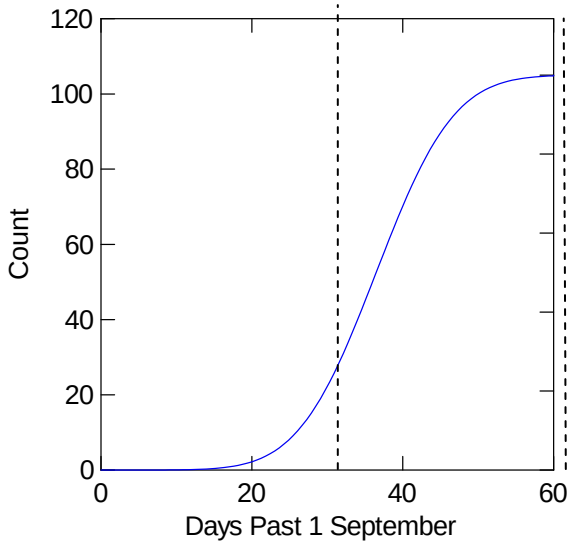

Figure 7. Cumulative frequency distribution (tension = 0.50) of reencounters of Northern peregrines at fall raptor banding stations in the United States (n = 106). The dashed lines represent critical dates in the harvest alternatives.

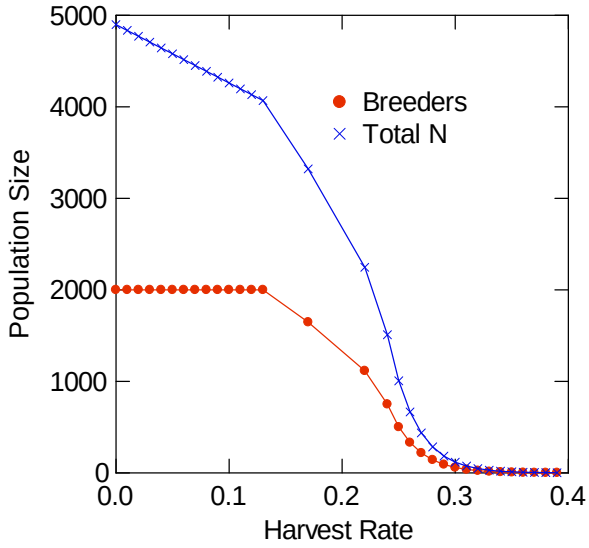

Figure 8. Estimated changes in population size at differing harvest rates (proportion of young produced in a year that are harvested) for a hypothetical Northern peregrine falcon population with the following characteristics: number of suitable nesting sites = 1,000; average annual adult survival = 81%; average annual subadult survival = 67%; average annual first-year survival = 54%; and annual fecundity = 1.48 young fledged per occupied nest site. Nest site occupancy is assumed to equal 100% as long as sufficient breeders exist in the population to occupy all sites. Harvest rate was modeled as an incremental increase in first-year mortality. Based on approach described in Millsap and Allen (2006).

The model suggested MSY under these vital rates occurred at a harvest rate of about 13% of fledged young (Figure 8). Millsap and Allen (2006) recommended that actual harvest rate not exceed 50% of calculated MSY or 5%, whichever is less, given uncertainties in the calculation of MSY, unaccounted-for stochasticity, and the inability to actually monitor the effects of harvest. This recommendation was adopted in the FEA on take of raptors from the wild for falconry by the Service (USFWS 2007a). Accordingly, a maximum harvest rate of 5.0% of annual production of Northern peregrines is also indicated, given the estimated vital rates reported here.

ALTERNATIVES

Considering our management objective and the population data presented in previous sections, our explicit management goal is to allow a harvest of up to 5% of minimum annual production of Northern peregrines, which is 179 migrants[3], while simultaneously (1) not increasing cumulative harvest of the U.S. portion of the Western or the Alaskan segment of the Northern population to a number greater than 81 for the Western segment and 49 for the Alaskan segment (based on data in Table 2 after taking the 10% post-fledging mortality bias adjustment, accounting for ongoing harvest in Canada and Mexico, consistent with the allocation framework presented in USFWS 2004); and (2) holding estimated take from non-target management populations to no more than two individuals from the Canadian portion of the Western population and seven individuals from the Eastern population (no more than 1% of annual production of non-target populations; from Table 2 after 10% bias reduction). The alternatives also assume a sex ratio no greater than 60:40 in either direction measured against the overall harvest limit, and a relatively evenly longitudinal distribution of harvest over the harvest area. Any captured peregrines wearing U.S. Geological Survey or CWS research bands shall be released under all alternatives.

ALTERNATIVE 1

No action. Take by falconers of autumn migrant peregrine falcons would remain prohibited in the coterminous U.S.

ALTERNATIVE 2

Allow take of first-year migrant peregrine falcons from 20 September through 20 October from areas of the U.S. south of 31° N latitude and east of 85° W longitude, and within the state of Alaska. Also, allow take of nestling and post-fledging first-year

[3] A total of 3,989 Northern fledglings per year x 0.9 (a 10% bias reduction in minimum number of young fledged) x 0.05 (from Millsap and Allen 2006) rounded down = 179.

peregrine falcons from the nesting period through 31 August west of 100° W longitude (including Alaska).

ALTERNATIVE 3

Allow take of first-year migrant peregrine falcons from 20 September through 20 October from areas of the U.S. south of 31° N latitude and east of 100° W longitude and within the state of Alaska. This was essentially the 1999 recommendation of the AFWA, except we have expanded the temporal harvest window to include more of the migration period for Northern peregrines. Also, allow take of nestling and post-fledging first-year peregrine falcons from the nesting period through 31 August west of 100° W longitude (including Alaska).

ALTERNATIVE 4

Allow take of first-year migrant peregrine falcons from 20 September through 20 October from areas of the U.S. west of 100° W longitude and from Alaska. Also, allow take of nestling and post-fledging first-year peregrine falcons from the nesting period through 31 August west of 100° W longitude (including Alaska).

ALTERNATIVE 5

Allow take of first-year migrant peregrine falcons from 20 September through 20 October from areas of the U.S. south of 31° N latitude and east of 100° W longitude, and from all areas of the U.S. west of 100° W longitude. Also, allow take of nestling and post-fledging first-year peregrine falcons from the nesting period through 31 August west of 100° W longitude (including Alaska).

ALTERNATIVE 6

Allow take of first-year migrant peregrine falcons from 20 September through 20 October from anywhere in the U.S. Also, allow take of nestling and post-fledging first-year peregrine falcons from the nesting period through 31 August west of 100° W longitude (including Alaska).

ALTERNATIVE 7 (Preferred Alternative)

Allow a take of first-year migrant peregrine falcons from 20 September through 20 October from all areas of the U.S. east of 100° W longitude. Also, allow take of nestling and post-fledging first-year peregrine falcons from the nesting period through 31 August west of 100° W longitude (including Alaska).

ALTERNATIVE 8

Allow harvest of up to 5% of first-year peregrine falcons from all management populations through any combination of resident and migrant harvest.

ENVIRONMENTAL CONSEQUENCES OF THE ALTERNATIVES

We used estimates of minimum numbers of young fledged per year for each management population (from Table 2, but adjusted to account for the estimated 10% post-fledging mortality) to calculate the maximum upper harvest limit for each management population, taking into account the constraints on harvest described earlier for each (Table 3). We partitioned the expected harvest between the Canadian and U.S. portions of the Western management population, and between the Alaskan and Canadian plus Greenland portions of the Northern management population. These political subdivisions were necessary to account for cumulative impacts on the Northern and Western management populations from the nestling peregrine harvest previously authorized in the U. S. (USFWS 2003), and to assess possible impacts to the Canadian portion of the Western management population, which is a concern of the CWS (G. Holroyd, CWS, personal communication; and based on comments on the DEA).

Table 3. Estimated minimum number of fall-migrant first-year peregrine falcons available for falconry harvest by management population and subunit under the alternatives considered in this Final Environmental Assessment.

Alternative	Management population	Estimated migrant population size[a]	Maximum allowable harvest rate[b]	Upper harvest limit[c]	Number available considering existing harvest[d]
1 through 7	Northern - Canada & Greenland[e]	2366	5%	118	107
	Northern - AK	1224	5%	61	49
	Eastern	674	1%	6	6
	Western - Canada	193	1%	1	1
	Western - US	1718	5%	85	81
	Total	6175		271	244
8	Northern - Canada & Greenland[e]	2366	5%	118	107
	Northern - AK	1224	5%	61	49
	Eastern	674	5%	33	33
	Western - Canada	193	5%	9	9
	Western - US	1718	5%	85	81
	Total	6175		306	279

[a] Population size estimates are 90% of the minimum number of young fledged per year from Table 2 to compensate for possible biases in productivity estimates (see text).

[b] Harvest rate is the percentage of young in a given year that are removed by falconers. Rationales behind variation in allowable harvest rates are described in the Alternatives section of the text.

[c] Maximum number allowed in harvest = Estimated migrant population size * Maximum allowable harvest rate. Values are rounded down to the nearest whole number so harvest does not exceed the maximum allowable harvest rate.

[d] Upper harvest limit - expected harvest in Canada and Mexico, from Table 4.

[e] Combines Canadian and Greenland portions of Northern management population.

Harvest of fall-migrant peregrines has been occurring for several years in the Province of Saskatchewan, Canada and even longer in eastern Mexico, and CWS requested that we account for this harvest if take is allowed in the U.S. Available data suggest no more than two migrant peregrines are taken by falconers in Canada annually, and about 25 have been taken historically each year by falconers in Mexico (G. Holroyd, CWS, personal communication; Ariel Rojo, Secretaría de Medio Ambiente y Recursos Naturales [SEMERNAT], personal communication). We used estimates of the proportional latitudinal and longitudinal distribution of migrants from each management population in Figures 5 and 6 to infer the likely makeup of the harvest of migrant peregrines in Saskatchewan and Mexico (Table 4), and we deducted these numbers from the proposed U.S. harvest limits for each management population or subunit (Table 3). We recognize that banding and population data are not optimal for these analyses, for reasons discussed previously. Nevertheless, they are the best information available to guide management decisions, and we believe they provide a sufficiently accurate picture of likely harvest makeup for management purposes.

We next calculated the number of peregrine falcons that could be harvested without exceeding the harvest limit for each management population or subunit by dividing the maximum number allowed in the harvest by the expected proportion of migrant harvest for each management population or subunit (Table 5). The expected proportions were derived as described above from the cumulative frequency distributions in Figures 5 and 6. We used this approach as a proxy for undertaking an actual physical count of the birds taken from each management population, which is not possible given the impossibility of determining the natal origin of migrants in the hand. The management population or subunit with the lowest number of peregrines that could be harvested was considered the limiting population, and the maximum harvest that could be allowed without overharvesting that management population or subunit was set as the overall harvest limit for the alternative. As an example, for Alternative 2, given the maximum allowable harvest and expected percent of migrant harvest by management population, the number of peregrine falcons that could be harvested without exceeding the harvest limits for the Northern - Canada and Greenland management population was 211 (118.30/0.5582), the harvest limit for the Northern - Alaska management population was 211 (61.21/0.2888), the limit for the Eastern management population was 82 (6.74/0.0814), the limit for the Western Canadian management population was 267 (1.93/0.0072), and the limit for the U. S. management population was 1,335 (85.91/0.0643) (rounding accounts for differences between reported harvest limits here and in Table 5). Under this alternative, the overall migrant harvest limit would be 82, the maximum number that could be taken without exceeding any of the limits for regional management populations or subunits (in this case, the limit for the Eastern management population is the limiting population), and 101 additional peregrines would be available for harvest within the Western management population area. Finally, we compared the expected migrant harvest with the number available considering existing harvest in

Table 4. Estimated make up of existing harvest of migrant peregrine falcons in Canada (Saskatchewan) and Mexico. Proportions of management populations exposed geographically and temporally are from Figures 5 and 6, and population size estimates are from Table 2.

Area	Management population	Estimated migrant population size[a]	Proportion exposed latitudinally to migrant harvest	Proportion Exposed Longitudinally to migrant harvest	Expected number exposed to migrant harvest	Expected % of migrant harvest	Expected migrant harvest with constraints
Mexico	Northern - Canada & Greenland[b]	2,366	0.40	0.49	463.72	38.83%	9.71
	Northern - AK	1,224	0.40	1.00	489.64	41.00%	10.25
	Eastern	674	0.15	0.00	0.00	0.00%	0.00
	Western - Canada	193	0.90	0.14	24.31	2.04%	0.51
	Western - US	1,718	0.90	0.14	216.48	18.13%	4.53
	Total	6,491			1194.15		25.00
Canada	Northern - Canada & Greenland[b]	2,366	1.00	0.30	709.78	36.63%	0.73
	Northern - AK	1,224	1.00	1.00	1224.11	63.17%	1.26
	Eastern	674	0.00	0.00	0.00	0.00%	0.00
	Western - Canada	193	0.10	0.20	3.86	0.20%	0.00
	Western - US	1,718	0.10	0.00	0.00	0.00%	0.00
	Total	6,491			1937.74		2.00
Pooled	Northern - Canada & Greenland[b]	2,366	1.00	0.30	709.78	36.63%	10.44
	Northern - AK	1,224	1.00	1.00	1224.11	63.17%	11.51
	Eastern	674	0.00	0.00	0.00	0.00%	0.00
	Western - Canada	193	0.10	0.20	3.86	0.20%	0.51
	Western - US	1,718	0.10	0.00	0.00	0.00%	4.53
	Total	6,491			1937.74		27.00

[a] Population size estimates are 90% of the minimum number of young fledged per year from Table 2 to compensate for possible biases in productivity estimates (see text).

[b] Combines Canadian and Greenland portions of Northern management population.

Table 5. Estimated make up of harvest by peregrine falcon management population under the harvest alternatives considered in this DEA. Proportions of management populations exposed geographically are from Figures 5 and 6, and population size estimates are from Table 2, as modified in Tables 3 and 4. The management population that limits overall harvest under each alternative is in red.

Alternative	Management population	Proportion exposed latitudinally to migrant harvest	Proportion exposed longitudinally to migrant harvest	Expected number exposed to migrant harvest	Expected % of migrant harvest	Expected migrant harvest[a]	Number available considering existing harvest[b]	Number remaining for nestling/ post fledging harvest
1	Northern - Canada & Greenland[c]	0.00	0.00	0.00	0.00%	0.00	107	
	Northern – AK	1.00	1.00	0.00	40.74%	0.00	49	49
	Eastern	0.00	0.00	0.00	0.00%	0.00	6	
	Western – Canada	0.00	0.00	0.00	0.00%	0.00	1	
	Western – US	1.00	1.00	0.00	59.26%	0.00	81	81
	Total			0.00		0.00	244	130
2	Northern - Canada & Greenland[c]	0.72	0.49	834.70	55.82%	46.22	107	
	Northern – AK	0.72	0.49	431.87	28.88%	23.91	49	25
	Eastern	0.21	0.86	121.64	8.14%	6.74	6	
	Western – Canada	0.40	0.14	10.80	0.72%	0.60	1	
	Western – US	0.40	0.14	96.21	6.43%	5.33	81	76
	Total			1495.22		82.79 (**82**)	244	101
3	Northern - Canada & Greenland[c]	0.72	0.88	1499.05	55.89%	72.10	107	
	Northern – AK	0.72	0.88	775.59	28.92%	37.31	49	12
	Eastern	0.21	0.99	140.03	5.22%	6.74	6	
	Western – Canada	0.40	0.35	27.01	1.01%	1.30	1	
	Western – US	0.40	0.35	240.53	8.97%	11.57	81	69
	Total			2682.21		129.01 (**129**)	244	81
4	Northern - Canada & Greenland[c]	0.94	0.12	266.88	12.19%	2.87	107	
	Northern – AK	0.94	0.12	138.08	6.31%	1.48	49	48
	Eastern	0.98	0.01	6.60	0.30%	0.07	6	
	Western – Canada	1.00	0.93	179.40	8.20%	1.93	1	
	Western – US	1.00	0.93	1597.83	73.00%	17.18	81	64
	Total			2188.79		23.54 (**23**)	244	112

Alternative	Management population	Proportion exposed latitudinally to migrant harvest	Proportion exposed longitudinally to migrant harvest	Expected number exposed to migrant harvest	Expected % of migrant harvest	Expected migrant harvest	Number available considering existing harvest[a]	Number remaining for nestling/ post fledging harvest
5	Northern - Canada & Greenland[c]	0.94	1.00	2223.96	40.98%	22.24	107	
	Northern – AK	0.94	1.00	1150.66	21.20%	11.51	49	38
	Eastern	0.21	1.00	141.44	2.61%	1.41	6	
	Western – Canada	1.00	1.00	192.91	3.55%	1.93	1	
	Western – US	1.00	1.00	1718.10	31.66%	17.18	81	64
	Total			5427.07		54.27 (**54**)	244	102
6	Northern - Canada & Greenland[c]	0.94	1.00	2223.96	37.40%	22.24	107	
	Northern – AK	0.94	1.00	1150.66	19.35%	11.81	49	37
	Eastern	0.98	1.00	660.05	11.10%	6.77	6	
	Western – Canada	1.00	1.00	192.91	3.24%	1.98	1	
	Western – US	1.00	1.00	1718.10	28.90%	17.63	81	63
	Total			5945.69		60.42 (**60**)	244	100
7	Northern - Canada & Greenland[c]	0.72	0.88	1499.05	41.94%	15.30	107	
	Northern – AK	0.72	0.88	775.59	21.70%	7.91	49	41
	Eastern	0.98	1.00	660.05	18.47%	6.74	6	
	Western – Canada	1.00	0.20	38.58	1.08%	0.39	1	
	Western – US	1.00	0.35	601.34	16.82%	6.14	81	75
	Total			3574.61		36.48 (**36**)	244	116
8	Northern - Canada & Greenland[c]	1.00	1.00	2365.92	38.32%	118.30	107	
	Northern – AK	1.00	1.00	1224.11	19.83%	61.21	49	
	Eastern	1.00	1.00	673.52	10.91%	33.68	33	
	Western – Canada	1.00	1.00	192.91	3.12%	9.65	9	
	Western – US	1.00	1.00	1718.10	27.83%	85.91	81	
	Total			6174.56		308.75 (**308**)	279	

[a] Bold values in parentheses are allowed take.
[b] From Table 4.
[c] Combines Canadian and Greenland portions of Northern management population.

Table 3 to ensure expected harvest did not exceed allowable harvest for any management population or subunit.

ALTERNATIVE 1

Alternative 1 is consistent with the explicit management objectives. However, it would deny falconers outside Alaska access to peregrine falcons that could be removed from the wild for falconry without negatively affecting wild populations.

ALTERNATIVE 2

The maximum fall (20 September through 20 October) migrant harvest from areas of the U.S. south of 31° N latitude and east of 85° W longitude, and within the State of Alaska that could be allowed under this alternative, given population-specific constraints outlined above, is 82. The predicted harvest under this alternative would be consistent with the explicit management objective for most management populations, except that harvest levels of nestling and post-fledging first-year resident peregrine falcons from the nesting period through August 31 in Alaska and the western U.S. could not exceed 25 and 76, respectively, without leading to potential cumulative overharvest of these population segments. The population limiting harvest under this alternative is the Eastern management population. Allocation of harvest among age-classes (resident vs. passage) and among states and provinces would need to be coordinated through the Flyway Councils.

ALTERNATIVE 3

The maximum fall migrant harvest from areas of the U.S. south of 31° N Latitude and east of 100° W longitude, and within the State of Alaska that could be allowed under this alternative, given population-specific constraints outlined above, is 129. The predicted harvest under this alternative would be consistent with the explicit management objective for most management populations, except that harvest levels of nestling and post-fledging first-year resident peregrine falcons from the nesting period through August 31 in Alaska and the western U.S. could not exceed 12 and 69, respectively, without leading to potential cumulative overharvest of these population segments. The population limiting harvest under this alternative is the Eastern management population. Allocation of harvest among age-classes and states and provinces would need to be coordinated through the Flyway Councils.

ALTERNATIVE 4

The maximum fall migrant harvest from areas of the U.S. west of 100° W longitude, and within the State of Alaska that could be allowed under this alternative, given the population-specific constraints outlined above, is 23. The predicted harvest under this alternative would be consistent with the explicit management objective for most management populations, except that harvest levels of nestling and post-fledging first-year resident peregrine falcons from the nesting period through August 31 in Alaska and the western U.S. could not exceed 48 and 64, respectively, without

leading to potential cumulative overharvest of these population segments. The population limiting harvest under this alternative is the Western – Canada management population subunit. Allocation of harvest among age-classes and states and provinces would need to be coordinated through the Flyway Councils.

ALTERNATIVE 5

The maximum fall migrant harvest from areas of the U.S. south of 31° N latitude and east of 100° W longitude and from all areas of the U.S. west of 100° W longitude that could be allowed under this alternative, given population-specific constraints outlined above, is 54. The predicted harvest under this alternative would be consistent with the explicit management objective for most management populations, except that harvest levels of nestling and post-fledgling first-year resident peregrine falcons from the nesting period through August 31 in Alaska and the western U.S. could not exceed 38 and 64, respectively, without leading to potential cumulative overharvest of these population segments. The population limiting harvest under this alternative is the Canadian segment of the Western management population. Allocation of harvest among age-classes and states and provinces would need to be coordinated through the Flyway Councils. To accomplish the objective of geographic balance in the migrant harvest, the flyway councils would need to allocate 50% of the migrant harvest to areas of the U.S. west of 100° W longitude, and 50% east of that longitude. This would mean that fall harvest in the east would be 27 birds.

ALTERNATIVE 6

The maximum fall migrant harvest from anywhere in the U.S. that could be allowed under this alternative, given population-specific constraints outlined above, is 60. The predicted harvest under this alternative would be consistent with the explicit management objective for most management populations, except that harvest levels of nestling and post-fledging first-year resident peregrine falcons from the nesting period through August 31 in Alaska and the western U.S. could not exceed 37 and 63, respectively, without leading to potential cumulative overharvest of these population segments. Allocation of harvest among age-classes and states and provinces would need to be coordinated through the Flyway Councils. To accomplish the objective of geographic balance in the migrant harvest, the flyway councils would need to allocate 50% of the migrant harvest to areas of the U.S. west of 100° W longitude, and 50% east of that longitude. This would mean that fall harvest in the east would be 30 birds.

ALTERNATIVE 7 (Preferred Alternative)

The maximum fall migrant harvest from all areas of the U.S. east of 100° W longitude under this alternative, given population-specific constraints outlined above, is 36. The predicted harvest under this alternative would be consistent with the explicit management objective for most management populations, except that harvest levels

of resident nestling and post-fledging first-year peregrine falcons from the nesting period through August 31 in Alaska and the western U.S. could not exceed 41 and 75, respectively, without leading to potential cumulative overharvest of these population segments. Allocation of harvest among states and provinces would need to be coordinated through the Flyway Councils. Based on comments received on the DEA, this is the preferred alternative because it affords the widest geographic opportunity to harvest peregrines for falconry yet is consistent with our management goal.

We selected this alternative because comments on the Draft Environmental Assessment made it clear that a falconry take over the widest possible geographic range was preferred. Under this alternative, more birds are available in the eastern US than are available under alternative 5 or alternative 6.

ALTERNATIVE 8

The maximum cumulative harvest that could be allowed in the U.S. under this alternative is 308. This alternative, while consistent with the Service's analyses that show peregrine falcon populations should be able to withstand a harvest rate of 5%, does not include constraints to protect certain peregrine populations from harvest as requested by the flyway councils and CWS. As such, this alternative is not consistent with the Service's current management goal. Upon delisting of *F. p. anatum* in Canada, and upon a determination by the Atlantic and Mississippi flyway councils that harvest of peregrine from the Eastern management population is warranted, this alternative would be preferable to the current selected alternative because it allows greater harvest within sustainable limits for the species.

CUMULATIVE IMPACTS

Impacts of other forms of mortality and nesting failure (at contemporary levels) were accounted for in the demographic data used by Millsap and Allen (2006) and as modeled here. Impacts across management populations of each harvest alternative have been evaluated and reported above and in Table 5 using the best available biological data. We envision there may be some additional unintended mortality associated with capture of passage peregrines, but we suspect such mortality will be exceedingly low. Nevertheless, we will assess this issue each year as part of the adaptive management process for the proposed action (see below).

We believe our population estimates are buffered conservatively, and as such, compensate to some degree for unforeseen cumulative impacts. For example, under Alternative 2, we estimate that about 1,495 first-year fall-migrant peregrine falcons will be present in the harvest area during the harvest period. However, at a single location within the proposed harvest area (Curry Hammock State Park in the Florida Keys), an average of over 1,700 southbound migrant peregrines have been observed annually since 1999 (Lott 2006). Estimates suggest 39% (or 663) of these were likely

first-year birds, and, based on trapping records, about 67% were females (Lott 2006). While many of the peregrines that pass through the harvest area likely pass Curry Hammock State Park, it is unlikely that over 40% do, given the apparent bias in sex ratio, and it is even less likely they are all sighted. We believe this is empirical evidence of the conservative nature of the assessment of take in this document.

ADAPTIVE MANAGEMENT

Given the considerable uncertainty in the banding and population data used in this assessment, validation of the assumptions employed is warranted. We will require collection of two breast feathers from all peregrines harvested during the first three years after implementation of the proposed action. At the end of three years, if accepted techniques for stable isotope or DNA analysis are available to estimate the latitudinal derivation of the harvest, the feathers will be analyzed to determine if the actual harvest conforms to predictions. If analyses suggest levels of take of Eastern and/or Western Canadian peregrines are greater than anticipated, we will work with the flyway councils to implement corrective measures.

The general framework of the proposed alternative accomplishes the objective of geographically balancing the harvest. However, there will need to be extensive coordination within and among the Atlantic, Mississippi, and Central flyway councils on matters of harvest allocation between participating states in the U.S. We propose to work with the flyway councils to establish procedures for collection, housing, and assessment of feather samples, and to establish criteria for determining the sex of harvested peregrines. In addition, we propose to monitor the number, sex, and geographic distribution of peregrines that are harvested to ensure compliance with the frameworks in the proposed action. We will work through the flyway councils, or take regulatory actions, to resolve issues of non-compliance.

It is likely future population surveys will identify changes in population size and productivity values from those reported here. We will review population and harvest data for Canada, the U.S., and Mexico every five years, or at the request of the flyway councils, to reassess the allowable harvest limits. If, during one of these reviews, we determine that *F. p. anatum* is no longer formally considered threatened or endangered by CWS in Canada, and if the Atlantic and Mississippi flyway councils have determined that peregrines from the Eastern management population no longer warrant special protection, the Service will consider transitioning from managing peregrines under Alternative 7 to Alternative 8. Based on analyses and the evaluation conducted in this FEA, we believe Alternative 8 is a safe, sustainable long-term approach for managing falconry harvest of peregrine falcons. Alternative 8 also has the advantage of being consistent with how the Service manages take for falconry of other raptors.

NATIONAL ENVIRONMENTAL POLICY ACT COMPLIANCE

We reviewed the proposed action to determine whether it met any of the general criteria for preparation of an Environmental Impact Statement (EIS). We concluded that, under the guidance in the USFWS Manual (550 FW3), allowing the harvest of first-year, fall-migrant peregrine falcons under the preferred alternative and the long-term preferred alternative does not warrant preparation of an EIS. In particular, based on analyses of the effects of take using demographic data, we do not believe that a harvest of first-year, fall-migrant peregrine falcons should generate significant controversy, given the very minimal environmental effect. The proposed changes do not comprise a major federal action, so preparation of an EIS is not warranted.

TRANS-BOUNDARY EFFECTS OF THE ALTERNATIVES

Peregrine falcons are a highly migratory international resource. Stocks targeted for harvest in this FEA are produced at nest sites in the U.S., Canada, and Greenland, and spend the winter throughout the temperate U.S., Caribbean, Mexico, Central America, and South America. This FEA considers impacts on all of these source populations, and the preferred alternative is not likely to have measurable, negative effects on any of them. In addition, we have considered and accounted for the limited peregrine falcon harvest for falconry that does occur in Canada and Mexico (G. Holroyd, CWS, personal communication; Ariel Rojo, SEMERNAT, personal communication).

Most Canadian provinces are members of the flyway councils, and the CWS regularly participates in the flyway council meetings. SEMERNAT in Mexico has indicated an interest in expanding their participation in the flyway councils as well. Additionally, all three countries participate in the Trilateral Committee for Wildlife and Ecosystem Conservation (Trilateral), and issues of mutual concern regarding migratory birds are discussed there at the Migratory Bird Table. We believe the flyway councils and Trilateral afford ample opportunities for the countries of Canada, Mexico, and the U.S. to coordinate matters of concern regarding the harvest of migrant peregrines.

The Ministry of Environment and Nature in Greenland has expressed concern over take of first-year migrant peregrines for two reasons. First, the species is a fully protected species in Greenland, and therefore all exploitation is prohibited. Second, the Ministry does not support the capturing of wild animals with the purpose of keeping them in captivity (Bjarne Peterson, Greenland Ministry of Environment and Nature, personal communication). We will continue to communicate with the Ministry of Environment and provide more details about the effects of this action on the peregrine population in Greenland.

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DIVISION OF MIGRATORY BIRD MANAGEMENT