

## A comparison of the Canadian and U.S. Partners in Flight systems for identifying bird species important for conservation planning

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### Abstract

Partners in Flight (PIF) priority-ranking systems for landbird species, developed separately by PIF-U.S. and PIF-Canada, differ in several respects: criteria considered, scoring scales, and means of identifying important species. Scores generated for 296 Canadian landbirds from both scoring systems were compared, to determine whether differences in results might interfere with Canada-U.S. co-operation on conservation of shared species. The Canadian system gives lower scores to species with moderately low abundance, but higher scores for species with moderately narrow ranges. Fewer species are given high scores for declining population trend in the Canadian system, but these scores are given greater importance. The number of species considered important by both scoring systems was 112, with 13 more appearing only on the list generated from the U.S. system and 26 more only on the list from the Canadian system. Most of the discrepant species had low Canadian stewardship scores but would be considered more important on regional priority lists in the provinces where they occur. There is no obvious need to harmonize the two scoring systems, and the time and effort that task would consume would be better spent using results to promote concrete conservation and management activities.

### Introduction

Because there are not enough resources available to detail the status of every bird population and to research the causes of every decline in numbers, we must set priorities for monitoring and research activities to ensure that scarce resources are used most effectively. Numerous ranking systems have been developed to help set conservation priorities, most of them focusing attention on rare and endangered species (Dunn et al., in press). Systems developed by Partners in Flight (PIF) (Web site at <<http://www.PartnersInFlight.org>>) have taken a broader view, in that they also rank highly those species that are particularly characteristic of a region.

PIF is a grouping of government agencies, academics, private companies, and conservation groups, which co-ordinates efforts to promote healthy population levels of birds, particularly landbirds. (Here, "landbirds" refers to all species that are not waterfowl, shorebirds, or seabirds, which

are already addressed by other initiatives.) PIF-U.S. was begun in 1990, and one of its first activities was to develop a priority ranking system (Hunter et al. 1993). When PIF-Canada got underway in 1995 it decided to undertake priority rankings as well. In that exercise, the existing PIF-U.S. system was modified to meet specific Canadian needs (see Dunn et al. [in press] for details). Since that time the U.S. system has been further modified and refined such that the two systems are now much more similar in scope and intent (Carter et al. 1999).

The two systems use some of the same ranking criteria, including abundance of the species on a global basis, breadth of total breeding and wintering ranges, population trend in the area under consideration, and a stewardship criterion indicating the degree to which a species is characteristic of a region's fauna. However, there are three important differences. First, scoring criteria are not entirely the same, in that the U.S. system also incorporates scores indicating threat to the species on breeding and wintering grounds (Table 1). Second, the two systems have different scales for scoring the criteria that they share (Table 2). Finally, they have different ways of generating lists of "important" species, meaning species whose needs should be considered during regional conservation and land-use planning (Table 3).

Because of the variation in the two North American PIF ranking schemes, there has been concern that one system might emphasize different species than the other, possibly interfering with co-ordination and co-operation on international efforts to benefit species common to both countries. This note compares results from the ranking systems of PIF-Canada (Dunn et al., in press) and PIF-U.S. (Carter et al. 1999) to determine how serious a problem this may be.

### Methods

Scores were calculated using both systems for 296 of the 297 landbird species that regularly breed in Canada (PIF-U.S. scores were not available for Crested Myna, *Acridotheres cristatellus*). Canadian scores were available from the PIF-Canada database described in Dunn et al. (in press) and Dunn (1997), calculated as shown in Tables 1-3.

U.S.-style scores were prepared as follows. Most of the criteria are scored "globally," in that the scores are the same for any region. For these criteria, U.S. scores could be downloaded directly from the Internet (<<http://members.aol.com/cbopifdb/status.html>>). The two U.S. scores that are calculated "locally" (i.e., for the area for which species ranks are being prepared) are the stewardship score (known in the U.S. system as "area importance") and the population trend score. The U.S. scoring scale for area importance was specifically designed for sub-national geographic regions, and there is no simple way of calculating a comparable score

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for Canada. Instead, wherever a score for area importance was called for using the U.S. system (Table 3), the PIF-Canada responsibility score was substituted instead. Population trend score was calculated by applying the U.S. scoring scale for this criterion (Table 2) to population trend data for Canada.

The U.S. criteria for importance (Table 3) call for adding any species to the list that has special conservation status recognized in legislation. The closest Canadian equivalent is the list of species considered Vulnerable, Threatened, or Endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). The April 1998 update of the list (Web site: <<http://www.Cosewic.gc.ca/COSEWIC/Default.cfm>>) was used in this comparison.

## Results

The differences in scoring scales between the PIF-Canada and PIF-U.S. systems have a large effect on the scores for Canadian landbirds. The Canadian scoring scale for abundance is highly skewed, with only two species in the highest two levels versus 30 with the U.S. scale (Fig. 1). This is somewhat counterbalanced by the breadth-of-range scores, which give more high scores in the Canadian system (Figs. 2 and 3). For population trend, Canada assigns the middle score to a great many more species than does the U.S. system (Fig. 4), and fewer species score very high or very low.

The total number of Canadian landbirds considered important by the Canadian system was 138, versus 125 by the U.S. system. However, the reasons for appearing on the list differed between systems (Table 4). Moreover, although the total number of important species appearing on each list differed by only 12, the lists were not otherwise identical. The number of species appearing in common on both lists was 112.

There were 13 species on the Canadian importance list when it was generated using the U.S. system, but not when using the Canadian system (Table 5): two primarily because of high threat scores (a criterion considered in the U.S. system but not by Canada's), and 11 because the U.S. system adds federally listed species that have not qualified based on other criteria (Table 3). However, 14 other COSEWIC-listed species did make the list under the Canadian system.

An additional 26 species were considered important using the Canadian system but not when using the U.S. system (Table 5), usually because of higher scores in the Canadian

system for breadth of range (Table 2) and greater weight given to population trend score in defining importance (Table 3).

## Discussion

Despite marked differences in the scales for scoring criteria, and different ways of using scores to generate lists of important species, the PIF-Canada and PIF-U.S. ranking systems generate very similar lists. Most of the differences in scoring scales are balanced out either by scores for other criteria or by criteria used for determining importance. Thus, even though the Canadian system gives higher scores for breadth of range, this is somewhat balanced by higher U.S. scores for abundance. The higher U.S. scores for population trend are balanced by the extra emphasis the Canadian system gives to population trend in determining importance.

Table 4 shows that the U.S. system ranks more species highly on conservation concerns, whereas the Canadian system captures some of these species only because of high stewardship scores. However, a direct comparison is not possible, because most of the importance criteria in the U.S. system include elements both for conservation concern and stewardship (Table 3).

Inclusion of threat scores in the U.S. system caused only two species to be added to the importance list that were not captured by the Canadian system on other criteria, suggesting that there is no great need to add this criterion to the Canadian system at the national level. Nonetheless, PIF-U.S. threat scores have been added to the PIF-Canada database for users who may wish to take them into consideration. The recommended method of incorporating them into Canadian scoring is to average them into the national vulnerability score along with the three other vulnerability criteria (see Table 3). This will in turn affect the national concern score (Table 3), which is used in calculating provincial concern scores (Dunn et al., in press).

The Canadian system results in a somewhat longer list of important species, largely because of more generous breadth-of-range scores and extra weighting of population trend score (Table 5). Species important according to the U.S. but not the Canadian system made the list largely because of COSEWIC designation. Examination of this list of discrepant species (Table 5) suggests that there are few grounds for concern about disagreement on international conservation priorities. Nearly all the species appearing on

**Table 1**  
Partners in Flight criteria used in ranking species

| Canada                                    | U.S.                                       |
|---|--|
| Breadth of breeding range                 | Breadth of breeding range                  |
| Breadth of wintering range                | Breadth of wintering range                 |
| Abundance                                 | Abundance                                  |
| Population trend                          | Population trend                           |
| Stewardship (Responsibility) <sup>a</sup> | Stewardship (Area importance) <sup>a</sup> |
|   | Threats on breeding ground                 |
|   | Threats on wintering ground                |

<sup>a</sup> The stewardship scores have different names in the two systems, as indicated in parentheses.

**Table 2**

Scoring scales for the PIF ranking criteria shared by the U.S. and Canada.  
 Summary only; for details see Dunn et al. (in press) and Carter et al. (1999)

| Canadian scale  | Criterion and score | U.S. scale  |
|---|---------------------|---|
| <b>Abundance<sup>a</sup></b>  |                     |   |
| Abundant  | 1                   | 100   |
| Common  | 2                   | 30–99.9   |
| Uncommon to fairly common   | 3                   | 10–29.9   |
| Rare to uncommon  | 4                   | 1–9.9   |
| Very rare   | 5                   | <1  |
| <b>Breadth of breeding range<sup>b</sup></b>  |                     |   |
| >14 451 656 km <sup>2</sup>   | 1                   | >4 411 940 km <sup>2</sup>  |
| >9 634 438–14 451 656 km <sup>2</sup>   | 2                   | ≥2 205 970–4 411 940 km <sup>2</sup>  |
| >4 817 219–9 634 438 km <sup>2</sup>  | 3                   | >1 102 984–2 205 970 km <sup>2</sup>  |
| >1 926 888–4 817 219 km <sup>2</sup>  | 4                   | ≥551 493–1 102 984 km <sup>2</sup>  |
| ≤ 1 926 888 km <sup>2</sup>   | 5                   | <551 493 km <sup>2</sup>  |
| <b>Breadth of wintering range<br/>in Western Hemisphere<br/>Scored as above<br/>(using same area definitions)</b>   |                     |   |
| <b>Population trend in Canada<sup>c</sup></b>   |                     |   |
| ≥3%/yr ( $P < 0.05$ , $n > 14$ ),<br>or well-documented increase  | 1                   | ≥1%/yr ( $P \leq 0.10$ and $n \geq 14$ )  |
| 1 to 3%/yr ( $P < 0.05$ , $n > 14$ ),<br>or ≥3%/yr ( $P > 0.05$ , $n > 14$ ),<br>or well-documented modest increase,<br>or some evidence of major increase    | 2                   | -1 to 1%/yr (any $P$ value, $n \geq 14$ ),<br>or ≥1%/yr ( $P \leq 0.10$ , $n = 6-13$ ),<br>or ≥1%/yr ( $P = 0.11-0.35$ , $n \geq 14$ )                |
| -3 to 3%/yr ( $P > 0.05$ , $n > 14$ ),<br>or -1 to 1%/yr ( $P < 0.05$ , $n > 14$ ),<br>or other evidence of stable population                                 | 3                   | >1%/yr or <-1%/yr ( $P > 0.35$ , $n \geq 14$ ),<br>or any trend ( $P > 0.10$ , $n = 6-13$ ),<br>or any trend (any $P$ value, $n < 6$ ),<br>or no data |
| -1 to -3%/yr ( $P < 0.05$ , $n > 14$ ),<br>or ≤-3%/yr ( $P > 0.05$ , $n > 14$ ),<br>or well-documented modest decrease,<br>or some evidence of major decrease | 4                   | ≤-1%/yr ( $P \leq 0.10$ , $n = 6-13$ ),<br>or ≤-1%/yr ( $P = 0.11-0.35$ , $n \geq 14$ )   |
| ≤-3%/yr ( $P < 0.05$ , $n > 14$ ),<br>or well-documented decrease   | 5                   | <-1%/yr ( $P \leq 0.10$ and $n \geq 14$ )   |
| <b>“Stewardship”</b>  |                     |   |
| Responsibility <sup>d</sup>   |                     | Area importance <sup>e</sup>  |
| ≤20%  | 1                   | Accidental  |
| >20–40%   | 2                   | 0–5% (peripheral)   |
| >40–60%   | 3                   | 6–25% (low relative abundance)  |
| >60–80%   | 4                   | 26–50% (medium relative abundance)  |
| >80%  | 5                   | <50% (high relative abundance)  |

<sup>a</sup> Canadian scoring based on reverse order of The Nature Conservancy National Heritage Program abundance rating (Master 1991). U.S. scoring based on the mean number of the species recorded on the 10 Breeding Bird Survey routes on which it is most abundant (or, in the absence of BBS data, an equivalent score based on expert opinion).

<sup>b</sup> Canadian score based on breadth of breeding range in Canada and the U.S. only; U.S. score based on breadth of breeding range in Canada, the U.S., and Mexico through Panama and the Caribbean.

<sup>c</sup> Annual rates of change, based on longest time period from best available data (usually Breeding Bird Survey but sometimes Christmas Bird Counts).  $P$  indicates significance level of linear trend;  $n$  refers to number of BBS routes or CBC circles used in trend analysis.

<sup>d</sup> Proportion of the U.S. and Canadian breeding range that is in Canada. (Another step is taken to reduce scores for species with only a small proportion of global range in North America; Dunn et al., in press).

<sup>e</sup> Average abundance on BBS routes in region as percentage of abundance in the region with maximum abundance. (In absence of BBS data, based on expert opinion.) This stewardship score cannot be calculated at a national scale.

**Table 3****Criteria for identifying species of importance for regional conservation and land-use planning**

| Canada                                     | U.S.  |
|--|---|
| <b>Preliminary calculations</b>            |   |
| Vulnerability = average of scores for:     | Total = sum of scores for:  |
| Abundance                                  | Abundance   |
| Breadth of breeding range                  | Breadth of breeding range   |
| Breadth of wintering range                 | Breadth of wintering range  |
|  | Threats on breeding range   |
| Concern = average of scores for:           | Threats on wintering range  |
| Vulnerability                              | Population trend  |
| Population trend                           | Stewardship <sup>a</sup>  |
| <b>Criteria for importance<sup>b</sup></b> |   |
| Concern = 4 or 5                           | Total ≥ 22  |
| Responsibility = 4 or 5                    | Total = 19 to 21 and (stewardship <sup>a</sup> +population trend) ≥ 8 |
|  | (Total - stewardship <sup>a</sup> ) ≥ 20,                             |
|  | Total = 18 or 19 and population trend = 5,                            |
|  | Federally listed species  |
|  | High stewardship score <sup>c</sup>                                   |

<sup>a</sup> U.S. stewardship score unsuited to national scale (Table 2), so Canadian responsibility score was used in its place for results presented here.

<sup>b</sup> U.S. criteria from K. Rosenberg (pers. commun.).

<sup>c</sup> Defined by PIF-U.S. as a species with >5% of its global population in an area <200 000 km<sup>2</sup>; a criterion intended for regional scales. For this national comparison, a species with "high stewardship score" was instead defined as one with PIF-Canada responsibility score ≥ 4.

**Table 4**

Comparison of reasons why the 112 species that appeared on both lists were considered important, using the Canadian and U.S. ranking systems

|                                   | <u>U.S. system</u>                |                          | <u>Totals using Canadian system</u> |
|-----------------------------------|-----------------------------------|--------------------------|-------------------------------------|
|                                   | Conservation concern <sup>a</sup> | Stewardship <sup>b</sup> |                                     |
| <u>Canadian system</u>            |                                   |                          |                                     |
| Conservation concern <sup>a</sup> | 39                                | 4                        | <u>43</u>                           |
| Stewardship <sup>b</sup>          | 17                                | 52                       | <u>69</u>                           |
| <u>Totals using U.S. system</u>   | <u>56</u>                         | <u>56</u>                |                                     |
| <u>Total species overlap</u>      |                                   |                          | <u>112</u>                          |

<sup>a</sup> Species qualifying for importance for any reason in Table 3 except for high stewardship score.

<sup>b</sup> Species not qualifying for importance on conservation concern criteria, but that have PIF-Canada responsibility scores ≥ 4.

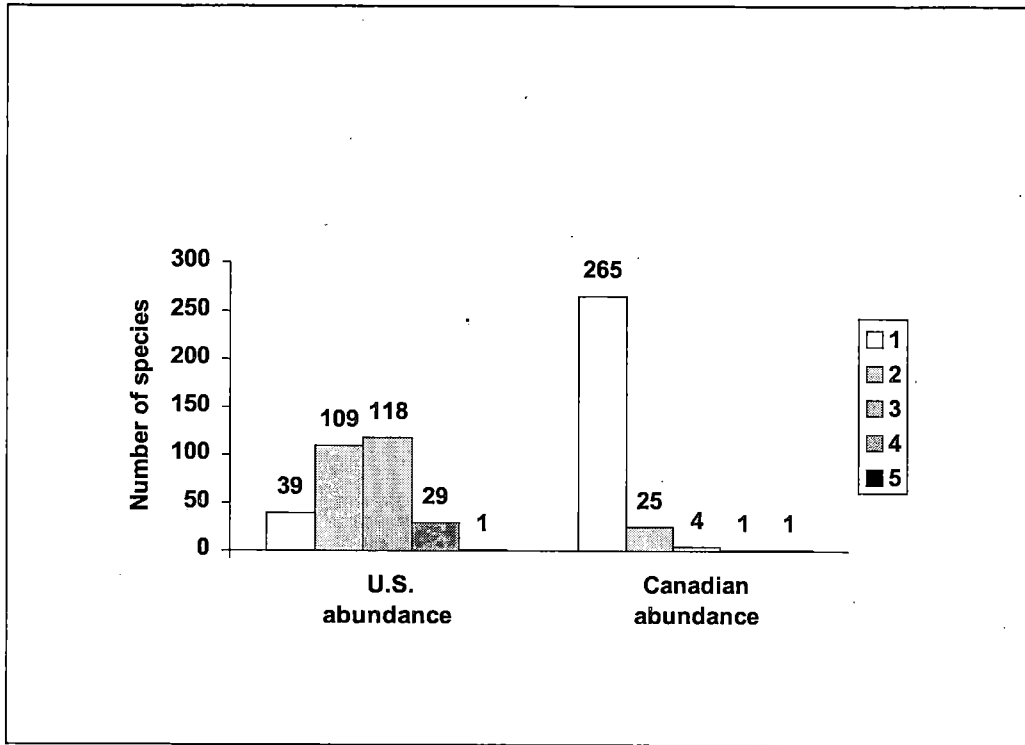
the importance list only when using the U.S. system have very low Canadian responsibility scores (Table 5), indicating that only the periphery of the range is in Canada. The Canadian system calculates regional responsibility and concern scores in a way that will ensure these species are listed as important for local action in the regions where they occur, even though they are not on the national list (Dunn et al., in press), so conservation agencies in those regions will have reason to co-operate with crossborder protection efforts. Indeed, many of these species are already the focus of

conservation attention in the regions of Canada where they occur.

The list of species identified as important solely by the Canadian system also suggests there is little reason for concern. Again, most are of moderate to low Canadian responsibility, and are therefore unlikely to draw Canadian attention away from species that are more characteristic of the country. By the same token, Canadians are not likely to press the U.S. for action on these species, because they are generally underrepresented in the Canadian fauna.

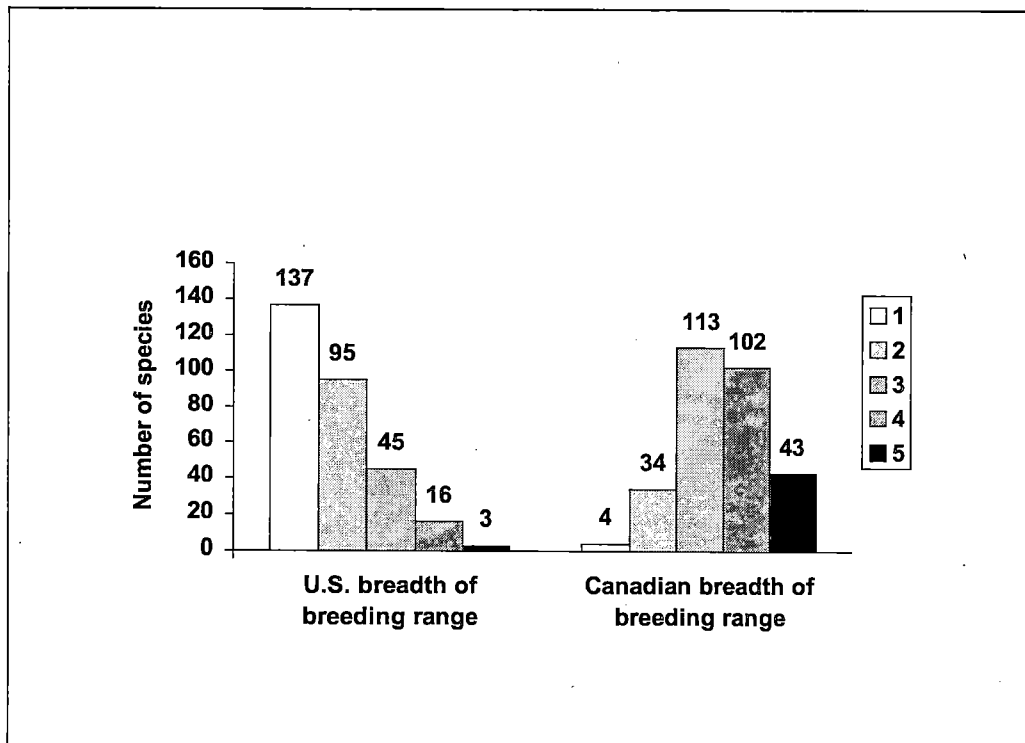
**Figure 1**

Distribution of scores for Canadian landbirds on the abundance criterion, according to the U.S. and Canadian Partners in Flight ranking systems (see Table 2 for scoring scales).

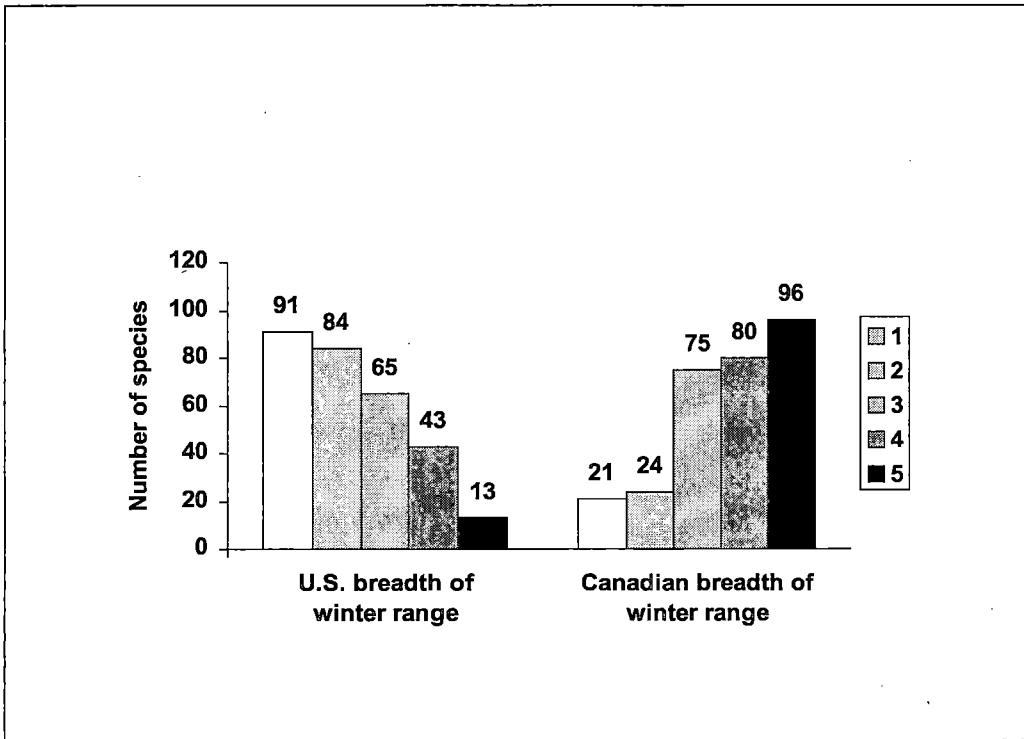


**Figure 2**

Distribution of scores for Canadian landbirds on the breadth-of-breeding-range criterion (see Table 2 for scoring scales).



**Figure 3**  
 Distribution of scores for Canadian landbirds on the breadth-of-wintering-range criterion (see Table 2 for scoring scales).



**Figure 4**  
 Distribution of scores for Canadian landbirds on the population-trend criterion (see Table 2 for scoring scales).

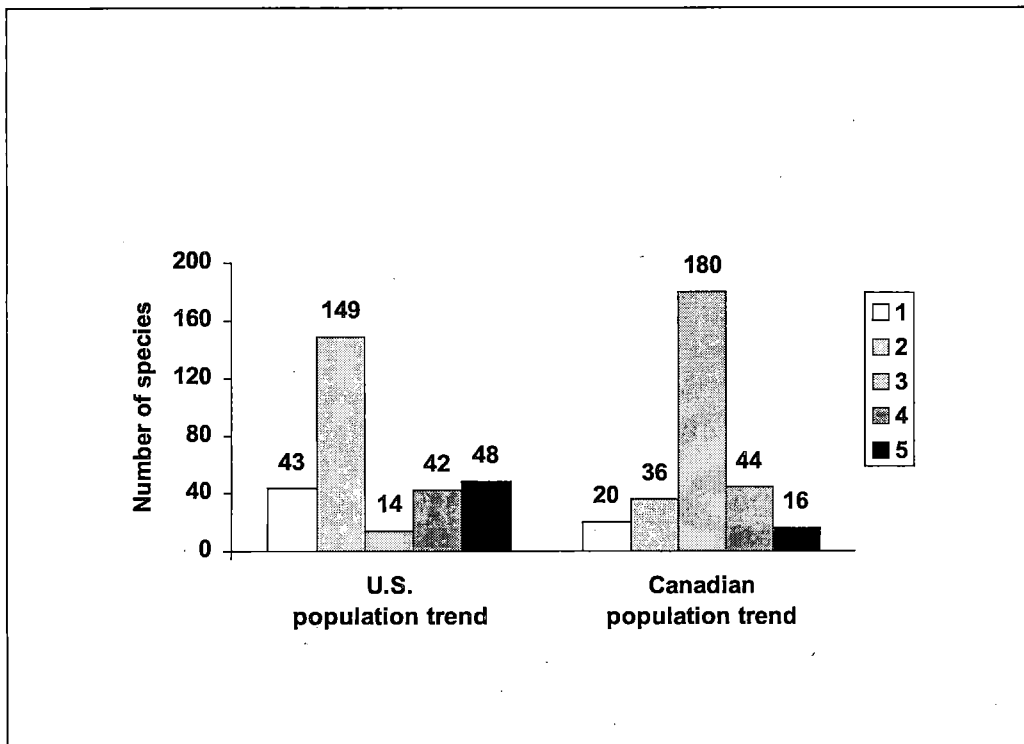


Table 5

Species on which Canadian and U.S. PIF ranking systems disagree on importance

| Species                              | Latin name                        | Main reason for importance <sup>a</sup> | Canadian stewardship <sup>b</sup> |
|--------------------------------------|-----------------------------------|---|-----------------------------------|
| <b>Species on U.S. list only</b>     |                                   |   |                                   |
| Red-shouldered Hawk                  | <i>Buteo lineatus</i>             | 1                                       | 1                                 |
| Ferruginous Hawk                     | <i>Buteo regalis</i>              | 1                                       | 1                                 |
| Peregrine Falcon                     | <i>Falco peregrinus</i>           | 2                                       | 1                                 |
| Barn Owl                             | <i>Tyto alba</i>                  | 2                                       | 1                                 |
| Burrowing Owl                        | <i>Athene cunicularia</i>         | 2                                       | 1                                 |
| Red-headed Woodpecker                | <i>Melanerpes erythrocephalus</i> | 2                                       | 1                                 |
| White-headed Woodpecker              | <i>Picoides albolarvatus</i>      | 2                                       | 1                                 |
| Acadian Flycatcher                   | <i>Empidonax virescens</i>        | 2                                       | 1                                 |
| Golden-winged Warbler                | <i>Vermivora chrysoptera</i>      | 2                                       | 1                                 |
| Louisiana Waterthrush                | <i>Seiurus motacilla</i>          | 2                                       | 1                                 |
| Hooded Warbler                       | <i>Wilsonia citrina</i>           | 2                                       | 1                                 |
| Yellow-breasted Chat                 | <i>Icteria virens</i>             | 2                                       | 1                                 |
| Bobolink                             | <i>Dolichonyx oryzivorus</i>      | 2                                       | 3                                 |
| <b>Species on Canadian list only</b> |                                   |   |                                   |
| Eared Grebe                          | <i>Podiceps nigricollis</i>       | 4                                       | 2                                 |
| Little Blue Heron                    | <i>Egretta caerulea</i>           | 3                                       | 1                                 |
| Chukar                               | <i>Alectoris chukar</i>           | 3                                       | 1                                 |
| White-tailed Ptarmigan               | <i>Lagopus leucurus</i>           | 3                                       | 3                                 |
| Mountain Quail                       | <i>Oreortyx pictus</i>            | 3                                       | 1                                 |
| California Quail                     | <i>Callipepla californica</i>     | 3                                       | 1                                 |
| Chimney Swift                        | <i>Chaetura pelagica</i>          | 4                                       | 1                                 |
| Vaux's Swift                         | <i>Chaetura vauxi</i>             | 3                                       | 3                                 |
| Anna's Hummingbird                   | <i>Calypte anna</i>               | 3                                       | 1                                 |
| Eastern Wood-Pewee                   | <i>Contopus virens</i>            | 4                                       | 1                                 |
| Hutton's Vireo                       | <i>Vireo huttoni</i>              | 3                                       | 1                                 |
| Sky Lark                             | <i>Alauda arvensis</i>            | 3                                       | 1                                 |
| Chestnut-backed Chickadee            | <i>Poecile rufescens</i>          | 4                                       | 3                                 |
| Gray-headed Chickadee                | <i>Poecile cinctus</i>            | 3                                       | 1                                 |
| Bushtit                              | <i>Psaltriparus minimus</i>       | 4                                       | 1                                 |
| Canyon Wren                          | <i>Catherpes mexicanus</i>        | 4                                       | 1                                 |
| Wood Thrush                          | <i>Hylocichla mustelina</i>       | 4                                       | 1                                 |
| Gray Catbird                         | <i>Dumetella carolinensis</i>     | 4                                       | 1                                 |
| Brown Thrasher                       | <i>Toxostoma rufum</i>            | 4                                       | 1                                 |
| Yellow Wagtail                       | <i>Motacilla flava</i>            | 3                                       | 1                                 |
| Blue-winged Warbler                  | <i>Vermivora pinus</i>            | 3                                       | 1                                 |
| Black-throated Blue Warbler          | <i>Dendroica caerulescens</i>     | 3                                       | 1                                 |
| Lark Bunting                         | <i>Calamospiza melanocorys</i>    | 4                                       | 2                                 |
| Golden-crowned Sparrow               | <i>Zonotrichia atricapilla</i>    | 3                                       | 3                                 |
| Eastern Meadowlark                   | <i>Sturnella magna</i>            | 4                                       | 1                                 |
| Common Grackle                       | <i>Quiscalus quiscula</i>         | 4                                       | 1                                 |

<sup>a</sup> Main reason for appearance on importance list in one ranking system and not on other:

1: High scores for threats on both breeding and wintering grounds.

2: COSEWIC-listed species for Canada, but low Canadian concern scores.

3: High Canadian breadth-of-range score (relative to U.S. system).

4: Population decline emphasized more heavily by Canadian system in determining importance.

<sup>b</sup> See scoring scale in Table 2.

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Both PIF ranking systems have undergone modification and refinement, and both recommend using scores for individual criteria in a variety of ways to address particular goals (Dunn et al., in press; Carter et al. 1999). Results presented here indicate substantial agreement on important species at the national scale. So rather than divert energy into further modifying the Canadian system, we should move ahead with what we have to promote conservation planning.

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**References**

Carter, M. F.; Hunter, W.C.; Pashley, D.N.; Rosenberg, K.V. 1999. Setting landbird conservation priorities for states and physiographic areas of North America. In R. E. Bonney, D.N. Pashley, R. J. Cooper, and L. Niles (editors). Strategies for bird conservation: the Partners in Flight planning process. Cornell Laboratory of Ornithology Web site: <<http://birds.cornell.edu/pifcapemay>>

Dunn, E. H. 1997. Setting priorities for conservation, research and monitoring of Canada's landbirds. Canadian Wildlife Service Technical Report Series No. 293. Environment Canada, Ottawa.

Dunn, E.H.; Hussell, D.J.T.; Welsh, D.A. In press. A priority-setting tool based on concern and responsibility for species, applied to Canada's landbirds. Conservation Biology.

Hunter, W. C.; Carter, M.F.; Pashley, D.N.; Barker, K. 1993. The Partners in Flight species prioritization scheme. Pages 109-119 in D.M. Finch and P.W. Stangel, editors. Status and management of Neotropical migratory birds. U.S. Forest Service General Technical Report RM-229.

Master, L. 1991. Assessing threats and setting priorities for conservation. Conservation Biology 5:559-563

National Geographic Society. 1987. Field guide to the birds of North America. National Geographic Society, Washington, D.C.

The Nature Conservancy. 1988. Natural Heritage Program operations manual (revised). The Nature Conservancy, Arlington, Virginia.

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