CONSERVATION PLAN FOR THE AMERICAN GOLDEN-PLOVER (*PLUVIALIS DOMINICA*)

Version 1.1

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WHSRN
WESTERN HEMISPHERE SHOREBIRD RESERVE NETWORK

NOTE about Version 1.1:

The only difference between Version 1.1 (February 2010) and Version 1.0 (September 2009) is the addition of a Spanish executive summary.

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EXECUTIVE SUMMARY


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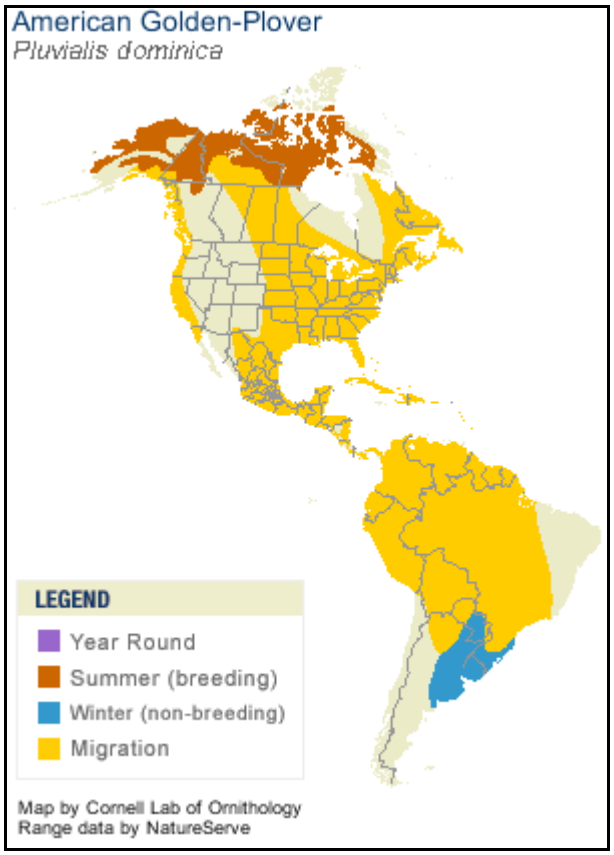
The American Golden-Plover (*Pluvialis dominica*) is one of four species in the genus *Pluvialis*. It is one of the longest-distance migrants in the Americas, breeding in arctic and sub-arctic regions of Canada and Alaska and wintering in southern South America, primarily in the Pampas grasslands of southern Brazil, Uruguay, and northern Argentina (Map 1). The most recent global estimate for *P. dominica* is 200,000 birds, though the accuracy of the estimate is likely low. Current population trends are unclear and the limited data available are often conflicting, underlining the urgent need for monitoring of birds on the breeding and nonbreeding grounds and during migration. Most recent authors have, however, considered the species to be in decline. Furthermore it does not appear to have ever fully recovered from market and sport hunting, primarily in North America, during the late 19th Century. Hunting is no longer the threat it once was, though unregulated hunting in Barbados, and to a lesser extent the Guianas, is a concern.

The most significant current threats facing the species are probably loss of habitats and exposure to agrochemicals. The loss of habitat is variously caused by agricultural expansion and intensification, and the conversion of land to other uses such as residential development and mining. Agrochemicals are being used throughout the species's migration corridors and nonbreeding grounds with potentially negative effects on the birds. As an arctic-breeding species, and one which is dependent on near-coastal grasslands during a large part of the nonbreeding season, the species is also highly susceptible to climate change.



Map 1: Breeding, migration, and nonbreeding (wintering) range of *Pluvialis dominica*.

Key to the long-term survival of *P. dominica* is a suite of habitat-level strategies and actions. These include the adequate protection of large tracts of breeding habitat, measures to minimize the impacts of climate change, and the widespread adoption of responsible agricultural practices that combine economic viability with environmental sustainability and social equality. An important first step may be the formal recognition of key landscape-level areas as being of particular importance for the species. This can be achieved through the Western Hemisphere Shorebird Reserve Network (WHSRN) Landscape of Hemispheric Importance designation. Priorities areas for such designation are the coastal grasslands of Buenos Aires Province (Argentina), eastern Uruguay, and Rio Grande do Sul (as three separate WHSRN landscapes); the coastal plain of Texas and Louisiana (USA); and Benton County and parts of White County, Indiana (USA).

The effective protection of a network of key sites for the species will also be important in its long-term survival. A total of 17 sites of global importance (holding 1% or more of the global population) are identified in this plan: 2 breeding sites, 7 migration stopover sites, and 8

nonbreeding (wintering) sites. A further 40 sites are also identified as of regional importance (holding 0.2% or more of the global population). Appropriate grassland management regimes (to create the short grass habitat favored by the species), reduction/elimination of the use of agrochemicals, and the regulation (or where appropriate) elimination of hunting, are the main actions required at these sites.

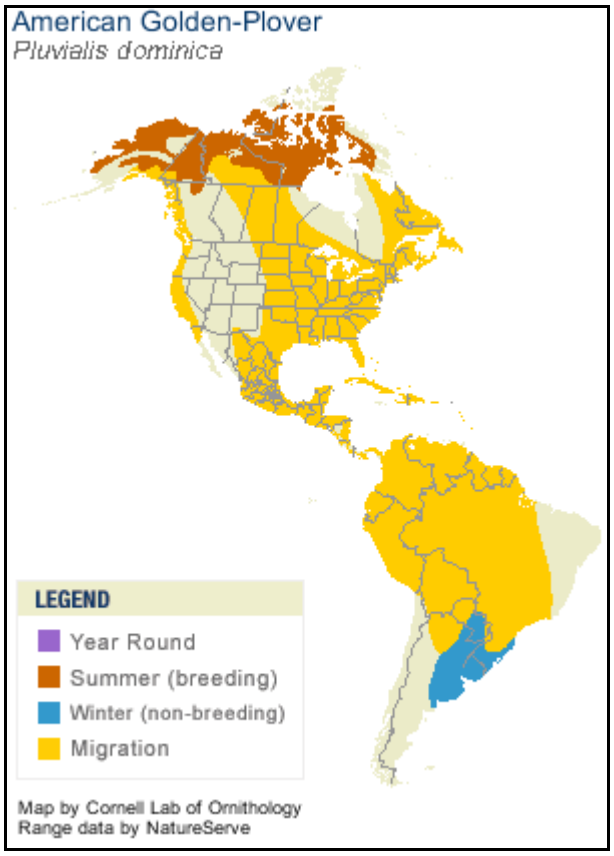
The American Golden-Plover has been relatively well studied on its breeding grounds, and to a lesser extent during its migration through North America. However, comparatively little is known about the species during its migration outside of North America and on the South American nonbreeding (wintering) grounds. Considerable data have been gathered in recent years from parts of the species's wintering range and the compilation and analysis of these data is a clear priority for action. Of particular importance is a better understanding of the use of agricultural fields. Such understanding would help facilitate the assessment of migration and wintering area counts, and shed light on what proportion of the population uses different habitat types, how the plovers use them, and whether the birds undertake local or regional movements to follow the crop cycle. There is also a clear need for research to better understand the species's population dynamics and the degree to which it is threatened. Such research should include a regular breeding-range-wide census to determine trends and consolidation of efforts to monitor the species during migration and on nonbreeding grounds.

An important first step in implementing the activities identified in this plan is the creation of an American Golden-Plover Working Group. This group would include researchers, conservationists, and educators from throughout the range of the species, with the goal of overcoming the challenges of communicating across a hemisphere and in several languages and fostering/coordinating research, conservation action, and monitoring.

RESUMEN EJECUTIVO

El *Pluvialis dominica* es una de las cuatro especies del género *Pluvialis*. Es una ave migratoria de las Américas que realiza largos recorridos, se reproduce en el ártico y regiones subárticas de Canadá y Alaska y pasa el invierno en el sur de Suramérica, principalmente en las pampas del sur de Brasil, Uruguay, y en el norte de Argentina (Mapa 1). La estimación mundial más reciente para *P. dominica* es de 200.000 aves, aunque la exactitud de la estimación es probablemente baja. Las tendencias demográficas actuales son poco claras y los datos disponibles son limitados y a menudo contradictorios, lo que se subraya es la urgente necesidad de monitorear a estas aves en temporadas reproductivas, no-reproductivas, y durante la migración. La mayoría de autores recientes consideran que la población de esta especie está disminuyendo. Además no parece que se haya recuperado del mercado y la caza deportiva, que hubo principalmente en Norte América durante el siglo XIX. La cacería ya no es la amenaza que fue alguna vez, aunque en Barbados y en las Guayanas en menor proporción, la cacería no reglamentada es preocupante.

Las amenazas actuales más significativas que enfrenta el *P. dominica* es probablemente la pérdida del hábitat y la exposición a productos agroquímicos. La pérdida del hábitat es causada por la expansión e intensificación agrícola y la utilización de la tierra para otros usos tales como el desarrollo residencial y la explotación minera. Los productos agroquímicos son utilizados en áreas donde la especie migra y pasa el invierno, generando efectos potencialmente negativos en las aves. Esta especie que se reproduce en el ártico y que depende de pastizales cercanos de la costa durante gran parte de la temporada no-reproductiva, es susceptible al cambio climático.



Mapa 1. El rango de reproducción, migración, y no-reproducción (invierno) del *Pluvialis dominica*.

El clave a la supervivencia de *P. dominica* es el conjunto de acciones y estrategias al nivel de hábitat. Estos incluyen una adecuada protección de grandes extensiones de lugares donde se reproducen, medidas para minimizar los impactos del cambio climátic, y la adopción de prácticas agrícolas responsables que combinen la solvencia económica con la sustentabilidad ambiental y social. Un primer paso importante puede ser el reconocimiento formal de áreas claves del paisaje como zonas importantes para la especie. Esto puede lograrse a través de la Red Hemisférica de Reservas para Aves Playeras (RHRAP) con la designación de Paisaje de Importancia Hemisférica. Áreas importantes para tal designación son los pastizales costeros de la Provincia de Buenos Aires (Argentina), el este de Uruguay, y el Río Grande do Sul (Brasil) (como tres diferentes paisajes de RHRAP); la llanura costera de Texas y Louisiana (EEUU); y el Benton County y partes de White County, Indiana (EEUU).

La protección efectiva de una red de sitios claves para la especie también será importante en su supervivencia a largo plazo. Un total de 17 sitios de importancia mundial (que alberga el 1% o más de la población mundial) son identificados en este Plan: 2 sitio de reproducción, 7

sitios de migración, y 8 sitios de no-reproducción (de invierno). Otros 40 también son identificados como sitios de importancia regional (que alberga el 0.2% o más de la población mundial). Las principales acciones necesarias en estos sitios son los regímenes de manejo adecuado de de los pastizales (para crear el hábitat de pastos cortos que favorece a la especie), la reducción/eliminación del uso de agroquímicos, y la eliminación de la cacería.

El *P. dominica* ha sido relativamente bien estudiado en los sitios de reproducción y en una menor medida los sitios durante su migración a través de Norte América. Sin embargo, comparativamente poco se sabe de la especie en su migración fuera de Norte América y en la temporada no-reproductiva en Suramérica (invierno boreal). Se han reunido datos importantes en los últimos años a partir del rango invernado de la especie, y la recopilación y análisis de estos datos son una clara prioridad para acciones. De particular importancia es una mejor comprensión de la utilización de campos agrícolas. Dicha comprensión puede facilitar y contribuir a la evaluación de los puntos de los lugares de reproducción y migración, y arrojar una luz sobre qué proporción de la población utiliza diferentes tipos de hábitats, como los chorlos los usan, y si las aves llevan a cabo movimientos locales o regionales para seguir el ciclo de cultivo agricultura. También hay una clara necesidad de más investigación para comprender mejor la dinámica de la población de esta especie y el grado de amenaza. Dichas investigaciones deben incluir censos en el rango de reproducción para determinar las tendencias y consolidar esfuerzos para el monitoreo de la especie durante la migración y no-reproducción.

Un primer paso importante es la ejecución de actividades identificadas en este Plan es la creación de un Grupo de Trabajo para el *P. dominica.*. Este grupo debería incluir a investigadores, conservacionistas, y educadores expertos desde el rango entero de la especie, con el objetivo de superar los desafíos de la comunicación a través de un hemisferio y en varios idiomas, y la promoción / coordinación de la investigación, las acciones de conservación, y monitoreo.

PURPOSE

The American Golden-Plover (*Pluvialis dominica*) is one of the longest-distance migrants in the Western Hemisphere. It breeds in arctic and sub-arctic regions of Canada and the United States and migrates to its nonbreeding ("wintering") grounds within the grasslands and coastline of southern South America; some birds spend the boreal winter [austral summer] as far south as Patagonia. The purpose of this conservation plan is to define the conservation status of *P. dominica* throughout its range, describe current threats, list research and management needs, and outline recommended conservation actions.

P. dominica warrants conservation planning because it faces serious threats throughout its range:

- As a species dependent on arctic and sub-arctic tundra for breeding, *P. dominica* may be particularly vulnerable to the effects of **climate change** on its nesting habitat.
- The species's long migration pathways involve regions where problems associated with humans are likely. The **loss of key stopover and feeding areas** as lands are developed for other purposes (expansion of cities and towns, changes in agricultural practices, construction of wind farms, etc.) is a major threat.
- During migration and on the nonbreeding grounds, this plover regularly forages in agricultural habitats (livestock areas and croplands), where the widespread use of **agrochemicals** may be causing currently unrecognized mortality or other problems.
- The majority of the population is believed to spend the boreal winter in the Pampas grasslands of South America, the region's "bread basket," where **habitat has been lost or greatly modified** in recent decades.

To what extent these potential threats (individually or collectively) are influencing *P. dominica* is unknown. Populations in some areas have declined, whereas in others they have significantly increased. Thus, there is a clear need for better understanding the population dynamics of the species and the degree to which the factors mentioned above are influencing the current status of this plover. The intent of this conservation plan is to help guide management and research activities, identify gaps in knowledge, and develop short-term conservation strategies that will benefit this species in the long term.

STATUS AND NATURAL HISTORY

Pluvialis dominica has been relatively well studied on breeding grounds, and to a lesser extent during migration through North America. However, little is known about these birds when they are migrating outside of North America or when they are on nonbreeding (wintering) grounds in South America.

MORPHOLOGY

The genus *Pluvialis* consists of four species: the American Golden-Plover, Pacific Golden-Plover (*P. fulva*), Eurasian Golden-Plover (*P. apricaria*), and the Black-bellied Plover (*P. squatarola*). All are medium-size plovers and strong migrants that breed primarily in the Arctic and Sub-arctic. Each has spotted or spangled upperparts in all plumages; in breeding plumage, the underparts become extensively black. The Black-bellied Plover (also known as Grey Plover) differs from its congeners in that body size is somewhat larger; also, the birds have a vestigial hind-toe, grayish upperparts, and black axillary patches. For helpful color photos of the four *Pluvialis* plovers, see O'Brien *et al.* (2006).

Sexual dimorphism in American Golden-Plovers is apparent only when birds are in full breeding plumage. Males are then easily identified by their striking black/white/golden coloration (Figure 1). Females are generally less intensely colored, being mottled white on the underparts and face; also, there is a subtle brownish hue to their black feathering (Figure 2). Notably, the underpart patterning of some females is nearly male-like (Figure 3), and the brownish hue of the female's plumage may be apparent only when pairs are seen together. Adults often retain traces of breeding plumage until late October/November.

Juvenal plumage (Figure 4) is similar to adult nonbreeding plumage (Figure 5), except the upperparts are relatively drab and underparts are mottled grey and white with fine grayish-brown barring on the flanks and sides. The latter feature is often still distinctive in December. Aside from these plumage features, no age criterion for young birds has been clearly defined for *P. dominica*. This is unlike *P. fulva*, in which first-year individuals retain worn juvenile primaries until their second wintering season (Johnson and Johnson 1983, 2004).

Figure 1: Adult male *Pluvialis dominica* in full breeding plumage / © Oscar Johnson

Figure 2: Typical adult female *Pluvialis dominica* in full breeding plumage / © Oscar Johnson

Figure 3: Adult female *Pluvialis dominica* with male-like breeding plumage / © Oscar Johnson

Figure 4: Juvenile *Pluvialis dominica* / © Steve Mlodinow

Figure 5: Adult in almost complete nonbreeding plumage (few vestiges of breeding plumage in under- and upperparts) / © Silvia Centrón

Johnson and Johnson (2004) provide a detailed morphometric analysis of both *P. dominica* and *P. fulva*, including comparisons between the two species. Among their findings:

1) *P. dominica* breeding at the western end of their range (Seward Peninsula, Alaska) had shorter wings and tarsi but longer bills than birds nesting at the opposite end of the range near Churchill, Manitoba (Table 1);

2) Compared to *P. fulva*, *P. dominica* were longer-winged (averaging 12 millimeters longer), and had shorter bills and tarsi (Table 2);

3) The most reliable field characters for separating *P. dominica* and *P. fulva* were interspecific differences in breeding plumage, the number of primaries exposed beyond the longest tertials (4–5 in *dominica*, 2–3 in *fulva*), and the distance to which primary tips projected past the end of the tail (12–22 mm in *dominica*, 0–9 mm in *fulva*); and

4) Molting birds and some nonbreeding-plumaged birds may be impossible to identify to species.

Table 1: Comparable mean linear measurements (in millimeters) of *Pluvialis dominica* at opposite ends of its breeding range. Bold indicates measurements that differ significantly (by t-tests at 0.005 level of significance). Table and data from Johnson and Johnson (2004).

Location	Wing	Total Head	Bill	Tarsus
Seward Peninsula 64º51'N, 166 º 05'W	184 (176–192, 46)	58.2 (55.6–60.1, 42)	22.8 (21.0–24.7, 45)	44.1 (41.9–46.6, 43)
Churchill, Manitoba 58 º44'N, 93 º49'W	**190** (183–198, 31) *P* = <0.0001	58.7 (56.2–60.4, 3)	**22.3** (20.8–24.2, 30) *P* = 0.014	**44.9** (41.7–47.6, 38) *P* = 0.007

Table 2. Comparable measurements between *Pluvialis dominica* and *P. fulva.* Data from Johnson and Johnson (2004).

Species	Wing	Bill	Tarsus
American Golden-Plover (*P. dominica*)	184 mm ± 3.9 *n* = 46	22.8 mm ± 0.8 *n* = 45 (*t* = 9.43, *P* = <0.0001, df = 484)	44.1 mm ± 1.2 *n* = 43 (*t* = 7.20, *P* = <0.0001, df = 460)
Pacific Golden-Plover (*P. fulva*)	172mm ± 4.1 *n* = 411 adults	24.3 mm ± 1.1 n = 441 adults & 1st year	45.9 mm ± 1.6 *n* = 419 adults & 1st year

Appreciating the difficulties of separating *P. dominica* from *P. fulva* is of some relevance to the conservation of *P. dominica*, because both species occur in the westernmost part of its breeding range and both could occur during winter (or as migrants) along the Pacific coast of the Americas.

Johnson and Connors (1996) summarize mass measurements (grams) for breeding birds and northbound migrants, and all are within the range of 122–194 for males and 126–190 for females. The largest sample (after Cramp and Simmons 1983) was from Alaska and Canada, and these averaged 145 for males (122–194 g, *n* = 50) and 146 for females (126–169 g, *n* = 32). Birds generally arrive on the breeding grounds carrying fat reserves (Johnson and Connor 1996); thereafter, reserves decline in some individuals (Irving 1960) but apparently not in others (Johnson and Connor 1996).

TAXONOMY

For many years, the American Golden-Plover was classified as a subspecies of the Lesser Golden-Plover (*P. dominica*), the latter consisting of two forms: American (*P. d. dominica*) and Pacific (*P. d. fulva*). Convincing evidence that these were in fact two full species was provided by Connors *et al*. (1993) who found "clear and consistent differences in breeding vocalizations and nesting habitat, and strict assortative mating in areas of sympatry in western Alaska." Subsequent analyses of mitochondrial DNA suggest that *P. fulva* is more closely related to the Eurasian Golden-Plover (*P. apricaria*) than to *P. dominica* (F. Gill *et al*. unpubl. data, see Johnson and Connors 1996).

POPULATION ESTIMATE AND TREND

Population Estimates

The most recent global population estimates for *Pluvialis dominica* are 150,000+ (Morrison *et al*. 2001) and 200,000 (Morrison *et al*. 2006). In each case, Morrison *et al*. consider the accuracy of their estimate to be "low," but probably "in the right order of magnitude." That the population could actually be 2.5 million breeding pairs as estimated by Byrkjedal and Thompson (1998) is highly unlikely. The somewhat higher estimate in 2006 by Morrison *et al*. was based upon new information from west-central Indiana where large spring aggregations (42,000–84,000 birds) have been documented by Braile (1999) (also see Johnson 2003). The Morrison *et al*. estimates are based almost entirely on surveys in North America (see Morrison *et al*. 2001 for details). Counts during the nonbreeding season (from wintering grounds and along migratory routes in the Caribbean and in Central and South America) are too few and insufficiently systematic to be of use in global population estimates.

Population Trend

Current population trends are unclear, and the limited data available are often conflicting. Bart *et al*. (2007) reported significant declines for the species during post-breeding migration in the North Atlantic region of North America, yet a significant increase within the Midwest region. Morrison *et al*. (1994) found no significant change in numbers migrating through eastern Canada during 1974–1991. On the breeding grounds, Gratto-Trevor (1994) and Lin and Jehl (1998)

noted rising numbers at Churchill, Manitoba; and Pattie (1990) documented an increase during 1978–1989 on Devon Island, Nunavut. However, Gratto-Trevor *et al*. (1998) found a significant decline in the population breeding on the Rasmussen Lowlands, Nunavut, from the mid-1970s to the mid-1990s, and Troy (1996) reported declines at Prudhoe Bay, Alaska.

Most recent authors (*e.g.* Johnson and Connors 1996, Morrison *et al*. 2001a, Johnson 2003, USFWS 2004, Morrison *et al*. 2006) have considered that despite these conflicting reports, the combined data suggest a decline. However, in a more recent assessment for the 2008 Birds of Conservation Concern (USFWS 2009), the overall population of *P. dominica* was regarded as stable and the species was not considered to be of national conservation concern (B. Andres in litt. 2008). In this analysis, the approach used to judge trends followed that of Donaldson *et al*. (2000), and "stable" was defined as decreases reported in 31–69% of the datasets. Differences in census protocols preclude the possibility of combining the datasets for more detailed analyses. Whether the *P. dominica* population is truly stable remains questionable. The trend may indeed be downward, and there is an urgent need for monitoring the number of birds at stopover areas and on breeding and nonbreeding grounds.

Historical Changes

During the 19th and early 20th centuries, *Pluvialis dominica* suffered a major decline caused by excessive sport and market hunting (Cooke 1910, Wetmore 1927, Bent 1929, Allen 1934). Large numbers were killed in North America during the northbound migration and to a much lesser extent on the nonbreeding (wintering) grounds in South America. As an extreme example, 48,000 were estimated to have been shot in a single day near New Orleans in 1821 (J. Audubon in Bent 1929).

One of the first indications of hunting on the nonbreeding (wintering) grounds was provided by de Azara (1805) who reported that in the 1770s he was able to kill or buy "quite a few" individuals of the species, which he considered to be a gregarious, but not abundant summer visitor. Hudson (1920) reported the species as being abundant and a popular gamebird (two months after their arrival in late August, when birds had fattened up). He also mentions that 25 years earlier they were less frequently hunted, due to the scarcity of firearms in the region, and that hunting was undertaken using the traditional "bolas." Somewhat in contrast, Wetmore (1927) did not consider the species to be particularly favored by market hunters, though he did

comment that the species was "formerly so abundant that it occurred in flocks containing 200 or 300 individuals; at present it is hardly to be considered common." Although there are several mentions in the published literature about shorebird hunting in southern South America, Canevari and Blanco (1994) failed to find any documentation of significant shorebird hunting in the Pampas.

With the decline of hunting in North America around the turn of the century, and its prohibition from 1918 onwards, the species's population recovered at least partially. Olrog (1967) saw no evidence of any further reduction in the nonbreeding (wintering) population in eastern Buenos Aires Province, Argentina, over the period 1927–1962; and Isacch and Martínez (2003a, b) working at the Medaland Ranch found plovers in numbers similar to those recorded there in earlier years by Myers and Myers (1979). Despite this limited evidence of recovery and stability, the population does not appear to have reached its former size, presumably because of habitat loss on the winter range (Johnson and Connors 1996). In fact, as far back as 1927, Wetmore was predicting that agricultural development of the Pampas would restrict *Pluvialis dominica* wintering habitat to coastal areas, a remarkably prescient forecast of the surveys in 1992–1993 by Blanco *et al*. (1993) who indeed found most birds in the "Pampa deprimida" (flooding Pampas) in coastal Buenos Aires Province.

DISTRIBUTION AND ABUNDANCE

Breeding Range

The main breeding range for *Pluvialis dominica* is in arctic and sub-arctic regions of Canada and Alaska. In Canada, the distribution extends from northeast Manitoba across Nunavut and Northwest Territories (including the major islands of Southampton, Victoria, Banks, Melville, Devon, and much of Baffin), south through the Yukon to northwest British Columbia. There is also an apparently isolated breeding area at Cape Henrietta Maria in northern Ontario (AOU 1983, Peck and James 1983), and Campbell *et al*. (1990) reported the species likely breeding ("probably" *P. dominica*) in the Ithca Mountains, British Columbia, about 600 kilometers south of the previously known range.

In the United States, the species breeds throughout northern, central, and western Alaska (including the entire Seward Peninsula), and south along Norton Sound, to the watersheds of the

Pikmiktalik and Andreafsky Rivers; also Cape Romanzof, the Askinuk Mountains, Nelson Island, and the Nushagak River drainage. Furthermore, the species's range probably includes Nunivak Island, and many high tundra ridges in southwestern and south-central Alaska. For additional details and references concerning the distribution of this plover in Alaska, see Johnson and Connors (1996) and Bennett (1996).

Outside of the Western Hemisphere, the species was reported as breeding on the Chukotskiy Peninsula, Russia, in the late 19th and early 20th centuries (Vaurie 1965, Portenko 1972). Its present status in the region needs clarification, as undue weight was given by these authors to uncorroborated statements and inadequately documented records (Knox 1987). However, recent observations and collections indicate probable nesting there (Tomkovich 1988, Tomkovich and Soloviev 1988). There are also unconfirmed reports from Wrangel Island and Herald Island (see Kondratiev 1989, Stishov and Pridatko 1990).

This species's vast range covers many remote, poorly known areas, and mapped breeding distribution boundaries are thus somewhat arbitrary.

Nonbreeding Range

The primary nonbreeding (boreal winter / austral summer) range of *Pluvialis dominica* is the Pampas grasslands of southern South America (in Brazil and Uruguay also known as Campos grasslands) which stretch from southern Paraguay and southern Brazil (Rio Grande do Sul) southward through Uruguay and Argentina (to Cordoba, Mendoza, and Bahía Blanca); some birds range as far south as Patagonia, where they appear to be primarily an accidental visitor (Vuilleumier 1995). The coastal grasslands of southern Brazil and Uruguay and the eastern part of the "flooding Pampas" grasslands of Argentina (eastern Buenos Aires Province) appear to be the preferred nonbreeding area (Blanco *et al*. 2004). Some birds have also been reported from northern-coastal and inland Brazil (Morrison and Ross 1989, Sick 1997). The species is primarily a transient migrant in Paraguay (Hayes *et al*. 1990, del Castillo and Clay 2004), while in Chile it only occurs in small numbers, primarily in the extreme north and south (Jaramillo 2003). Occasional birds reported as "wintering" elsewhere (such as along the Atlantic and Gulf coasts of the United States, and in Central America and northern South America) may be late post-breeding or early pre-breeding migrants (Johnson and Connors 1996)), or could be misidentified *P. fulva*. Deforestation in Amazonia is increasingly producing open areas suitable

for migrating and wintering *P. dominica* (Stotz *et al*. 1992, Sick 1997), and Sick considered them to be "abundant in central Brazil until end of February."

Extralimital Records

Pluvialis dominica and/or *P. fulva* have been reported in many areas outside of their normal ranges, however the difficulties of identification (especially in nonbreeding plumages) often casts doubt about which of the two species was actually observed. Nonetheless, it appears certain that *P. dominica* occurs annually in Britain and Ireland, with an average of 4.9 birds recorded each year from 1950–2005 together with an average of 6.4 unidentified plovers (either *P. dominica* or *fulva*) per year for the same period (BBRC 2007). The number of birds recorded each year has gradually increased, from 3.1 in the 1970s to 6.5 in the 1980s, 10 in the 1990s, and 12 during 2000–2005. While a marked increase in observers, together with greater awareness and birding skills, is likely to explain most of this trend, it is also possible that these numbers reflect an increasing population and/or changes in migration routes. Notably, a specimen of *P. dominica* collected in 1900 in Friesland, Netherlands, was described and measured by Roselaar (1990). Furthermore, *P. fulva* has been well documented as a regular fall visitor in The Netherlands (Jukema 1987, Roselaar 1990, Jukema and van der Veem 1992).

Notable records of *P. dominica* (assuming correct identification) include the west coast of Africa from Senegal to South Africa, in Okinawa (Brazil 1991), and in New Guinea and New Zealand (Finch and Kaestner 1990, Marchant and Higgins 1993). Marchant and Higgins (1993) considered several reports of the species in Australia to be unacceptable.

MIGRATION

Pluvialis dominica makes one of the longest migrations of any bird in the world, including extensive nonstop flights over water. The species is well-known for its elliptical migration pattern, with a post-breeding (southbound) trans-oceanic route over the western Atlantic, and a pre-breeding (northbound) mid-continental route.

Southbound Migration

Failed breeders start to leave breeding areas in late June to mid-July, while the majority of adults leave in August. Peak migration of adults through the Canadian Atlantic provinces is 26

July–30 August (Morrison *et al*. 1994). Juveniles leave later (late August–early October). By mid-October juveniles are common transients in Paraguay, peaking in early November (R. Clay unpubl. data). The first birds arrive on the nonbreeding grounds in late August (Hudson 1920, Myers and Myers 1979, Belton 1984, Isacch and Martínez 2003a) before the last birds have left breeding areas.

During the post-breeding migration, large numbers of birds first move southeastwards, making one or more stops in central (*e.g.* Hudson and James Bays) and southeast Canada and/or New England before making the trans-Atlantic flight to South America (Williams and Williams 1990, Wilson and McRae 1993). Some birds, especially juveniles, migrate southward through the Missouri, Mississippi, and Ohio River valleys, while others move along the Atlantic Coast then across the Caribbean to South America. Small numbers of birds also migrate along the Pacific Coast, perhaps from the westernmost breeding areas (Paulson 1993).

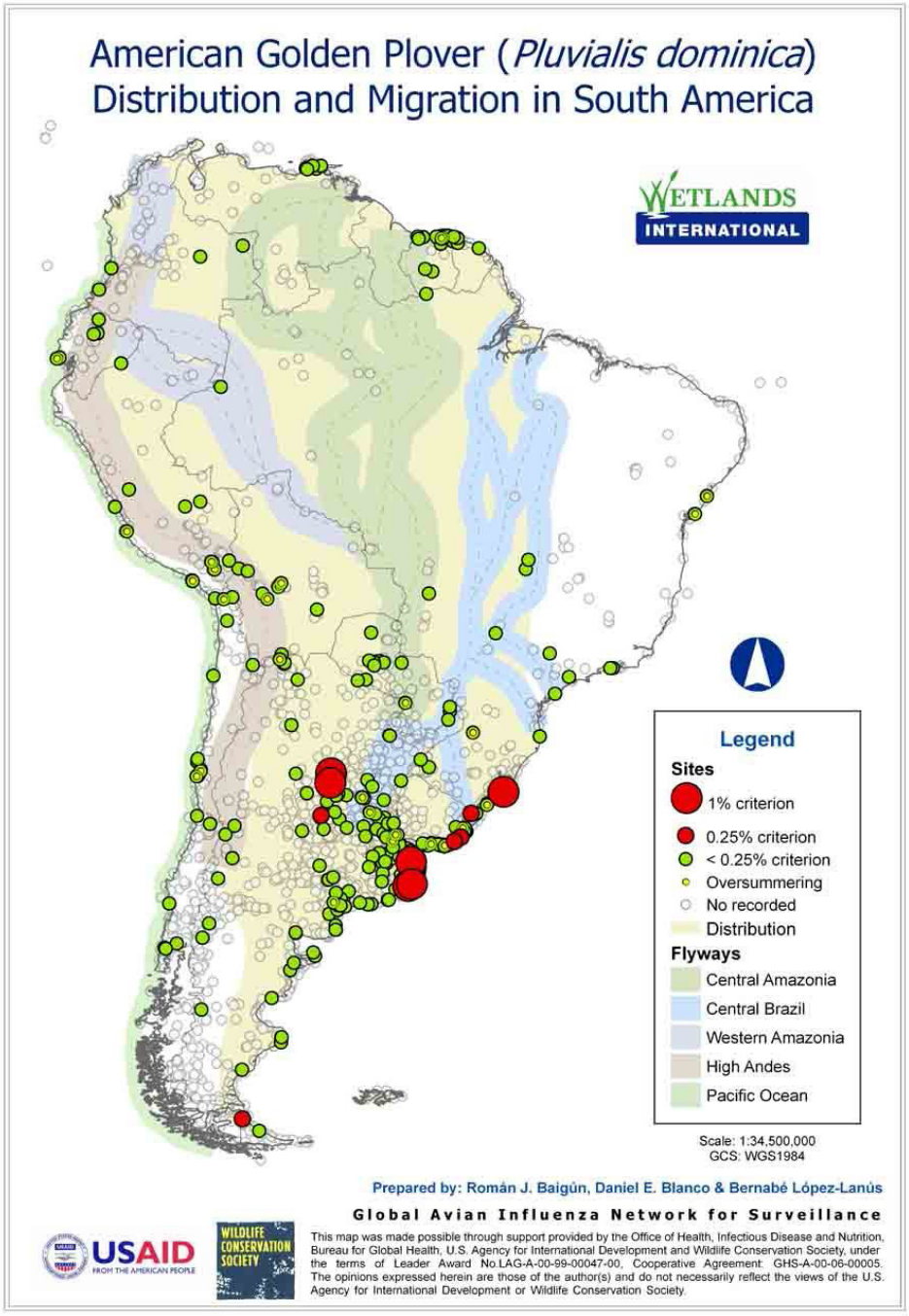
In most of the Caribbean, the species is considered to be a rare post-breeding migrant from August to November, and a very rare migrant during the northbound return migration in March and April (Raffaele *et al*. 1998). However, large numbers occur annually in Barbados during the post-breeding migration (Hutt 1991).

Migration of the species in South America is not well known. It is reported to be an uncommon to fairly common passage migrant in grassy pastures and less frequently sandy beaches of northern South America (see Appendix I) during September–December. Many birds may fly far inland before alighting, and some may fly directly to the upper Amazon in Brazil (Johnson and Connors 1996). Goulding (1989) reported the species to arrive on beaches in the central Amazon in August or September, with some birds remaining until their return migration begins in January and February. Subsequent movements are believed to follow the major north-south river valleys where low water levels and extensive pastures provide appropriate habitat (Antas 1983). According to Antas (1983), *Pluvialis dominica* apparently use the following flyways (Map 2):

- ***Central Brazil flyway***: From the mouth of the Amazon River, along the Araguaia/Tocantins and Xingu River valleys to the Paraná River valley. Antas noted the absence of *P. dominic*a from the coastal area between the Amazon River mouth and Rio de Janeiro state, and suggested that birds reach coastal areas south of Rio de Janeiro by

following this flyway and then cutting across via the Tiete and Paranapanema River valleys.

- ***Central Amazonia/Pantanal flyways:*** From the Caribbean coast and rivers in the Guianas and the Orinoco in Venezuela, across the central Amazon to the Pantanal, then south via the Paraguay River.
- ***Western Amazonia flyway:*** Crosses western Amazonia from Central America and Colombia. Antas suggested that most first-year *P. dominica* use this flyway to migrate south.



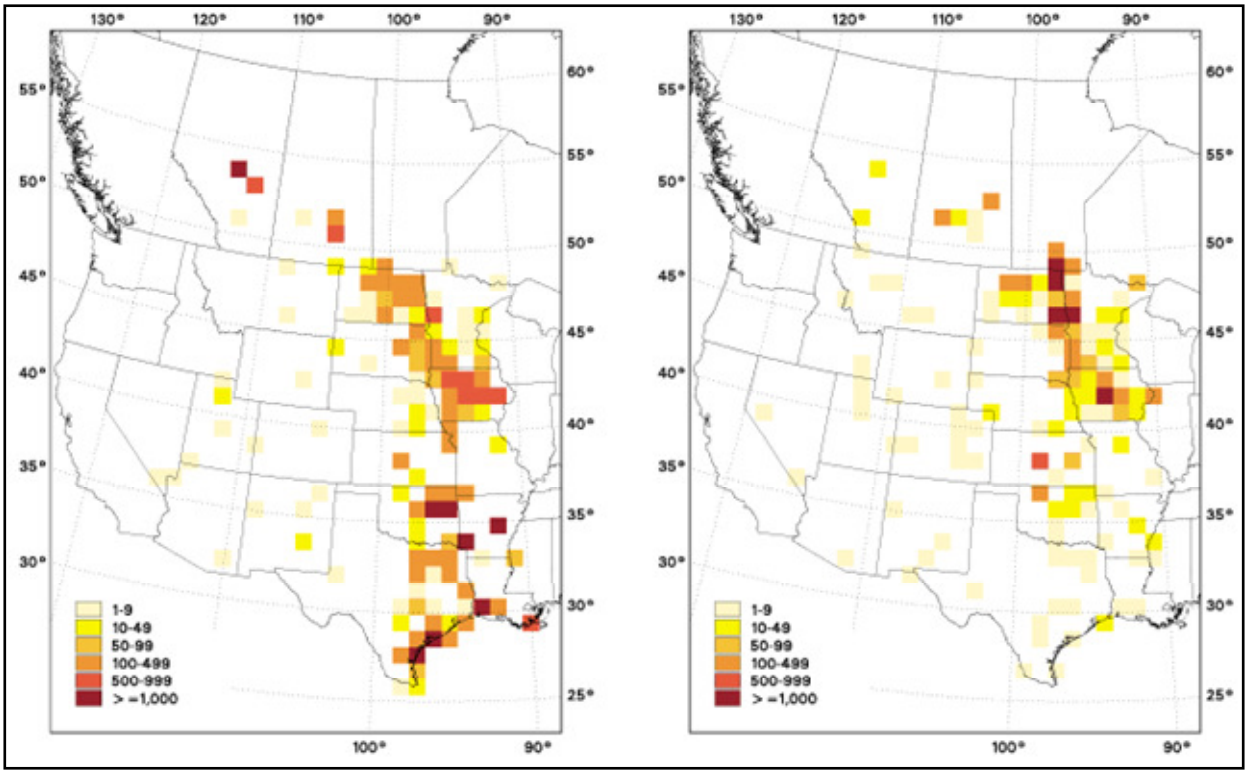
Map 2: Shorebird flyways in the interior of South America and sites of global and regional importance as identified using Neotropical Waterbird Census data.

Northbound Migration

Return migration begins in late January, with a major exodus in February, yet with some birds remaining into April (Dabbene 1920, Wetmore 1927, Olrog 1959, Myers and Myers 1979, Blanco *et al*. 1988, Hayes *et al*. 1990, Sick 1993) and rarely into May (Resende and Leeuwenberg 1987, Belton 1984, Vooren and Chiaradia 1990, Mähler *et al*. 1996). Antas (1983) considered that the northbound route lies mostly west of the southbound route, passing through the upper reaches of the Amazon basin in Bolivia, Peru, and Colombia. Consistent with this is the observation of large numbers of the species around 4,000 meters in the altiplanos of northwest Argentina, Bolivia, and Peru in March–April (Fjeldså and Krabbe 1990). Northbound migration would thus appear to cross the Andes to Central America, where the species is a fairly common pre-breeding migrant (see Appendix I). However, at least some birds apparently depart northwest South America, probably flying nonstop across the Caribbean and the Gulf of Mexico (Johnson and Connors 1996).

The first returning migrants arrive in the United States in Texas, Louisiana, and Florida in late February to early March. There is a major influx during April over a broad region in the Missouri, Mississippi, and Ohio River valleys, primarily from Kansas to Kentucky northward to the Dakotas and southern Minnesota (Map 3). A few birds also migrate along the Atlantic coast of the United States and Canada, to at least Nova Scotia, and in the far west from Nevada and Utah to northern Idaho and western Montana. Passage through the upper midwestern United States and southern Canada usually peaks early to mid-May (Johnson and Connors 1996).

Arrival on the breeding grounds is mostly during mid-May to early June, depending on latitude and annual variations in snowmelt (see references in Johnson and Connors 1996), with the latest arrivals in the third week of June in the extreme north of the species's range (Devon Island, Nunavut) (Hussell and Holroyd 1974).



Map 3: Northbound (left) and southbound (right) migration of *Pluvialis dominica* through midcontinental North America. From Skagen *et al*. (1999).

MAJOR HABITATS

Breeding Range

Pluvialis dominica primarily nests on arctic and sub-arctic tundra, and sometimes on montane tundra, favoring higher and drier areas with sparse, low vegetation on rocky slopes (Parmalee *et al*. 1967, Jehl and Smith 1970, Martin and Moitoret 1981, Montgomerie *et al*. 1983, Johnson and Connors 1996). On the Seward Peninsula, Alaska, where *P. dominica* and *P. fulva* are sympatric, *P. fulva* favors lower and moister sites, with fewer rocks (Connors *et al*. 1993, Johnson *et al*. 2001). The different nesting preferences of the two species appear to be consistent across their ranges, although *P. dominica* occasionally uses wetter habitats with taller vegetation (Miller *et al*. 1985, Byrkjedal 1989). Snowmelt is believed to be an important factor in determining the timing of breeding and reproductive success of arctic breeding shorebirds. The eastern Arctic is showing wider swings in temperature than the western Arctic, which could potentially have a greater impact on more eastern-breeding populations of *P. dominica*.

Migration

During migration, *P. dominica* uses a wide variety of habitats including natural grasslands, pastures, tilled farmland, harvested crop fields, burned fields, golf courses, airports, coastal and inland shorelines, mudflats, estuaries, riverine sandbanks, and beaches. During the early boreal spring, tundra ridges and hillsides blown free of snow are particularly important (Johnson and Connor 1996). Given such a wide array of habitats, it is difficult to draw conclusions regarding trends in habitat quality and availability for the species. Sick (1993) considered that the conversion of large areas of the Cerrado of central Brazil to agricultural crops may actually be creating habitat for the species.

Nonbreeding Range

The main nonbreeding (wintering) range of *P. dominica* is the temperate grasslands of southern South America, and in particular the coastal grasslands of southern Brazil and Uruguay and the easternmost "Flooding Pampas" in the eastern Buenos Aires Province of Argentina (Blanco *et al*. 2004). The main agricultural activity in this region is cattle ranching, as the soils are largely unsuitable for crops because of flooding and salinity (Isacch and Martínez 2003b). As such, the coastal grasslands and eastern flooding Pampas are the best conserved of the Pampas grasslands (Bilenca and Miñarro 2004). Preferred nonbreeding habitats are short grasslands and pastures that are grazed by sheep or cattle. The plovers also are frequently found in other inland habitats such as freshwater marshes, lagoons, riverine beaches, shores of reservoirs, ploughed fields, and rice fields during the first stages of the rice cycle (especially in Rio Grande do Sul [Brazil] and Uruguay, where it is more common in coastal than inland rice fields) (Blanco *et al*. 2006a). In addition, the birds use coastal habitats such as estuaries and mudflats (Blanco *et al*. 2006b, 2008) and also sandy oceanic beaches (*e.g*. Vooren and Chiaradia 1990).

Isacch and Martínez (2003a) reported that nonbreeding *Pluvialis dominica* at Estancia Medaland, Buenos Aires Province, Argentina, had a strong preference for areas of short grass and high site fidelity within years. American Golden-Plovers and Buff-breasted Sandpipers (*Tryngites subruficollis*) both appear to have a preference for coastal grasslands of the Pampas region, with a secondary preference for inland short grass habitat (Blanco *et al*. 1993, Martínez *et al*. 1993, Lanctot *et al*. 2002).

This entire region, the "bread basket" of southern South America, has been extensively altered by agriculture since the arrival of the first Europeans and there has been a particularly rapid loss in recent decades through agricultural intensification. Although some *P. dominica* use agricultural fields, these are much less suitable than grazed grasslands (Blanco *et al*. 1993). This raises the question of what habitats were used by *P. dominica* prior to the introduction of European livestock in the 16th century. Presumably, birds used short-turf grasslands created through natural fires or flooding, and had a greater dependency on other habitat types such as wetlands and coastal areas. It is conceivable that the introduction of European livestock helped create greater expanses of short-turf grasslands, thus re-establishing conditions that had disappeared with the extinction of the endemic megafauna some 10,000 years ago (Isacch 2001). It is certainly the case today that livestock grazing helps to produce large expanses of habitat favored by this plover in the coastal grasslands of southern Brazil, Uruguay, and northern Argentina.

Oversummering

In contrast to *Pluvialis fulva*, very few *P. dominica* appear to "oversummer" (*i.e*., remain on wintering grounds during the austral winter / boreal summer). Blanco and Canevari (1998) reported only 15 instances of oversummering (involving a total of 108 birds) during Neotropical Waterbird Censuses from 1990–1995 in Argentina, Chile, and Uruguay. Because he found only unworn primary feathers in specimens from breeding grounds, Connors (1983) concluded that first-year *P. dominica* must be oversummering on the winter range. However, examining specimens collected in Minnesota during spring migration, Johnson (1985) noted fresh primaries on individuals with small cloacal bursae (the latter a feature of first-year individuals). Thus, young American Golden-Plovers apparently return to breeding grounds in their first spring and, unlike *P. fulva,* do not retain their juvenal flight feathers.

CONSERVATION STATUS

At a global level, *Pluvialis dominica* has been placed in the "Least Concern" category of the IUCN Red List. The factors involved in this listing include the species's "large range, with an estimated global Extent of Occurrence of 3,600,000 km²" and "a large global population estimated to be 150,000 individuals (Wetlands International 2002)." Although "global population

trends have not been quantified," the species is not believed to approach the population decline thresholds of the IUCN Red List (BirdLife International 2008). NatureServe (2007) also considers the species to be "Secure" (category G5). The species is not specifically listed by the Convention on Migratory Species (though it is included, along with all migratory Charadriidae, in Appendix II to the convention), nor is it listed by the Convention on International Trade in Endangered Species (CITES).

Pluvialis dominica has been listed as a "Species of High Concern" in the Canadian and U.S. Shorebird Conservation Plans (Donaldson *et al*. 2000, Brown *et al*. 2001, USFWS 2004), and was considered to be a species of "National Concern" in the 2002 version of the Birds of Conservation Concern (USFWS 2002). However, in a more recent assessment for the 2008 Birds of Conservation Concern (USFWS 2009), the overall population of *P. dominica* was ranked as stable and the species was not listed as a species of national conservation concern (B. Andres in litt. 2008). The ABC/Audubon Watchlist (Butcher *et al*. 2007) includes *P. dominica* in the "Yellow" list – species that are either declining or rare, and typically of national conservation concern with moderate population declines and/or a small population size.

POPULATION GOALS

Because we lack adequate information about population size and trends, it is impossible to set quantitative population goals for the species. However, it is clear that historically there was a dramatic decline in the species's population, and one from which it has never fully recovered. Therefore it is prudent to set a minimum goal of no net loss in the current *P. dominica* population, and ideally to increase the current population size to offset expected future decreases from habitat loss.

CONSERVATION SITES

This section of the plan identifies the key sites of conservation importance for *Pluvialis dominica*. Key sites support 1% or more of the biogeographic population of the species. As no subspecies has been described for *P. dominica* (nor are there significantly large discrete breeding populations), 1% of the biogeographic population is taken to be 1% of the global population, estimated at 200,000 birds. Thus, any site holding 2,000 or more *P. dominica* qualifies as a site of global conservation importance for the species, according to BirdLife International's

Important Bird Area (IBA) criteria and as a Site of Regional Importance in the Western Hemisphere Shorebird Reserve Network (WHSRN) (Table 3). Sites known to hold less than 1% of the global population but more than 0.2% (400 birds) are considered to be of regional importance for the species (Table 4); it is anticipated that such sites may prove to be key once turnover is taken into account.

Abbreviations used in Tables 3 and 4 below are as follows: *Seasonal Use:* N mig. – northbound migration, S mig – southbound migration; *Source:* NWC data – Neotropical Waterbird Census (provided by Wetlands International 2007), BirdLife IBA database (BirdLife International 2009), Audubon IBA database - http://iba.audubon.org/iba/siteSearch.do, Canadian IBA database - http://www.bsc-eoc.org/iba/IBAsites.html; *Designation:* IBA – Important Bird Area.

Table 3. IBA sites of **global** importance to the American Golden-Plover (*Pluvialis dominica*), supporting 1% or more of the species's global population (*i.e.,* 2,000 birds or more).

Site name	State/Prov.	Country	High Count	Seasonal Use	Designation	Source
Teshekpuk Lake-E. Dease Inlet	Alaska	USA	6,534	Breeding	IBA	Audubon IBA database
American Golden-Plover Staging Grounds (Benton County and parts of White County)	Indiana	USA	5,785 (total of 42,000 to 84,000 estimated)	N mig	IBA	Audubon IBA database Braile 1999
North Dakota State University, Fargo	North Dakota	USA	4,000	S mig.	-	Skagen *et al*. 1999
Blow River Delta	Yukon Territories	Canada	6,472	S mig.	IBA	Canadian IBA database
Foxe Basin Islands	Nunavut	Canada	3,452	Breeding	IBA	Canadian IBA database
Shooting Swamps of St Lucy	-	Barbados	9,000	S mig.	IBA	BirdLife IBA database
Shooting Swamps of St Phillip	-	Barbados	9,000	S mig.	IBA	BirdLife IBA database
Littoral	-	French Guiana	5,000–10,000	S. mig.	IBA	BirdLife IBA database

Plaine Kaw & Pointe Béhague	-	French Guiana	1,000–2,499	S mig.	IBA	BirdLife IBA database
Lagoa do Peixe	Rio Grande do Sul	Brazil	5,000–10,000	Wintering	IBA	Morrison *et al*. 2001, WHSRN 1993
Bahía Samborombón y Punta Rasa	Buenos Aires	Argentina	> 10,000	Wintering	IBA	D.E. Blanco in litt. 2009
Bañados del Río Dulce/ Laguna Mar Chiquita	Córdoba	Argentina	20,000	Wintering	IBA	WHSRN 1993
Laguna de los Porongos	Córdoba	Argentina	14,000–15,000	Wintering	-	Miatello *et al*. 2003
Lagunas de Etruria	Córdoba	Argentina	2,000	Wintering	-	Scott and Carbonell 1986
Estancia Medaland	Buenos Aires	Argentina	3,454	Wintering	IBA	Isacch and Martínez 2003
Albúfera Mar Chiquita	Buenos Aires	Argentina	3,000	Wintering	IBA	Blanco and Canevari 1998
Laguna de Rocha	Rocha	Uruguay	> 2,000 (1,700 at one ranch)	Wintering	IBA	D.E. Blanco in litt. 2009

Table 4. IBA sites of **regional** importance to the American Golden-Plover (*Pluvialis dominica*), supporting more than 0.2% but less than 1% of the species's global population (*i.e*., 400 to 1,999 birds).

Site name	**State/Prov**	**Country**	**High Count**	**Seasonal Use**	**Designation**	**Source**
Mendenhall Wetlands	Alaska	USA	1,000	N mig.	IBA	Audubon IBA database
Highway 108, Miller County	Arkansas	USA	1,800	N mig.	-	Skagen *et al*. 1999
Georgetown, White County	Arkansas	USA	1,000	N mig.	-	Skagen *et al*. 1999
5 miles E Ogden, Little River County	Arkansas	USA	438	N mig.	-	Skagen *et al*. 1999
Kankakee Fish and Wildlife Area	Indiana	USA	400	N mig.	IBA	Audubon IBA database
Pine Creek/ Robert Feldt Marsh	Indiana	USA	1,300	N mig.	IBA	Audubon IBA database
N of Clemons, Marshall County	Iowa	USA	786	N mig.	-	Skagen *et al*. 1999

Terril, Dickinson County	Iowa	USA	600	N mig.	-	Skagen *et al*. 1999
Coralville Reservoir, Johnson County	Iowa	USA	500	N mig.	-	Skagen *et al*. 1999
Saylorville Reservoir, Polk County	Iowa	USA	492	S mig.	-	Skagen *et al*. 1999
Southwestern Greene County	Iowa	USA	400	N mig.	-	Skagen *et al*. 1999
Cheyene Bottoms Wildlife Management Area	Kansas	USA	542	S mig.	-	Skagen *et al*. 1999
Rice fields, Cameron County	Louisiana	USA	1,656	N mig.	-	Skagen *et al*. 1999
Cameron Parish	Louisiana	USA	600	N mig.	-	Skagen *et al*. 1999
Grand Terre, Jefferon Parish	Louisiana	USA	600	N mig.	-	Skagen *et al*. 1999
Orwell Wildlife Management Area	Minnesota	USA	500	N mig., S mig.	-	Skagen *et al*. 1999
Casselton	North Dakota	USA	1,500	S mig.	-	Skagen *et al*. 1999
Grand Forks Lagoons Area	North Dakota	USA	900	S mig.	-	Skagen *et al*. 1999
Walsh County	North Dakota	USA	400	S mig.	-	Skagen *et al*. 1999
Wagoner County	Oklahoma	USA	900	N mig.	-	Skagen *et al*. 1999
Hackberry Flats Wildlife Mgt. Area	Oklahoma	USA	775	N mig.	IBA	Audubon IBA database
Muskogee County	Oklahoma	USA	700	N mig.	IBA	Audubon IBA database
Corpus Christi	Texas	USA	1,000	N mig.	-	Skagen *et al*. 1999
Rice field, Matagorda County	Texas	USA	900	N mig.	-	Skagen *et al*. 1999
Magnolia Beach, Indionola Island, Calhoun County	Texas	USA	550	N mig.	-	Skagen *et al*. 1999
Spruce Grove, w of Edmonton	Alberta	Canada	1,500	N mig.	-	Skagen *et al*. 1999
Beaverhill Lake	Alberta	Canada	526	N mig.	-	Skagen *et al*. 1999
Jordan	Manitoba	Canada	1,225	S mig.	-	Skagen *et al*. 1999
Winnipeg	Manitoba	Canada	400	S mig.	-	Skagen *et al*. 1999
Cape Pine and St. Shotts Barren	Newfoundland	Canada	1,000	S mig.	IBA	Canadian IBA database
Valeport Marsh	Saskatchewan	Canada	500	N. mig	-	Skagen *et al*. 1999
Quill Lakes	Saskatchewan	Canada	422	N. mig	-	Skagen *et al*. 1999

Arrocera Sobrado, Jaguarão	Rio Grande do Sul	Brazil	442	Wintering	-	Blanco *et al*. 2006a
Ilha da Torotama	Rio Grande do Sul	Brazil	545	Wintering	-	R.B. Lanctot *in litt*. to Rafael A. Dias 2007
Laguna de Castillos	Rocha	Uruguay	1,290	Wintering	IBA	Blanco and Canevari 1998
Laguna José Ignacio	Maldonado	Uruguay	1,281	Wintering	-	D. Caballero in litt. to P. Rocca 2009
Bañados del Este	Rocha, Cerro Largo, y Trienta-y-Tres	Uruguay	400	Wintering	IBA	P. Rocca in litt. 2009
Laguna Merín	Rocha	Uruguay	670	Wintering	-	NWC
Estancia El Palenque	Buenos Aires	Argentina	715	Wintering	-	Blanco *et al*. 1998
General Lavalle	Buenos Aires	Argentina	550	Wintering	-	Blanco *et al*. 1993
Bahía San Sebastian	Tierra de Fuego	Argentina	1,380	Wintering	IBA	Goodall *et al*. 1993
Campo Bosques Argentinos	Córdoba	Argentina	1,346	Wintering	-	NWC

CONSERVATION THREATS

Pluvialis dominica is threatened by a number of factors. Among these: the loss of habitat, exposure to agrochemicals, unregulated hunting, and climate change. The loss of habitat is variously caused by agricultural expansion and intensification, and the conversion of land to other uses such as residential development and mining. Agrochemicals are being used throughout the species's migration corridors and nonbreeding grounds with potentially negative effects on the birds. Although the species is no longer subjected to the intense hunting pressure that it suffered in historical times, unregulated hunting remains a concern during the southbound migration, especially on Barbados, but also in the Guianas. As an arctic-breeding species, and one which is dependent on near-coastal grasslands during a large part of the nonbreeding season, the species is also highly susceptible to climate change.

Threats to *P. dominica* are addressed in more detail in the following sections and are presented in the order they appear in the IUCN-Conservation Measures Partnership classification hierarchy (Conservation Measures Partnership 2007).

RESIDENTIAL & COMMERCIAL DEVELOPMENT

The conversion of native grasslands to certain non-agricultural uses has resulted in the loss of habitat for *Pluvialis dominica* along its migration routes and on the winter range. Although often of less concern than the massive loss of habitat resulting from agricultural expansion, certain types of developments are potentially harmful. Depending on location, some coastal or shoreline projects, though small from the geographic perspective, may negatively effect important nearby areas used by wintering plovers. On a larger-scale, some of the massive water development projects currently being initiated or planned as part of IIRSA (*Iniciativa para la Integración de la Infraestructura Regional Sudamericana /* Initiative for the Integration of Regional Infrastructure in South America [http://www.iirsa.org]) might be potentially harmful. For example, development of the Paraguay-Paraná hidrovia (fluvial navigation system) could lead to the loss of sand banks and river beaches that are used by *P. dominica* during its migration. Similarly, the development of hidrovias within the Amazon basin could lead to the loss of beach habitats used during migration and by some wintering birds. Another form of development with unknown consequences concerns the potentially lethal effects of wind turbines erected along migration routes. Over the past several years, wind farm development has taken place on the major stopover site in Indiana (USA) listed in Table 3, and wind farms have been and continue to be installed along the Texas coast, where the species makes its first landfall (B. Ortego in litt. 2009). Large wind farms are also planned for other important areas to the species, such as coastal Rio Grande do Sul state, Brazil (R.A. Diaz in litt. 2009).

AGRICULTURE

Conversion of native grasslands to agriculture has resulted in an enormous loss of habitat for *Pluvialis dominica* throughout its nonbreeding (winter) range and along its migratory pathways. These losses are particularly significant on the wintering grounds which constitute the "bread basket" of southern South America. This region has been extensively altered by agriculture since the arrival of the first Europeans, who released cattle and horses into the

Pampas. The extent of the original grasslands has been greatly reduced (Bucher and Nores 1988, Soriano 1992), with a more than 60% decrease in the percentage of rangelands in the Argentine Pampas over the period 1880–2000 (Viglizzo and Frank 2006) (Figure 6). There has been a particularly rapid loss in recent decades through agricultural intensification, and a shift from cattle ranching to crops in the most fertile grassland areas (Viglizzo *et al*. 2005) (Figure 7). This shift has been in part the result of increasing demand (and high prices) for soybean, in part for biofuels. In the future, the development of second- and third-generation biofuels, such as cellulosic ethanol, potentially combined with the cultivation of exotic grasses, could lead to the loss of additional areas of grassland habitat. However, it might be conceivable to use a harvest cycle which provides short grassland during the appropriate season.

The conversion of natural, high-altitude grasslands in the Puna and Páramo (the high altitude temperate grasslands in the Andes of Argentina, Bolivia, Chile, Colombia, Ecuador, Peru, and Venezuela) may also impact the species, especially during northbound migration. These areas are increasingly being cultivated for potatoes (and this is likely to continue, at ever increasing altitudes due to the effects of climate change). Potato crops may also threaten some coastal grassland areas, which are otherwise marginal for agricultural crops (*e.g*., in Uruguay).

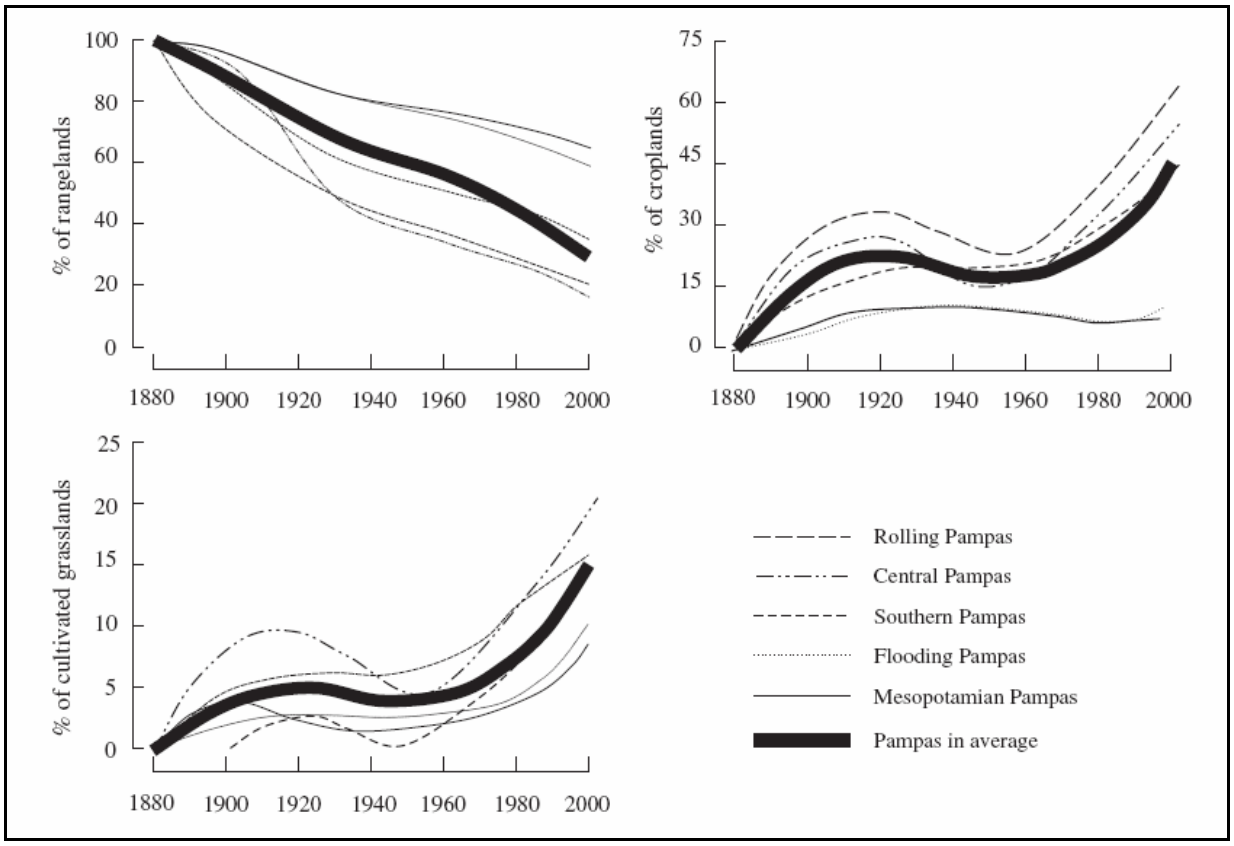


Figure 6: Historical changes in land-use in the Argentine Pampas grasslands (figure from Viglizzo and Frank 2006).

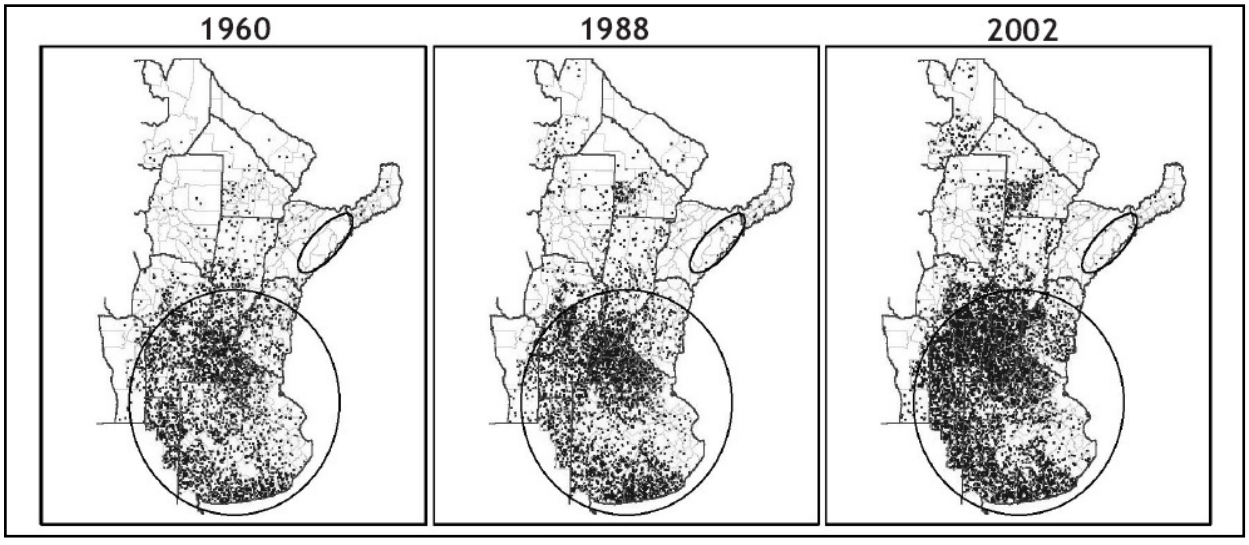


Figure 7: Expansion of annual crops in the Argentine Pampas 1960–2002 (figure from Viglizzo *et al*. 2005). Each point represents 3,000 hectares. The circle marks the main Pampas grasslands, the oval the Mesopotamian savannas.

Fortunately, the species has been able to withstand the disappearance of natural grasslands along migratory routes by adapting to row-crop agricultural fields. An excellent example is the spring stopover area in west-central Indiana (USA) where large numbers of plovers forage in soybean fields that were harvested the previous fall (Johnson and Connors 1996, Braile 1999).While some *P. dominica* use agricultural fields in South America during the wintering period, these are generally much less suitable than grazed grasslands (Blanco *et al*. 1993); however, Sick (1993) did hypothesize that the conversion of large areas of the Cerrado of central Brazil to agricultural crops may actually be creating habitat for the species. Of particular concern is the increasing trend to afforest natural grassland areas with exotic tree plantations (conifers and *Eucalyptus*), which eliminate all potential habitat for *P. dominica*. This represents a clear threat to the species in northeast Argentina (Corrientes Province), Brazil (Rio Grande do Sul state), and Uruguay.

Changes in grassland management regimes that lead to a taller sward height can result in areas becoming less suitable for *P. dominica*, as the species shows a clear preference for areas of short grass (Blanco *et al*. 1993, Isacch and Martínez 2003a). This may be a particular problem in areas that are managed for conservation – frequently livestock are removed to benefit other wildlife species, but this can be to the detriment of *P. dominica* and other grassland shorebird species, such as the Buff-breasted Sandpiper (*Tryngites subruficollis*), Rufous-chested Dotterel (*Charadrius modestus*), and Tawny-throated Dotterel (*Oreopholus ruficollis*).

ENERGY PRODUCTION & MINING

Resource Extraction

The development and extraction of oil and gas resources in northern Alaska and Canada may have negative impacts on the species, especially given that such developments are frequently located in drier habitats which are favored for breeding by *P. dominica*. An indirect impact of resource extraction may be increased predator populations. Predators are favored by availability of garbage around development sites and associated human communities, and their presence can lead to significant losses of nests and chicks. Potential predators include Arctic Fox (*Vulpes lagopus*), Red Fox (*V. vulpes*), Glaucous Gull (*Larus hyperboreus*), and Common Raven (*Corvus corax*).

BIOLOGICAL RESOURCE USE

Hunting

Pluvialis dominica suffered a major decline during the 19th and early 20th centuries caused by excessive sport and market hunting, primarily in North America but also to a lesser degree on its South American nonbreeding grounds. Baker and Strauch (1988) reported "very low levels of within-species genetic variation" in *P. dominica* which they attributed to a population bottleneck – most likely due to greatly reduced numbers caused by the excessive hunting. While hunting no longer occurs at historical levels, it does still occur regularly in Barbados and the Guianas (and presumably elsewhere in the Neotropics, such as Guadeloupe) (A. Levesque in litt. to Neoorn 2007).

Hutt (1991) first documented the systematic hunting of shorebirds on Barbados, which occurs in carefully designed "shooting swamps." These artificial swamps vary in size, the larger ones holding up to 2 hectares of open water contained in a series of embanked enclosures known as "trays." In the larger swamps, specially prepared short grass areas are maintained close to the shooting huts to attract *P. dominica*, which is a favored target species of Barbadian hunters. Numbers of the plover occurring in Barbados vary greatly from year to year (Hutt 1991). The main southbound migration route of the species is believed to lie considerably to the east of Barbados, though some birds pass over the island even in fine weather when east-northeast tradewinds are blowing. However, inclement weather resulting from the passage of tropical depressions forces flocks westward to Barbados, and brings them down onto the open grassy pastures and freshly ploughed fields. When such conditions occur, large numbers of the plover may be killed; in years with an absence of low pressure systems, relatively few are shot.

Shorebird hunting continues to this day on Barbados at levels similar to those documented by Hutt (Burke 2008), and may pose a significant threat to the plovers when they are at their most vulnerable during migration (grounded by inclement weather). The solution, however, is not as simple as restricting or banning the clubs, as they would then stop maintaining appropriate habitat for shorebirds, and thus greatly reduce the availability of habitat on the island. One problem is that while the take of *P. dominica* may not be excessive (Rappole 1995), there is no clear record of the overall numbers being killed; and, while exact data are not available, the estimated number of birds killed each shooting season (July–October) by the 10

active shooting swamps seems to range between 15,000 and 30,000 birds, of which an estimated 5–6% are *P. dominica* (W. Burke in litt. 2009).

In the Guianas, while *P. dominica* are not as common as in Barbados (with the exception of French Guiana), some birds are undoubtedly killed most years as part of the widespread hunting of shorebirds. Three main methods are used for hunting: shooting with a gun, trapping with a cast-net, and intercepting with a "choking wire." Cast-nets are used during very dark nights in combination with a strong light. Choking wires are long metal wires secured at one end to an uprooted mangrove stump or trunk on the mudflat. When a flock of shorebirds flies by, the wire is moved vertically, causing a sinuous whipping along its length. Birds colliding with the wire are killed or seriously wounded. This method originated in Guyana, and has now spread into Suriname and French Guiana. While the hunting of most shorebird species is illegal in Guyana and Suriname, it remains legal in French Guiana (Delelis and De Pracontal 2006).

POLLUTION

Contaminants

It seems likely that pesticides and herbicides pose a threat to *P. dominica*. Application of agrochemicals is common along migratory routes and throughout the nonbreeding range of the species, in habitats ranging from crop fields and pastures to golf courses and airfields (*e.g.* Hicklin and Spaans 1992, Blanco *et al*. 2006a for examples from rice fields). Exposure to agrochemicals may cause immediate death or reduce longer-term survival and/or reproductive rates. The birds are perhaps most vulnerable to agrochemicals on their wintering grounds and during the northbound migration through central North America. Spring sightings indicate that the plovers spend several weeks in gradual northward passage (Johnson and Connors 1996), and probably are exposed to numerous agrochemicals at feeding stops along the way.

CLIMATE CHANGE & SEVERE WEATHER

The Intergovernmental Panel on Climate Change (IPCC) predicts that global temperature will rise between 1.4 and 5.8°C by 2100, a temperature increase that is likely without precedence in the last 10,000 years (IPCC 2001). Of particular concern for *P. dominica* and other arctic-breeding shorebirds is the uncertain effect of global warming on breeding habitat and breeding

success. It would seem likely that increased temperatures will lead to a decrease in the extent of available breeding habitat as the treeline spreads north. The northward spread of trees has already been documented in arctic and sub-arctic areas (Lescop-Sinclair and Payette 1995, Gamache and Payette 2005). In areas where there is no land farther to the north, this will result in the loss of significant parts of the breeding range. How warming may affect the reproductive success and survival of *P. dominica* is currently unknown.

As a result of thermal expansion of ocean water and increased melting of landfast ice, the IPCC considers that sea level is likely to rise between 0.09 and 0.88 meters by 2100 (IPCC 2001). More recent estimates suggest that sea-level rises will be even higher, likely to reach 1 meter, and potentially even 2 meters (Rahmstorf 2007, Pfeffer *et al*. 2008). Such sea-level rises will not only eliminate many coastal areas used by the species, but will likely affect the grassland areas close to the coast which form the species's preferred nonbreeding habitat.

Migrating *P. dominica* are presumably dependent on favorable winds and weather patterns to complete their long oceanic flights. Warming ocean temperatures could change wind and weather patterns, thus disrupting migration (Gill *et al*. 2005). An increase in the number and severity of storms, both during migration and while at staging sites, could also have negative consequences for the plovers (Piersma and Lindstöm 2004), and be exacerbated by the prevalence of hunting at the first land-falls in Barbados and the Guianas.

CONSERVATION STRATEGIES AND ACTIONS

In this section, we present the priority conservation strategies and actions for the species on a hemispheric scale. Progress toward completion of these actions is dependent on suitable funding and workloads prioritized, but the steps described here should be incorporated into priority conservation planning.

NATIONAL STATUS ASSESSMENTS & LEGISLATION

Pluvialis dominica was considered to be a species of "National Concern" in the 2002 Birds of Conservation Concern (USFWS 2002). However, in the more recent 2008 Birds of Conservation Concern (USFWS 2009), the overall population of *P. dominica* was considered to be stable, and it was not listed as a species of national conservation concern (B. Andres in litt.

2008). It would appear that the only other country where the species has been legally recognized as being of concern is Paraguay, where it has been categorized as Near Threatened at a national level (del Castillo *et al*. 2005). Conducting national or, where appropriate, regional assessments of the status of the species should be a priority, as well as then including it in corresponding national/regional threatened species legislation, where warranted.

CONSERVATION OF KEY SITES

Many key breeding and nonbreeding locations currently lack protection. Site-specific information is listed in the Conservation Sites section of this plan and Tables 3 and 4. Acquiring legal protection for as many of these sites as possible should be a medium- to long-term goal. In the short term, their recognition as WHSRN and Ramsar sites (where appropriate and feasible) can be an important step in achieving legal protection. Creating new national protected areas can be a slow and time-consuming process, and it may be more effective to seek protection at the sub-national (*e.g*., state or provincial protected areas) or local (municipal protected areas) level, or through private reserve schemes. Decentralization processes in many countries in Latin America favor the creation of such reserves. An international designation that may be appropriate for some areas would be a World Heritage site (under the World Heritage Convention).

Many other sites, while officially protected, lack effective management regimes. The following sections give examples of the type of management activities that are needed for conserving shorebirds and their habitats. Conservation action at key sites should start with a detailed assessment of the threats, and an understanding of the pressures behind them and the stakeholders involved. This is best achieved through a participatory stakeholder analysis (for each site), during which all relevant stakeholders are identified and the threats and their drivers systematically assessed. Additional analyses that can help guide conservation action include an institutional analysis (of any local partners to identify key capacity needs); a problem analysis leading to production of a detailed project plan and logical framework (of project goal, objectives, activities, results, and expected outcomes); a 'participatory livelihoods analysis' to find out more about the situation of local people and how their livelihoods relate to the coastal environment; and a baseline conservation assessment of the site (using the WHSRN Site Assessment Tool).

CONSERVATION OF IMPORTANT HABITATS

Key to the long-term survival of *P. dominica* and fulfillment of the minimum population goal of no net loss (identified by the authors) will be a suite of habitat-level strategies and actions. Among these are the following priorities:

- Ensuring the adequate protection of **large tracts of breeding habitat** for *P. dominica* and many other arctic- and sub-arctic-breeding species. Whenever possible, delimitation of such areas should take into consideration the likely changes arising from global climate change (such as the northward displacement of appropriate breeding habitat). Planning for new protected areas or modifications to existing ones should include corridors of potential habitat into which appropriate breeding habitat can expand if conditions change.
- Lobbying for appropriate **measures to minimize the impacts of climate change**, including mandatory emissions reductions and the adoption of appropriate adaptation and mitigation strategies.
- Lobbying for responsible **agricultural practices that combine economic viability with environmental sustainability and social equality**. Active engagement with producers and agro-industry groups through roundtables, such as the Roundtable for Responsible Soy and the Roundtable on Sustainable Biofuels, is key. Such interaction can provide important opportunities to not only influence the criteria used to define responsible production, but also the decisions about which areas will have agricultural expansion/intensification and which areas will be set aside for more traditional land uses.
- Supporting the development of **agricultural certification schemes** for livestock (*e.g.*, beef raised on natural grasslands) and crop products (*e.g.*, organic rice) which are beneficial to the conservation of *P. dominica* and other grassland species.
- Supporting the development of **certification schemes for best practices** for sod (turf farms). While any one sod farm provides habitat for just a few plovers, the total extent of sod farms in the eastern United States provides an important area of grassland habitat that migrating plovers can use. Best practices should focus on limiting the use of agrochemicals (N. Dias in litt. 2009).

Protecting large expanses of habitat on the wintering range will be difficult, as approximately 95% of the Pampas grasslands are privately owned. As such, conservation on the nonbreeding grounds is primarily dependent on private initiatives (Isacch 2008). Nonetheless, much can be achieved by working with private landowners, especially with traditional ranching families. The challenge lies in developing best practices that will provide a competitive economic edge to production in harmony with biodiversity conservation.

An important first step may be the formal recognition of certain landscape-level areas as being of particular importance for the species. This can be achieved through the WHSRN Landscape of Hemispheric Importance designation, for which a landscape area must hold 30% or more of the biogeographic population. Five immediate priority areas for such designation are:

- The coastal grasslands of Buenos Aires Province (Argentina), eastern Uruguay, and Rio Grande do Sul (as three separate WHSRN landscapes);
- The coastal plain of Texas and Louisiana states (USA); and
- Benton County and parts of White County, Indiana (USA).

IMPLEMENTATION OF BENEFICIAL MANAGEMENT PRACTICES

Site and Habitat Management

Given the clear preference of *P. dominica* for short grasslands and pastures that are grazed by livestock, maintaining appropriate habitat is very compatible with ranching. The primary threat to such habitats is economic pressures to convert to row crops (though this is less prevalent in coastal areas where the soil is unsuitable for agriculture), and/or to intensify stocking levels to such an extent that the grasslands are permanently degraded. Intensification of stocking levels is often accompanied by the replacement of natural grasses and grasslands with invasive exotic species. While *P. dominica* may still be able to use such pastures, the cost to other grassland biodiversity is high. Any program that helps ranchers to keep grazing cattle in a way that is beneficial to *P. dominica* (and other grassland species) should be encouraged. This could be accomplished through certification schemes (for beef raised on natural grasslands), and technical assistance regarding best practice grazing systems, use of water resources, etc. (see, for example, Marino 2008).

Reducing the use of agrochemicals, and/or encouraging their appropriate application, (*i.e.,* only at recommended levels and using specified techniques) are important actions that need to be taken throughout the nonbreeding range of the species. Achieving this will require working with national and local authorities, and especially with government agricultural institutes that provide training to producers. However, because of the immense geographic areas over which the species moves annually, substantial reduction in hazards from contaminants presents an enormous challenge. At least some reduction might be possible in the short term within specific industries (*e.g.,* the sod farms mentioned above).

Hunting

The complex issue of shorebird shooting on Barbados should continue to be addressed. The artificially maintained shooting swamps provide important habitat for non-target waterbirds throughout the year, and for those migratory shorebirds which escape the guns. Elimination of shooting would in turn eliminate the swamps, as they exist solely as places in which to hunt. The answer lies in the regulation of shooting, including the setting of species-specific bag limits based on accurate data concerning the numbers of each species being shot and a better

understanding of the total numbers occurring. Already, one large swamp in the south-east (within the St. Philip Shooting Swamp IBA) no longer targets *P. dominica* as a result of advocacy work and the hunters having recorded a decline in this plover's numbers in recent years (W. Burke in litt. 2009). Formal regulation across the island should enable the most vulnerable species, such as *P. dominica* and also Lesser Yellowlegs (*Tringa flavipes*), to have a reprieve. However, even with regulated hunting, the ideal would be for the maintenance of "no-shooting" wetlands to offer sanctuary for migratory shorebirds.

EDUCATION

Education and outreach are required at many different levels, ranging from explaining to hunters in Barbados and Guianas the global impact of their hunting activities, to individual farmers regarding the consequences of their decisions about grassland management and agrochemical applications, to high-level decision makers in governments and agro-businesses. National and local programs should be developed to raise awareness about the importance of conserving *P. dominica* populations and habitats. Target groups would include farmers and other relevant landowners or managers, school children, and the general public.

TRAINING

The successful implementation of many of the priority conservation strategies and actions outlined in this section will require appropriately trained conservation practitioners and policy makers. Among priority areas for training are threat assessment, site conservation planning, integration of site and species conservation actions within development agendas, habitat management and creation, public outreach and education, and fundraising.

RESEARCH AND MONITORING NEEDS

Pluvialis dominica has been relatively well studied on its breeding grounds, and to a lesser extent during its migration through North America. However, comparatively little is known about the species during its migration outside of North America and on the South American nonbreeding (wintering) grounds. Considerable data have been gathered in recent years from parts of the species's wintering range (especially the coastal strip of Pampas

grasslands). Examples of such progress include data collected by Richard Lanctot and colleagues during surveys for *Tryngites subruficollis* (Lanctot *et al*. 2002, R.A. Dias in litt. 2009); through projects coordinated by Wetlands International and Aves Uruguay in Uruguay (D.E. Blanco and J. Aldabe in litt. 2009); and through annual grassland shorebird censuses undertaken by the Southern Cone Grasslands Alliance (http://www.pastizalesdelconosur.org). A clear priority for action is to compile and analyze these data.

DISTRIBUTION AND HABITAT USE

While the overall distribution and habitat preferences of *P. dominica* are reasonably well known, there still remain some significant gaps in knowledge. Work is needed in various areas, including the following:

- Gathering more information about the plover's use of upland areas in South America, especially in the southern Andes during the northbound migration.
- Clarifying the status of *P. dominica* and *P. fulva* on the Pacific coast of the Americas during both the nonbreeding and migratory seasons.
- Quantifying the importance of nonbreeding areas and habitats other than the coastal grasslands of southern Brazil, Uruguay, and Argentina.
- Gaining a better understanding of the use of agricultural fields (rice fields in particular), especially on the wintering grounds and during migration in South and Central America.
- Gaining a better understanding of the use of hay fields in the eastern United States during the southbound migration, and the potential to time hay harvest to maximize the area of short turf available.
- Researching the migratory connectivity (*i.e*., links between breeding populations and wintering grounds) by various means such as morphometric differences, stable isotopes, and geo-locators.

A better understanding of the use of agricultural fields would help facilitate the assessment of migration and wintering area counts, and shed light on what proportion of the population uses different habitat types, how the plovers use them, and whether the birds undertake local or regional movements to follow the crop cycle.

KEY SITES

While a number of key sites of global or regional importance for the conservation of *P. dominica* have been identified, there are undoubtedly more that await discovery. Field research should focus on:

- Identifying the main stopover sites used, if any, during migration in South America.
- Determining if *P. dominica* migrates directly to the wintering grounds or uses stopover sites en route.
- Identifying additional key sites on the wintering grounds and during migration in North America.
- Determining if *P. dominica* shows site fidelity to wintering sites and stopover areas.

POPULATION STATUS AND TRENDS

The population size and trends of *P. dominica* are at best poorly known. The population estimate cited herein (200,000 [Morrison *et al*. 2006]) seems reasonable, but it is unclear whether the species is in decline. There is thus a clear need for research to better understand the population dynamics of this plover and the degree to which it is threatened. Among clear priorities are:

- A regular breeding-range-wide census to determine trends;
- Consolidation of efforts to monitor the species during both the southbound and northbound migrations; and
- Consolidation of efforts to monitor *P. dominica* on the nonbreeding (wintering) grounds, including the compilation and analysis of existing data.

THREATS

The relative impacts of the different threats faced by *Pluvialis dominica* are poorly understood. Important areas for research include:

- Estimating the numbers of birds being killed by hunters throughout the range, but especially in Barbados and the Guianas.
- Quantifying the exposure to and the likely impacts of agrochemicals.

- Developing and refining models to explore the likely effects of climate change on breeding and nonbreeding habitats.
- Assessing possible mortality at wind farm developments throughout the range of the species (with priority to developments in Indiana, Texas, and Rio Grande do Sul).

MONITORING

A coordinated monitoring program is required both to accurately determine the population trend of *Pluvialis dominica* and to assess the effectiveness of the actions outlined in this conservation plan. Currently, monitoring efforts are fragmented and carried out piecemeal by partners who often lack dedicated funding to ensure ongoing efforts. The effectiveness of management efforts cannot be measured without dedicated funding.

CONSERVATION TIMELINE

By 2009

- Establish an American Golden-Plover Working Group to include participants from throughout the range of the species.
- Designate all known sites of global importance for *P. dominica* as Important Bird Areas.
- Working with Scientific Councilors and national focal points for the Convention of Migratory Species in Argentina, Paraguay, and Uruguay, incorporate the conservation and research needs of *P. dominica* into the regional action plan for the conservation of migratory grassland birds.

By 2010

- Compile and analyze all unpublished data for the species on its wintering grounds, to help identify additional key sites and further quantify the populations occurring at known sites.
- Assess the importance of all globally important *P. dominica* sites for other species, to facilitate multi-species conservation planning and actions.

- Initiate systematic monitoring of numbers (by species) migrating through Barbados and quantify the impacts of hunting.
- Establish two no-shooting swamps as refuges for *P. dominica* and other shorebird species in Barbados.
- Conduct on-site observations at the wind turbine facility in Indiana during the spring migration. This might be a multi-year project as the impact (if any) on plovers could vary with seasonal weather conditions.
- Assess and document the protected status (regional, national, international, voluntary) for all sites of global importance for *P. dominica*.
- Clearly establish highest-priority sites for conservation action through a participatory process combining the importance for *P. dominica* (and other species) with urgency (level of threat). Identify priority actions therein.
- Coordinate with Joint Ventures to ensure that their plans and actions in areas along principal *P. dominica* migration routes fully consider the conservation and research needs for this species.
- As the impacts of agricultural expansion/intensification in the Pampas grasslands are assessed, ensure that habitats preferred by *P. dominica* and other grassland shorebirds have been/are being taken into consideration (such as the Southern Cone Grassland Alliance's assessments).
- As the impacts of existing and future wind farm developments in Indiana, Texas, and Rio Grande do Sul are assessed, ensure that *P. dominica* (and other grassland shorebirds) have been/are being taken into consideration (*i.e.,* location relative to preferred habitats; mortality).
- As planning agencies assess the impacts of forestry expansion and intensification in the coastal grasslands of Rio Grande do Sul, Brazil, ensure that the habitats preferred by *P. dominica* (and other grassland shorebirds) have been/are being taken into consideration.
- Create appropriate wintering habitat for *P. dominica* in the Uruguayan coastal grasslands via projects developed for and supported by the Uruguayan GEF-funded "PPR" (Proyecto Producción Responsible).

- Designate at least three sites of global importance for *P. dominica* as new WHSRN sites.
- Establish a long-term, coordinated monitoring scheme for *P. dominica* within the primary wintering habitat (coastal grasslands of southern Brazil, Uruguay, and Buenos Aires Province of Argentina).
- Conduct surveys to assess *P. dominica*'s use of the southern Andes during northbound migration and its use of agricultural fields during migration and on the wintering grounds.

By 2011

- Designate at least two WHSRN Landscapes of Hemispheric Importance for the species.
- Identify all conservation actions required to maintain or increase *P. dominica* populations within protected areas of global or regional importance for the species.
- Train conservation practitioners at highest-priority sites to conduct threats assessments, site conservation planning, and public outreach.
- Quantitatively assess the potential impact of climate change on *P. dominica* throughout its range, focusing on key sites and habitats.
- Coordinate and expand efforts to assess the impacts of agrochemicals on *P. dominica* (and other grassland shorebird species).

By 2012

- Develop proposals to include threatened national or subnational populations of *P. dominica* in relevant legislation in all countries and/or states within its range.
- Designate at least five more sites of global importance for *P. dominica* as WHSRN sites.
- Complete site conservation plans for the highest-priority sites for conservation action for *P. dominica.*
- Determine linkages between breeding and nonbreeding populations and sites by conducting stable isotopes, morphometrics, and geo-locator studies.

- Through an extensive color-banding program, initiate a study of site fidelity on wintering grounds.

By 2015–2018

- Conservation actions are underway at all sites of global and regional importance for *P. dominica*.
- All sites of global importance have been designated as WHSRN sites and have received at least some level of formal protection as local, subnational, or national protected areas, private reserves, and/or through international conventions (Ramsar, World Heritage).
- Surveys to census *P. dominica* global population, including a regular breeding-range-wide census, are underway and leading to more accurate population estimates.
- Monitoring protocols at breeding, migration, and wintering sites are underway and providing a clearer picture of population trends.

EVALUATION

Evaluating the progress, success, and needs of the conservation strategies and actions outlined in this plan will not be an easy task, as it will involve the assessment of many actions across very different geographic regions. This is confounded by only limited existing communication between researchers and conservation practitioners throughout the hemisphere, and further complicated by language differences (Dutch, English, French, Portuguese, and Spanish are all represented within the countries comprising *P. dominica's* range). A first step in the implementation of this plan is to create an American Golden-Plover Working Group that includes researchers, conservationists, and educators from throughout the range of the species, with the goal of overcoming these challenges and fostering/coordinating research, conservation action, and monitoring.

Once created, the Working Group should be tasked with monitoring the implementation of the plan's conservation strategies and actions (and revising them as required). A key tool for monitoring the effectiveness of conservation action, built around the "Pressure-State-Response" (threat, condition, conservation action) framework adopted by the Convention on Biological

Diversity, is the WHSRN Site Assessment Tool. This tool, which can be used for any site of importance for shorebirds (*i.e.* not only designated WHSRN sites), permits changes in threats, shorebird populations, and conservation responses to be tracked over time and correlated, both at individual sites and across networks of sites. Implementation of the tool will require a network of appropriately trained conservation practitioners, local conservation groups, birdwatchers, and professional ornithologists all contributing information to a central coordinator/coordinating group (*i.e.*, the Working Group). Alignment of the tool with the Open Standards for the Practice of Conservation (Conservation Measures Partnership 2007) will enable the results of site assessments to be readily integrated with, and feed directly into, any conservation planning which utilizes Miradi (adaptive management software for conservation projects, based upon the Open Standards).

While the Site Assessment Tool provides a means for both detailed and general monitoring that is useful to conservation decision makers, measurement of more general indicators of success will be important for communicating progress to a wider audience. Among potential metrics are:

- Number of members of American Golden-Plover Working Group, and their geographic distribution.
- Number of national/subnational/regional threatened species (Red List) assessments undertaken that take into consideration corresponding *P. dominica* populations.
- The amount of local and national legislation passed that favors/improves conditions for the conservation of *P. dominica*.
- Number of hectares of *P. dominica* habitat newly incorporated within public or private protected areas systems and/or under international designations (Ramsar site, World Heritage site).
- Number of new WHSRN sites designated entirely or partly for *P. dominica*.
- Number of sites of international importance (regional or global) for *P. dominica* with site conservation plans which target the species.
- Number of surveys undertaken to search for additional sites of importance and to assess *P. dominica's* use of different habitat types.

- Number of local conservation groups participating in *P. dominica* conservation efforts (including population monitoring).
- Number of education and outreach programs which have incorporated information regarding the conservation of *P. dominica*.
- Number of sites of international importance (regional or global) for *P. dominica* being recognized as a result of new information becoming available.
- Clarification of *P. dominica* population size and trends.
- Clear understanding of migratory movements, both on northbound and southbound migration, and identification of key stopover sites.
- Clear (quantified) understanding of the threats posed by hunting, agrochemicals, agricultural expansion, and climate change.

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