

## NOTES ON SOME ARGENTINE ANATIDS<sup>1</sup>

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FROM mid-August, 1964, until late July, 1965, I was engaged in field work in Argentina studying waterfowl. Although special emphasis was placed on the Black-headed Duck (*Heteronetta atricapilla*), 28 species of anatids were observed in various parts of Argentina. Because so little is known of these species, some general observations are summarized and discussed in the hope that it will point out gaps in our knowledge and encourage additional work on this interesting group. Field work was financed by Grant GB-1067 from the National Science Foundation. Studies of museum specimens in the United States were financed by a Chapman Grant of the American Museum of Natural History, and aided materially in appraising the significance of plumage sequences in Neotropical ducks.

### AQUATIC HABITATS

Although the distribution of Argentine birds was considered by Dabbene (1910) and by Olrog (1959), little comment has been made on the distribution of water types and their influence on waterfowl distribution. Some helpful botanical comments are given by Cabrera (1953) for the Buenos Aires region and, Wetmore's (1926) observations on both botany and ornithology are excellent. Although time did not permit detailed botanical work during this study, some obvious differences in life-form of marsh vegetation were recorded in the areas visited (Fig. 1) in relation to the species composition of waterbirds.

The most extensive zone of freshwater and semipermanent marshes is found in an area roughly bordered by the cities of Venado Tuerto (Santa Fe), Buenos Aires, General Lavalle, Mar del Plata and Azul (Buenos Aires). These marshes are dominated by tules (*Scirpus californicus*), but some contain extensive areas of cut-grass (*Zizaniopsis bonariensis*) or of floating broad-leaved plants. Pondweeds (*Potamogeton* spp.) and milfoil (*Myriophyllum* spp.) are common submergents, and floating plants include *Azolla filiculoides*, *Lemna* spp. and *Wolffia* spp. These water areas rarely exceed 4 feet in depth, and shallow areas of 1 to 2½ feet often are dry by late summer. Numerous deeper lakes are found in the Chascomus-Mar del Plata district, but the edges are fringed with bulrushes which may provide feeding, rest and nesting areas. Cattails (*Typha* spp.) are not widely distributed, but some extensive stands were noted in sand-dune marshes near General Madariaga, south of General Lavalle. Areas of sedge (*Carex* spp.) and spikerush (*Eleocharis* spp.) were not conspicuous because of the intensive grazing common to marsh edges, but they occasionally occurred in isolated shallows away from the shoreline.

The greatest density of marshes of this deep-fresh type probably are south of Chascomus, but numerous marsh areas also are found at Junin. This whole zone of northeastern Buenos Aires Province undoubtedly is one of the major waterfowl production areas in

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<sup>1</sup> Journal Paper No. J-5455 of the Iowa Agricultural and Home Economics Experiment Station, Ames. Project No. 1504.



FIG. 1. Areas visited in Argentina.

Argentina because of the density of marshes and their large size and their configuration which often produces extensive shoreline.

Slow-moving streams are commonly associated with large marshes. In many cases, stream shorelines are vegetated with the same emergents common to the semipermanent marshes.

More saline lakes and marshes are found in western Buenos Aires Province, especially in the area west of Azul and extending southwestward through Guaminí. Most of the lakes I saw near Guaminí lacked fringing emergents; *Scirpus californicus* was rare or absent.

My exposure to river-bottom marshes, such as those along the Paraná, was minimal, but these areas contain fewer tall emergents, more floating broad-leaved plants, and more adjacent woody growth than do marshes of the open pampas.

Farther north, in the Chaco (Resistencia to Presidencia de la Plaza), marshes are rimmed with trees of various heights and cacti of many varieties (Fig. 2). The marshes I encountered were dominated by sedges and grasses. Tules were uncommon. As these marshes seem only seasonally inundated, sedges probably survive best there.

Marshes observed east of Tucumán and the Bañada de Figueroa were either man-made or man-influenced and perhaps were not typical. This generally arid region had few marshes except in association with rivers. Sedge areas were especially extensive in the marshy Bañada de Figueroa adjacent to the canalized Rio Salado River. Where permanent water areas had been formed by impoundment, tules were common.



FIG. 2. Searching for duck nests in a typical Chaco marsh near Presidencia de la Plaza, Chaco.

The vegetation of marshy areas in the puna zone of Abra Pampa (altitude of about 11,000 feet) consisted typically of short emergents, especially spikerush, but a few areas held bulrushes as well. These lakes were extremely shallow and graded into wet meadows of mixed spikebrush and semiaquatic grasses.

Tules also were noted in a few marshy lakes on the continental divide near Bariloche in northern Patagonia. However, most marshes and streambanks there were dominated by spikerush as noted farther north at higher altitudes.

#### WATERFOWL OBSERVATIONS

*Cape San Antonio.*—The waterfowl of this area were studied intensively from August 1964 through February 1965 and periodic observations were made from April through July 1965. A detailed summary of the marsh birds of this area has been published elsewhere (Weller, 1967*b*) but anatids for which nests, eggs or broods were observed are as follows, arranged in their approximate order of abundance (common names are from de Schauensee, 1966; scientific names are from Johnsgard, 1965). However, I have modified several common names (often by using some of Johnsgard's terms) in preference to those of de Schauensee, and have followed Woolfenden (1961) on *Metopiana* versus *Netta*: Yellow-billed Pintail (*Anas georgica*), Rosy-

billed Pochard (*Metopiana peposaca*), Fulvous Whistling Duck (*Dendrocygna bicolor*), Speckled Teal (*Anas flavirostris*), Silver Teal (*Anas versicolor*), Red Shoveler (*Anas platalea*), Black-headed Duck, Black-necked Swan (*Cygnus melanocoryphus*), Coscoroba Swan (*Coscoroba coscoroba*), Cinnamon Teal (*Anas cyanoptera*), Argentine Ruddy Duck (*Oxyura vittata*), and Chiloé Widgeon (*Anas sibilatrix*). During the fall and winter, Yellow-billed Pintails and Chiloé Widgeon were most numerous; Rosy-billed Pochards, Cinnamon Teal, and Silver Teal were uncommon, and Fulvous Whistling Ducks were not seen. Other species were present during the winter, but in reduced numbers. Only three White-cheeked Pintails (*Anas bahamensis*) were seen; one each on 21 January, 1 March, 1 June. There seem to be no records of nesting by the species in the area.

Gibson (1920) also reported the rare occurrence (during "flood" years) of Brazilian Ducks (*Amazonetta brasiliensis*) and Ringed Teal (*Calonetta leucophrys*). He reported one nest of a Brazilian Duck, but Ringed Teal have not been reported nesting. Grant (1911) reported additional species not seen during the present study, the rare winter visitors, the Ashy-headed Sheldgoose (*Chloephaga poliocephala*) and the Ruddy-headed Sheldgoose (*Chloephaga rubidiceps*).

The nesting season of ducks in the Cape San Antonio area was from September into early December, with a peak during October.

*Venado Tuerto*.—Several trips were made to the intensively farmed cattle-maize area of Venado Tuerto in southeastern Santa Fe. This is an interesting area ornithologically despite its intensive agriculture and apparent dryness. Possibly, it is the combination of grain availability and several large tule marshes which create suitable wintering areas for concentrations of ducks. These marshes are of the same semipermanent type found in eastern Buenos Aires Province, but several duck species which were rare or absent in the latter area were relatively common in eastern Santa Fe. These were the White-cheeked Pintail and the White-faced Whistling Duck (*Dendrocygna viduata*). Moreover, Peter Miles, a local resident who has hunted in this area intensively, also has seen Brazilian Duck, Ringed Teal and Comb Ducks (*Sarkidiornis melanotos*) in the area, although all are rare. Numerically, birds observed during six field trips from 9 May to 24 July were ranked as follows: Yellow-billed Pintail, Rosy-billed Pochard, Cinnamon Teal, Silver Teal, Chiloé Widgeon and Fulvous Whistling Duck.

During June and July, Speckled Teal were reduced in numbers, and Silver Teal were rare. It appears that Speckled Teal, Silver Teal, Rosy-billed Pochards and Fulvous Whistling Ducks move northward in winter, while other species remain throughout the winter. Here, as in eastern Buenos Aires Province, the influence of water availability is conspicuous, and after a

long series of rains in late June, large numbers of Rosy-billed Pochards and even a few Fulvous Whistling Ducks appeared. Peters (in Phillips, 1922) noted a mass movement of Rosy-billed Pochards stimulated by rain after a prolonged winter (May) drought in eastern Buenos Aires Province.

The pintails feed in dry fields and "roost" at night in flooded fields or shallow marshes. In larger marshes, they were found in areas of extensive mudbars. Rosy-billed Pochards and Fulvous Whistling Ducks rarely field-feed in the absence of water and, presumably, move out during dry periods. Their chief wintering area is unknown, although the Paraná River marshlands are probably suitable and are less than 200 miles from the Venado Tuerto marsh areas.

Courtship flights of pintails were conspicuous on 18 May (early winter), and pairs of Yellow-billed Pintails, White-cheeked Pintails, Red Shovelers and Cinnamon Teal were seen on nearly all trips. Relatively few Rosy-billed Pochards were seen in pairs even in mid-July, and no evidence of pairs was seen in Black-headed Ducks or Argentine Ruddy Ducks.

*Southwestern Buenos Aires Province.*—A brief field trip was made from 2 July to 7 July 1965, to appraise the distribution of water areas and waterfowl in drier regions of Buenos Aires Province. Of special interest was the distribution of the three species of sheldgeese which winter in southern Buenos Aires: Upland Sheldgoose (*Chloephaga picta*), Ashy-headed Sheldgoose, and Ruddy-headed Sheldgoose. A recent survey by Plotnik (1961) aided in finding concentrations of these "geese."

During this trip, as on several later ones, I was accompanied by Peter Miles of Venado Tuerto. Our route of travel from Venado Tuerto south took us through the dry and often sandy grazing land of southeastern Santa Fe and northwestern Buenos Aires. This area has few water areas. At Guaminí, there is a concentration of large and somewhat saline lakes distributed in WSW by ENE direction. In this region, we saw 11 flocks of Upland Sheldgeese, numbering from 7 to 249 birds. Four of these flocks contained 10 to 77 Ashy-headed Sheldgeese. In most cases, Ashy-headed Sheldgeese were in pairs and were grouped either at the edge of the Upland Sheldgeese or in an area where the density of Upland Sheldgeese was low. Some intra- and inter-specific aggression over feeding sites was noted, but too few observations were made to appraise dominance. An Ashy-headed Sheldgoose collected by Miles was in full body and tail molt. The primaries appeared new, but the greater secondary coverts were molting. Other birds of both species (seen through a 40× power telescope) were in body molt. Apparently, local residents in Patagonia question whether these birds have a simultaneous wing molt like other anseriforms (Scott, 1954).

The Upland Sheldgeese of both sexes varied considerably in color. The ruddy-colored heads of females could be grouped into three categories: light, medium and dark. The extremes probably are young (light) and adult (dark); possibly the intermediates were 2-year-olds. Males also varied, as noted by Delacour (1954:219). Some were white-breasted, some barred-breasted, and some were intermediate. Head color of males also varied with lightly-banded individuals having a yellowish-white head; presumably these are juveniles as illustrated by Scott in Delacour (1954: Plate XII).

On one of the Guaminí Lakes, Lake Alsina, we noted several other species of waterfowl. A flock of about 200 Yellow-billed Pintails was accompanied by 3 White-cheeked Pintails and several Speckled Teal. In a wind-protected bay, nearly 200 Argentine Ruddy Ducks were diving and sunning. Most of these were in dull brownish-gray plumage, but several males appeared to have rufous plumage over much of the body. Only a few had black heads, however. Pairs and singles or small flocks of Cinnamon Teal, Chilóe Widgeon, Red Shovelers and Black-necked Swans were seen on these lakes, and the ducks also were seen on small streams in the area.

The coastal region between Bahía Blanca and Tres Arroyos has some large, bare-looking sandy lakes, and a few flocks of sheldgeese were seen there. However, the area near Tres Arroyos was the greatest concentration area for *Chloephaga* (Fig. 3). In this area, pilots are hired by farmers' cooperatives to chase off the "avutardas" (an erroneous name for sheldgeese that actually means bustards); such pilots are called "avutarderos." Sheldgeese supposedly compete with livestock and damage wheat and other small grains. Fear of planes makes air-driving an effective means of moving birds to less-prized areas. Although such preventive measures are costly, they seem effective. Killing of nesting females in Patagonia has been recommended, but this seems biologically unrealistic in a sparsely-scattered population—as well as esthetically questionable.

The biggest flocks of sheldgeese were seen in the areas north of Tres Arroyos near Indio Rico. In total, we observed 29 flocks numbering about 2,840 *C. picta*, 205 *C. poliocephala* and 15 *C. rubidiceps*. There appeared to be more of the dark bar-breasted form of *C. picta* and a greater number of the smaller species than near Guaminí. Apparently, it is the small forms which move farthest east and north because these were noted at General Lavalle by Grant (1911).

Just north of Azul, we again found ourselves in the zone of semipermanent, deep-fresh, tule marshes common to northeastern Buenos Aires Province. Such areas were rare south and west of Azul, but increased as we went north-westward to Junin. In the Junin area we began to see numbers of ducks



FIG. 3. A flock of Upland Sheldgeese in a field near Tres Arroyos, Buenos Aires.

common to the deep-fresh marsh type: Black-headed Duck, Rosy-billed Pochard, Coscoroba Swan, Silver Teal, Cinnamon Teal, Yellow-billed Pintail, Speckled Teal and Chiloé Widgeon. Characteristic marsh birds such as egrets, ibis, and herons also became numerous. On 7 July (midwinter) intense courtship and copulation were observed in Chiloé Widgeon.

*The Chaco.*—Marsh areas north of Buenos Aires and Venado Tuerto are subtropical and are seasonally flooded. The waterfowl found in these areas are those species common to northern tropical regions, although a few species are ubiquitous.

My contacts with marshes of the broad Paraná River were restricted to those areas near the city of Santa Fe. Broad-leaved floating plants of the water hyacinth group were common as were broad-leaved emergents. Such areas were frequented by Wattled Jacanas (*Jacana jacana*) and herons, but few waterfowl were seen.

North of Santa Fe in the region of San Xavier were extensive rice-growing areas. These areas are, at times, plagued with waterfowl and blackbirds. Rosy-billed Pochards and Fulvous Whistling Ducks were said to be especially common prior to fall harvest, and local residents said that some nested in the rice. It was interesting to learn that the invasion of the bulk of these species

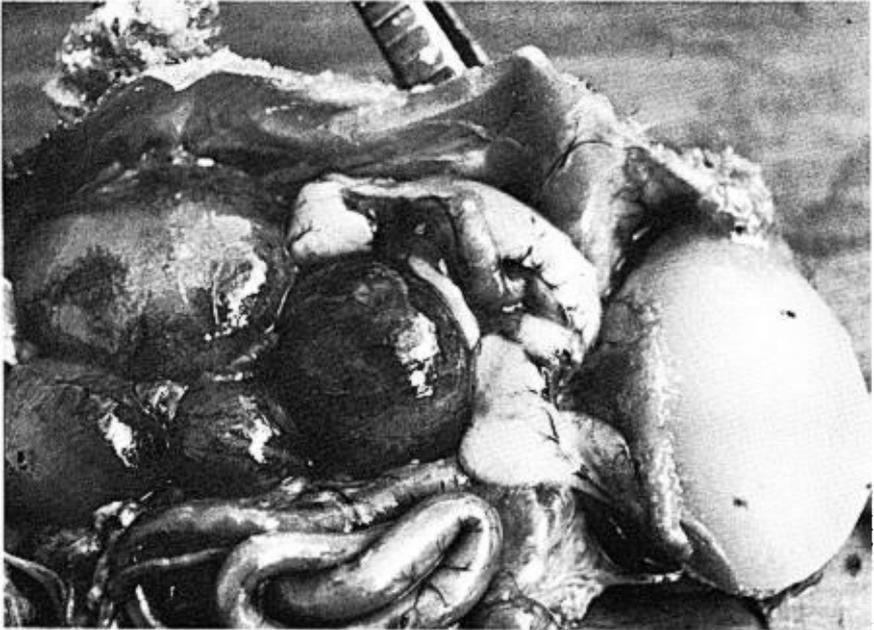


FIG. 4. Reproductive tract of female Brazilian Duck collected near Presidencia de la Plaza on 14 May 1965.

was synchronized with their departure from the deep-fresh marshes of eastern Buenos Aires. During our brief visit in early May (early winter), only a little rice remained unharvested, and few ducks were seen. However, this seems to mark the southern limit of the major range of Brazilian Ducks and Ringed Teal, which were seen in small numbers. A few Yellow-billed Pintails and Red Shovelers also were found near each puddle in the rice fields.

Timbered areas became more common as we drove north toward Resistencia in the region of the Gran Chaco. Like all but the Andean region, this area was level and low. After an extended drought, the area seemed like desert scrub, but we encountered open areas dominated by *Carex*, a type of papyrus (*Cyperus* spp.), and tall aquatic grasses which obviously had been flooded regularly in the past. Only in the area just south and to the west of Resistencia were well-flooded marshes of *Carex* and aquatic grasses noted. These marshes were extensive in places, and slightly higher areas were covered with sizeable, broad-branching trees. At this time, some timber areas were flooded—as they must be briefly each year—but the abundance of cacti and massive ant hills in the forest suggested that dry conditions are common much of the year.

Near Presidencia de la Plaza we encountered several isolated pairs of

Brazilian Ducks and one group of six or seven. Of three collected, a female was found with a large egg in the oviduct and four large ova in the ovary (Fig. 4). The two males both had enlarged testes. Thus, late fall breeding is clearly established for this species in northern Argentina. Nevertheless, all three birds had much body molt, and the laying female had tail molt as well.

The nesting site of the Brazilian Duck has not been adequately investigated or reported. Notes by Azara (1805) and Phillips (1925) are conflicting; our Indian guide agreed with Azara that they nested on sedge hummocks surrounded by water. However, Gibson (1920) reported eggs in the nest of a blackbird. Durnford (1878), on the other hand, flushed them from cliffs where he saw others perched; he was convinced that they nested there. Unfortunately, our search for nests in the Chaco proved futile.

A pair and a single male Ringed Teal also were collected. The pair flew well, although they had the outer two primaries still soft at the bases. Despite their teal-like build and flight, their iridescent plumage, black primaries and elongate tail appear much more like perching (Cairinini) than dabbling ducks (Anatini). The distinctive whistle of their wings was heard (see Dudley, 1958). Both males had highly vascularized gonads of moderate size.

This area also was known for its abundance of Muscovy Ducks (*Cairina moschata*), but we saw only a few in their lumbering flights from one area to another. Several flocks of Silver Teal were seen, and one male Black-headed Duck was observed. A few Red Shovelers and White-faced Whistling Ducks were seen south of Resistencia near Basail.

Another subtropical duck, rarely if ever occurring in the fresh-deep marshes of Buenos Aires Province, is the Masked Duck (*Nomonyx dominica*). A male, a female and then a group of 8 or 9 brown birds, probably immatures, were flushed from flooded sedge in a small patch of taller bulrush (*Scirpus* spp.). Their white wing-spots so matched those of the Ringed Teal that they were not recognized as stifftails at first, especially because of their flight behavior. Dr. C. Olog of Tucumán (pers. comm.) had told me that this species did not skitter to rise as do other stifftails, and I found his description accurate. They seem to jump straight up, with the body horizontal, and then go into a high-speed, rising flight with fast-moving wings. They showed none of the hesitancy to fly or the flapping-across-water that Phillips (1925) noted in the early literature. However, Wetmore (1965) indicates that they may take flight in either way.

One male Masked Duck was collected. Its trachea was not simple as has been reported but had a clear-cut longitudinal, dorsal slit in the enlarged upper end that was connected to an air sac as noted also by Wetmore (1965). The behavior, elongate body shape (intermediate between Black-headed Ducks

and typical stifftails) and unique skeletal features (Woolfenden, 1961) seem to justify placing it in a genus separate from that of the ruddys. Both the smooth egg shell (resembling *Heteronetta*) and the downy young (Bond 1961) add still more evidence of its distinctiveness.

The male collected probably was a first year male and was mainly in nuptial plumage. Its gizzard contained several types of seeds rather than animal matter.

*Bañada de Figueroa*.—The western dry Chaco and desert scrub of Santiago del Estero contains several extensive marsh areas associated with seasonal overflow by rivers. For purposes of irrigation, the Rio Salado has been impounded northeast of La Banda, and a lake has been created in what formerly was marsh area. From 16 March to 20 March 1965, I accompanied Dr. C. Olrog of Tucumán and Mr. Maurice Rumboll of Buenos Aires in search of fall-breeding Black-headed Ducks and to collect waterfowl. We found the area much drier than normal, but some cultivated fields were flooded by a leak in the dike which retained the river. Here, we found numerous Black-headed Ducks, but the three we collected were not in breeding condition as Olrog had found them in previous years. Flocks of up to 40 were seen in their typical late evening flights. Olrog had previously banded 46 by trapping them in mist nets over water (Olrog, 1963). Two potential host-species, White-winged Coots (*Fulica leucoptera*) and Common Gallinules (*Gallinula chloropus*) were present, but they were not nesting.

The most numerous ducks in these flooded fields were Rosy-billed Pochards and Yellow-billed Pintails, but a few White-checked Pintails were seen in most flocks; a male collected was not in breeding condition. Late flying flocks of Fulvous Whistling Ducks were heard, and two were seen with nine Rosy-billed Pochards taken by hunters. Several pairs of Silver Teal were seen, and one was collected. Red Shovelers were present in small numbers. No Brazilian Ducks were seen, but two other subtropical species were observed; two South American Comb Ducks were seen loafing in a shallow water area, and several flocks of 25–30 were seen near the artificial lake formed by the dam. Several pairs and one male Ringed Teal were seen, but none was collected. Local Indians indicated that Ringed Teal nested in trees, especially on old nests of other birds.

*The puna zone near Abra Pampa*.—The highland puna or altiplano, an extensive area at 11,000–13,000 feet, has its southern limits in northwestern Argentina. The area near Abra Pampa, just south of the Bolivian border in the Province Jujuy, is especially marshy. Dr. Olrog and Mr. Rumboll accompanied me to this area on 23 to 26 March 1965. This area ranges from about 11,000 to 11,500 feet in altitude.

The most conspicuous bird of this highland zone is the large white and



FIG. 5. A nest of the Yellow-billed Pintail in bulrush of a puna zone marsh near Abra Pampa, Jujuy, 24 March 1965.

black Andean Sheldgoose (*Chloephaga melanoptera*). A flock of 150 or more birds were observed grazing with cattle on a flat, broad, dry lake edge about 4 miles north of Abra Pampa. Sheldgoose droppings were widespread in the short-grazed grasses and sedges.

The flock of ducks on this shallow lake was dominated by the ubiquitous Yellow-billed Pintail, but the highland race of the Speckled Teal (*A. j. oxyp-tera*) was nearly as abundant. In lesser numbers were very dark-colored Cinnamon Teal and the highland Puna Teal (*Anas puna*). The latter form, often considered a subspecies of the Silver Teal, has a quite different shaped bill and lacks the yellow at the base. Its isolation in the puna zone suggests that it is a separate species. The most unique ducks present were two Crested Ducks (*Anas specularioides*) which seemed quite curious but still kept out of range. We were able to collect two Puna Teal and one Speckled Teal.

Despite the fact that this area is north of the Tropic of Capricorn, daytime temperatures at this altitude were cool, and nighttime temperatures were below freezing in fall. We were surprised, therefore, to find newly hatched broods of Speckled Teal and Cinnamon Teal, a pintail incubating 3 ready-to-

hatch eggs (Fig. 5) and a female Puna Teal with a brood patch. Olrog had noted this fall-breeding before and believed that it was associated with water availability as it seemed to be in the Bañada de Figueroa and in the Chaco.

In the area, we saw American Coots (*Fulica americana*), in the southernmost portion of its range, several Common Gallinules, flamingos and Black-crowned Night Herons (*Nycticorax nycticorax*). Olrog had observed Southern Pochards (*Netta erythrophthalma*) there previously, but none was seen on this trip.

*Andean lakes at Bariloche.*—The extensive lake zone of Chile-Argentina in northern Patagonia is an excellent waterfowl area. A trip to that area was made on 14–25 February 1965, and several interesting species of waterfowl were observed. The big and deep lakes are generally unattractive to most species of ducks, but a few Yellow-billed Pintails were seen on the shores of even the barest of lakes. Flying Streamer-Ducks (*Tachyeres patachonicus*) could be seen regularly in the busy excursion centers on Lake Napual-Huapi. Remarkably tame, they dived between the moving launches and hauled out on a nearby rocky island to preen. Nine were the most seen together at one time.

Along the Rio Limay northeast of Bariloche, a pair of Spectacled Ducks (*Anas specularis*) was seen on a gravel bar. This general portion of the stream was wooded, although there were extensive open fields away from the river. Two flocks of Upland Sheldgeese were seen, a group of nine swimming in the river and a flock of 60 or more grazing with cattle and domestic turkeys in an open marshy area. In the same marsh were about 30 Chiloé Widgeon, and groups of 5 to 15 widgeon were to be found in almost any quiet back-water area along the stream. Yellow-billed Pintails also were seen in small numbers.

Small marshes are isolated in the dense mountain forests and are not easily located. Marshy edges are common to several of the lakes, and a tall bulrush (*Scirpus* spp.) is common there. Such marshes were frequented by Yellow-billed Pintails, Speckled Teal and Red-fronted Coots (*Fulica rufifrons*).

#### MIGRATION

Migrations of ducks in South America have not been well studied, but the general observations of workers over the past 80 years demonstrate considerable evidence of some regular seasonal migrations. Seasonal shifts of southern Patagonian forms like sheldgeese are well known (Plotnik, 1961) as are movements of Yellow-billed Pintails, Silver Teal, Speckled Teal and Red Shovelers which nest in Tierra del Fuego (Crayshaw, 1907). But movements also occur in central Argentina.

Early workers such as Grant (1911) and Gibson (1920) noted movements of Rosy-billed Pochards and Fulvous Whistling Ducks which they attributed to water conditions. The unusual occurrence of Rosy-billed Pochards and Argentine Ruddy Ducks on the Falkland Islands was also thought due to dry conditions on the mainland (Bennett, 1922). A seasonal dry period seems to be common in central Argentina and forces the birds into larger water areas (where they probably molt) in late summer. By early fall, these areas often are dry, and birds would find more water and better feeding areas elsewhere. In the Cape San Antonio area, Rosy-billed Pochards, Fulvous Whistling Ducks, Silver Teal and Speckled Teal left the marshes by early to mid-February, while Black-headed Ducks left in early March. Only the Yellow-billed Pintails, Chiloé Widgeon and Red Shovelers, which have extensive nesting areas in Patagonia, remained and even increased in number throughout the winter. Some movements of pintails were seen in mid-April. Wetmore (1926) saw concentrations in October and November that he considered long-distance migrants; I saw some such groups, but had no evidence that these had moved from more southerly areas.

It is of interest that several observers in more northerly areas of Argentina have remarked on population increases of Rosy-billed Pochards and Fulvous Whistling Ducks in late February and early March just following the period of their departure from eastern Buenos Aires Province. Durnford (1877), who lived along the Paraná some 50 miles northwest of the city of Buenos Aires (Baradero) considered both Black-necked Swans and Coscoroba Swans as winter residents and noted increases in Rosy-billed Pochards, Speckled Teal, Cinnamon Teal and Chiloé Widgeon in winter. Barrows (1884), who observed at Concepción (Province Entre Rios) along the Uruguay River, noted an increase in Silver Teal in winter, and increases in Rosy-billed Pochards with wet periods. Olrog (1962) observed that the sizable Rosy-billed Pochard populations of the Bañada de Figueroa increased in late February and early March and that birds departed in June and July. His banding data suggest a southeasterly movement to southeastern Brazil.

These notes suggest rather definite migratory patterns. Although some of these movements are local and water-influenced, some birds probably move from the major breeding marshes of eastern Buenos Aires along the natural guidelines of the coast and rivers and up the Paraná and Uruguay Rivers to warmer, wet areas; then northwesterly along the many major streams arising in the Andes to wetland areas in the deserts and along the Andean foothills.

The banding program initiated by Olrog at the Lillo Institute of Tucumán holds great promise for the solution of these problems of migration, but greater national and international effort needs to be directed to support his efforts.

## CHRONOLOGY OF NESTING

Phillips (1922) pointed out that waterfowl in tropical South America breed on irregular schedules and are much influenced by local water conditions. Certainly, in Patagonia and as far north as Buenos Aires, there are usually definite spring breeding periods. In more northerly parts of Argentina, seasons appear to be longer than we find in Northern Hemisphere anatids although it is difficult to compare since there are no major waterfowl breeding areas in the same climatic zone in North America.

It is quite possible that the area from about 35° S. latitude and north marks a zone where climate is less limiting and where waterfowl can breed at most times of year. Other factors then may be limiting. Water definitely seems a factor at Bañada de Figueroa (Olrog, pers. comm.), and Partridge (1956 and pers. comm.) considered water availability the reason that Brazilian Mergansers (*Mergus octosetaceus*) nested in June—the coldest time of the year. Water also seems important in the timing of nesting of many common ducks and coots each season since nest initiation began much later and was much reduced in volume in 1965 than in 1964, according to reports from residents in the General Lavalle Area of Buenos Aires and in southern Santa Fe.

There is no evidence of double-broodedness in tropical anatids, but in some areas, both spring and fall nesting (or continuous nesting) is indicated. Wetmore (1926) reported that Ringed Teal in Paraguay were in breeding condition in September; yet, birds collected during this study in May in Northern Argentina had just completed the wing molt. Moreover, specimens from Paraguay in the University of Michigan Museum of Zoology demonstrate late summer and fall breeding: A downy young Ringed Teal was taken on 6 February and a flying immature was taken on 15 January. Downy young White-faced Whistling Ducks also were taken on 6 February, and a downy young Black-headed Duck was collected on 1 March.

Brazilian Ducks were found both in body molt and laying during May in Argentina, and Wetmore (1926) reported males in Paraguay with new wing feathers in mid-February.

Apparently, there is a gradient from normal spring breeding in southern Argentina to a more irregular, possibly longer season in northern Argentina and in Paraguay. It appears that water availability is the major factor influencing fall and winter breeding, even at the latitude of Buenos Aires. Maurice Rumboll (pers. comm.) noted breeding by several species of ducks in southern Santa Fe Province during 1966, following an intensive drought during the normal spring breeding period. Other things such as insects, diseases, and food supplies need to be evaluated. Clearly, much information is

needed on the chronology of breeding for these subtropical and tropical habitats.

COURTSHIP, PAIR BONDS, AND BROOD CARE

Based mostly on observations of northern anatids, members of the Anatinae are considered to form pair bonds seasonally only, although many Anserinae pair for longer periods—probably for life (Delacour and Mayr, 1945). However, the presence of “pairs” of many duck species is common at all times of the year in central Argentina. General observations suggest that some of the population remains paired (or at least shows interest in members of the opposite sex) throughout the year. A related fact is that, in many species, males regularly accompany the female and brood, but such behavior in northern ducks is considered rare and has resulted in a series of publications pointing out such unique events.

My general observations in eastern Buenos Aires Province and in marshes near Venado Tuerto, Santa Fe, indicate that pairs were conspicuous after the nesting season, and in fall and winter among Yellow-billed Pintails, Silver Teal, Chiloé Widgeon, Speckled Teal and occasionally in Red Shovelers and Cinnamon Teal. Pairs were not common in post-nesting periods in Argentine Ruddy Ducks, Black-headed Ducks or Rosy-billed Pochards (although few Rosy-billed Pochards were seen in winter).

It also was noted that those species which retain a pair bond are those in which males commonly attend broods. My own records for the Cape San Antonio area show such attentiveness in Yellow-billed Pintails, Chiloé Widgeon, Silver Teal, and Fulvous Whistling Ducks.

Another interesting phenomenon not well documented in northern anatids is the occurrence of active courtship immediately following the main breeding season. Although such events are not common and the lack of continuity in my observations does not permit plotting of the chronology or relative frequency of displaying, courtship was seen regularly. After a September to November breeding season at General Lavalle in 1964, courtship was seen in Chiloé Widgeon, Silver Teal, Speckled Teal, and Red Shoveler in November, and in Cinnamon Teal in March. Pairs of Yellow-billed Pintail, Chiloé Widgeon, and Speckled Teal were seen regularly during the hunting season in April, and aerial courtship flights of Yellow-billed Pintails were seen in mid-May at Venado Tuerto. The latter period would be comparable to courtship periods of related species in the United States in November (Weller, 1965).

Nevertheless, much typical flock behavior also was noted in some of the same species. Flocks of Yellow-billed Pintails were seen fairly early in the breeding period, and those of Speckled Teal were seen just afterwards. The

TABLE 1  
ANATIDS EXAMINED IN HUNTERS' BAGS, 4 MARCH-23 JULY 1965, MAINLY IN EASTERN  
BUENOS AIRES AND SOUTHEASTERN SANTA FE PROVINCES

Species	Adult male	Adult female	Immature male	Immature female	Unknown	Total
Yellow-billed Pintail	71	33	6	10	2	122
Speckled Teal	15	8	-	4	-	27
Red Shoveler	11	8	-	4	-	23
Rosy-billed Pochard	3	4	-	-	9 <sup>1</sup>	16
Black-headed Duck	8	7	1	-	-	16
Chiloé Widgeon	6	4	-	3	-	13
Silver Teal	7	2	-	2	1	12
Cinnamon Teal	7	3	1	-	1	12
White-cheeked Pintail	6	5	-	1	-	12
Coscoroba Swan	1	1	2	2	-	6
Fulvous Whistling Duck	-	-	-	-	2	2
Argentine Ruddy Duck	1	1	-	-	-	2
	136	76	10	26	15	263

<sup>1</sup> Santiago del Estero Province.

sex and age composition of such groups is unknown and no observations were made to determine the presence of pairs within these flocks. Phillips (1922) reported that male pintails do leave nesting females and gather in flocks, but the source of this observation was not stated. Tremendous flocks of pintails and other dabblers are seen field-feeding in fall and midwinter, and some bag data suggest that adults and males may dominate some of these flocks. However, pairs are conspicuous in marsh areas even then.

It is possible that the permanency of pair bonds is related to latitude and migration and that southern migratory ducks are less inclined toward (i.e., have less opportunity for) permanent pairing. Such birds would contribute to large flocks, as would young-of-the-year. In fact, strongly migratory segments of duck populations at any latitude may be less prone toward permanent pairing. Unfortunately, neither banding nor observational data presently are available.

#### HUNTER-KILL

Hunters' bags were checked whenever possible, and in most cases, sex and age data were recorded. Most data were collected from the areas near General Lavalle, Buenos Aires, and Venado Tuerto, Santa Fe, but five areas are represented. A total of 263 birds of 12 species was examined (Table 1). There is general agreement on the relative abundance of species as observed in the

TABLE 2

A SUMMARY OF THE AVERAGE WEIGHTS (IN GRAMS) OF YELLOW-BILLED PINTAILS TAKEN 28 FEBRUARY 1964 TO 23 JULY 1965 AT GENERAL LAVALLE, BUENOS AIRES AND VENADO TUERTO, SANTA FE

Dates	Place	Adult male	Adult female	Immature male	Immature female
28 Feb.-18 Apr. 1965	B. A.	746.2 (13)	663.5 (10)	—	600 (2)
May	S. F.	789.3 (20)	697.0 (6)	770 (1)	650 (2)
June	S. F.	740.3 (23)	707.8 (11)	782.3 (4)	636.8 (5)
July	B. A.	826.9 (18)	769.3 (7)	670 (1)	—
	S. F.				
Totals	B. A. and S. F.	775.6 (74)	705.5 (34)	761.5 (6)	631.6 (9)

field and recorded in hunters' bags. However, there probably is a disproportionately high number of Yellow-billed Pintails because more field shooters than marsh shooters were sampled. This also results in reduced numbers of Rosy-billed Pochards. The near absence of Fulvous Whistling Ducks is due to their departure from shooting areas during late summer and also to their late flight times—when it is too dark for shooting. The two reported were from Santiago del Estero, probably a wintering area. Small samples of Rosy-billed Pochards, Silver Teal, and Speckled Teal are also influenced by their fall migration.

Separated by areas, the major species differences are the abundance of White-checked Pintails at Venado Tuerto and their absence at General Lavalle. More Black-headed Ducks were taken at General Lavalle, and Coscoroba Swans were not taken at Venado Tuerto.

The absence of immatures may be a product of both differential migration and gradual maturation of the sex organs used in age determination.

#### WEIGHTS

A quick survey of the literature demonstrates how little is known of the relative size of South American Anatidae. For this reason, weights of ducks were taken whenever possible; some were from collected birds, but most were from hunters' bags. As a result, samples are small, and few are available from any time period (Tables 2 and 3).

From the available data it seems that Argentine waterfowl follow the pattern typical of Northern Hemisphere anatids: Adult males exceed adult females in weights. Depending on the time of year and the species, adult females may be equaled or exceeded by immature males. In the case of the Yellow-billed Pintails, the small samples of immature males were taken late in

TABLE 3

A SUMMARY OF AVERAGE WEIGHTS (IN GRAMS) OF VARIOUS SPECIES ARRANGED BY SAMPLE AND AGE AND SEX. FIGURES IN PARENTHESES ARE SAMPLE SIZES. BIRDS WERE TAKEN IN THE PAMPAS REGION OF ARGENTINA DURING 28 FEB.-23 JULY (FALL AND WINTER) 1965 EXCEPT FOR LAST THREE SPECIES WHICH WERE TAKEN IN THE CHACO IN MAY, 1965

Species	Adult male	Adult female	Immature male	Immature female
Speckled Teal	429.1 (17)	394.6 (5)	—	388.2 (5)
Red Shoveler	608.3 (10)	522.6 (7)	—	543.0 (3)
Rosy-billed Pochard	1,181.2 (6)	1,004.0 (5)	1,000 (1)	1,000 (1)
Black-headed Duck	513 (11)	565 (13)	360 (2)	453 (3)
Chiloé Widgeon	939.0 (5)	828.3 (3)	—	665.0 (2)
Silver Teal	442.6 (10)	373.3 (3)	—	386.5 (2)
Cinnamon Teal	476.0 (7)	437.0 (3)	494 (1)	—
White-cheeked Pintail	710.4 (7)	670.5 (4)	—	553 (1)
Coscoroba Swan	3,785 (1)	3,200 (1)	1,660.0 (2)*	2,425 (2)
Argentine Ruddy Duck	610 (1)	560 (1)		
White-faced Whistling Duck	831 (1)			
Ringed Teal	350 (2)	310 (1)		
Brazilian Duck	600 (2)	580 (1)		
Masked Duck	400 (1)			

\* Probably underweight; several individuals were found sick and dead in the marshes near General Lavalle.

the year when they were nearing adulthood. Immature females are the lightest in weight. A clear-cut exception is the parasitic Black-headed Duck in which females normally outweigh males at all ages.

#### NOTES ON PLUMAGE

Most Southern Hemisphere ducks have plumage cycles which differ from northern forms by the absence of the "eclipse" plumage (abbreviated "basic" of Humphrey and Parkes, 1959). Some species lack sexual dimorphism, others have sexual dimorphism all year, and some possess the first non-nuptial (basic) plumage strongly developed.

Phillips (1922, 1923) stated that southern anatids have two molts per year, but no details have been available. Five species were observed regularly during the present study, and numerous fresh specimens as well as skins were examined. Based on these general observations, four of the five typically have a complete late summer molt (postnuptial or prebasic) and a partial spring molt (prenuptial or prealternate). Discussions of the following species are arranged according to plumage patterns rather than taxonomy.

*Yellow-billed Pintail*.—The Yellow-billed Pintail is representative of many Southern Anatini which lack conspicuous sexual dimorphism, both sexes having nearly the same plumage coloration year-round, but which have two molts per year. On the basis of skins in the Museo Argentino de Ciencias Naturales, the natal plumage is replaced by the juvenal plumage which then seems to be held until midwinter (June). However, the juvenal tail is shed earlier, and only a few birds with juvenal tail feathers were seen in hunters' bags in April and early May. A juvenile specimen in the Museo Argentino still has all juvenal rectrices and was collected in mid-January. Immatures examined in hunters' bags in mid-June through July had adult tail feathers with worn tertials. No evidence of a first non-nuptial (basic) plumage was noted, but birds probably were not seen at the age when this plumage is conspicuous.

In June, immatures and adults were found in full body molt, and presumably, this was placing the birds in their nuptial (alternate) plumage. Tail molt was common, and several skins in Argentine and U. S. museums taken during July to September showed body and often tail molt. The timing of this molt seems to vary with locality, but at least a major body molt is apparent in winter and early spring. Presumably, the plumage acquired at this time is worn until the complete annual molt in summer (November and December). Specimens taken in summer are rare.

Based on limited observations of specimens in hunters' bags in late winter, and from specimens seen in museums, the same pattern seems to prevail in Speckled Teal, Chilóe Widgeon, Red Shoveler, Silver Teal, and probably White-cheeked Pintail. There is a complete annual molt in late summer, placing the bird in non-nuptial (basic) plumage which is held until the spring when the nuptial (alternate) plumage is acquired. Because there is no seasonal color dimorphism and the history of these plumages is unknown, homologies are uncertain.

*Rosy-billed Pochard*.—The general pattern in this species seems comparable to that of the Yellow-billed Pintail except that a "permanent" sexual dimorphism occurs. It differs from northern *Aythya* and *Anas* in the absence of the dull "eclipse" plumage in adults. No distinct first non-nuptial (basic) plumage was noted in skins examined, although it may occur in the head region. The juvenal plumage was replaced by the first nuptial (alternate) plumage in March to June, depending on the geographic area. As in Nearctic *Aythya*, the juvenal tail feathers were not replaced until young were 4.5–5 months old in April or May when the body plumage was nearly complete. In six juvenile males in Argentine museums and six in U. S. museums, the alternate plumage was acquired first on the cheeks, then on the midback and flanks, and finally on the chest. The head and neck become almost entirely black before the scapulars, back and flanks are half renewed. The midline of the belly whitens after the breast is partly black.

The first-year male nuptial (alternate) plumage is characterized by the dull blackish-brown head with white-tipped feathers and, often, a white patch in the "V" of feathers between the lower mandibles. Yearling males also retain the brown juvenal wing coverts, while those of adults are black.

Spring molt was noted in adult males in September, October, and November specimens and in females in August and October in the skins in the Museo Argentino. Body and tail molt was noted in three adults taken in July at Venado Tuerto. Immature males, like adults, seem to have breast molt in the spring, and it is uncertain whether this was a gradual completion of the molt started in winter or if it involves another generation of feathers.

*Black-headed Duck*.—The plumage pattern in this species resembles that of the Rosy-billed Pochard. However, there is a complete postjuvinal, first non-nuptial (basic) plumage which starts to develop before the natal down has been replaced by the juvenal plumage under the wings (Weller, 1967a). The tail and back are renewed first. This plumage is held until August and September when the first nuptial (alternate) plumage of males is acquired. The pattern in females is less certain. The nuptial (alternate) plumage of males is replaced by the annual molt in December and January, and the latter plumage is worn all winter until August and September when at least a partial molt occurs, involving the head, breast, back, and tail. This pattern resembles other southern Anatids and differs from the Ruddy Ducks in that the winter non-nuptial (basic) plumage is essentially as bright as is the alternate plumage.

*Argentine Ruddy Duck*.—The plumage pattern in this species is of interest because it resembles that of the North American Ruddy Duck (*Oxyura jamaicensis*). It has been suspected of having a long-lasting non-nuptial (basic) plumage in winter like the North American form (Delacour, 1959), and this definitely seems to be the case. Males with bright rufous body were noted with female-like heads as early as 26 January 1965, at General Lavalle and similar birds were seen at Venado Tuerto, Santa Fe, in early winter (19 May 1965). In the field, the question arises as to whether these are young males entering their first nuptial (alternate) plumage or adults entering the dull non-nuptial (basic) plumage. This was clarified by a specimen collected at General Lavalle during mid-April 1965. This male had an adult penis and lacked a bursa but had the brown head with a white eye-stripe. The throat is whiter than in females, and the body has a general rufous aspect. However, close examination shows that most of the reddish feathers are worn and that new brown feathers are developing on the back. Another specimen in the Museo Argentino had been collected in May and is still more brown on the body. Some males collected in winter seem to have mottled blackish heads, and it may be that this basic plumage is transitory.

A late winter or early spring body and tail molt (August–October) occurs in both sexes, according to museum specimens at La Plata and observations summarized by Grant (1911).

The juvenal plumage is characterized by distinct juvenal tail feathers as is true of most stifftails (Coues, 1878). There also appears to be a distinct and long-lived first non-nuptial (basic) plumage as six young males in the American Museum have new brown feathers replacing the brown juvenal feathers. Presumably, young males acquire their first alternate plumage in September–October.

*Cinnamon Teal*.—This species differs from the previous forms in that it resembles the North American subspecies and males of most Nearctic dabbling ducks in possessing a short-lived “eclipse” plumage. Snyder and Lumsden (1951) found a well-developed first non-nuptial (basic) plumage (although they did not use this term). Young males have acquired new tail feathers and most of their alternate plumage by early winter (May). A specimen from Chile in the Museo Argentino had full juvenal plumage (including juvenal rectrices) when it was taken in March. Whether any late winter or early spring molts occur is not positively known, but such may be expected in females. Of three Chilean female specimens in the Museo Argentino, two showed no molt in May or July, but considerable breast molt was apparent in the specimen collected in September. Six adult males from Buenos Aires and Santa Fe were examined from mid-June to mid-July 1965, and no significant body or tail molt was noted.

Adult males of this species do have an “eclipse” plumage as was pointed out by Brooks

(1938) and by Snyder and Lumsden (1951). I suspect some irregularities in this plumage since some birds acquire it very early. Moreover, it seems transitory since a paired male collected on 8 January 1965, was dominantly in dull basic plumage but had some old reddish adult plumage as well as incoming bright alternate plumage. By late February, most adults again are in bright plumage.

#### SOUTHERN VERSUS NORTHERN PLUMAGE PATTERNS

Most Southern Hemisphere ducks which are sexually dimorphic have plumage cycles which differ from those of northern forms by the absence of the dull "eclipse" plumage of the late summer. This results in "permanent" sexual dimorphism, a sequence which may have resulted from a loss of the "eclipse" plumage (with a molt added in spring), or a change in its color. However, many southern anatids, especially of the genus *Anas*, lack prominent sexual dimorphism. The reasons for these differences between plumages of northern and southern ducks have not been explained and it cannot be assumed that all evolved in the same way.

The above patterns strongly suggest that the non-nuptial (basic) plumage or "eclipse" plumages of adults in northern ducks are relics of primitive plumage patterns as Humphrey and Parkes (1959) have proposed. Fairly typical Northern Hemisphere patterns are apparent in southern Cinnamon Teal and Argentine Ruddys, suggesting that these are recent arrivals to South America. The Argentine Ruddy has a long "winter" plumage resembling that of Nearctic forms, the Cinnamon Teal has a brief "eclipse" plumage, while the Black-headed Duck lacks any dull plumage.

Assuming that seasonal sexual dimorphism evolved first, permanent dimorphism could have resulted from a continuous shortening of the duration of the dull non-nuptial plumage (i.e., "winter" or "eclipse") as seen in the series: Argentine Ruddy Duck, Cinnamon Teal, and Black-headed Duck (or Rosybill). In the latter species, two plumages of the same color occur, and the homologies are uncertain. The forces producing such a loss are unknown but Sibley (1957) suggested that the early acquisition of the nuptial (alternate) plumage (and shortening of the non-nuptial) in northern ducks was associated with early pair formation, a situation which has been supported by observations in some North American species (Weller, 1965). This might imply an almost continuous courtship in species which lack the dull, non-nuptial plumage. However, my own observations suggest that several of the South American species with clear-cut, permanent sexual dimorphism do not pair for life and have a distinct spring courtship period (Black-headed Duck and Rosy-billed Pochard).

The absence of an eclipse plumage in subtropical and tropical areas may not mean that pairs *do* engage in courtship all year but that they *can*. In either dimorphic or non-dimorphic plumages, year-round con-

stancy in plumage is essential to pair formation in birds residing in areas where the time of breeding is dependent on rainfall and other conditions, and where a regular periodicity such as occurs in the northern hemisphere is lacking. Birds constantly in nuptial plumage (bright or dull) are always ready to breed when environmental conditions permit. Presumably, this holds true for many non-waterbirds as well which do not breed at a regular time each year.

The absence of prominent sexual dimorphism, such as seen in the species of the genus *Anas*, could have resulted from early forms which lacked dimorphism or from forms having dimorphic patterns which recently have been lost. Most investigators imply that the latter is most probable in view of the dull plumages of northern ducks isolated on southern islands (Sibley, 1957). Although this loss of dimorphism often is explained on the basis of the lack of contact between closely related species, other possibilities exist. Generally, the Argentine species which lack sexual dimorphism tend to pair "permanently"—or at least some members of the population are in pairs all year. Courtship may be less intense and probably occurs over a longer period than in northern forms. It seems possible that the non-dimorphic (and often dull) plumage may develop in ducks which pair "permanently," do not engage in intense seasonal, social courtship, and which in some cases are not strongly migratory.

#### SUMMARY

Observations on the habitat ecology, nesting behavior, distribution, and weights of some Argentine anatids are presented. Data were gathered during August 1964 to July 1965 with observations from eastern and southern Buenos Aires Province, the Chaco zone of northern Argentina, the highland puna zone of northwestern Argentina, and the Andean Lakes region of northern Patagonia.

Compared to northern ducks, observations of southern forms indicate a lower degree of sexual dimorphism (especially in the genus *Anas*), a tendency toward permanent pairing (resulting in males accompanying broods), an extended period of courtship—possibly of lower intensity than in northern forms, reduced migration, and the absence of the "eclipse" plumage in males. Notes on plumages of five ducks are outlined to show variations in sexual dimorphism and molt patterns. Observations on several species suggest that the absence of sexual dimorphism is related to long pair bonds, while that of permanent dimorphism in South American anatids may be tied to temporary pair bonds. Loss of the eclipse plumage in Neotropical birds possibly is due to the irregularity of breeding seasons. Birds constantly in the breeding plumage have a definite advantage in being ready to pair whenever environmental conditions permit.

#### ACKNOWLEDGMENTS

For their enthusiastic assistance in field and laboratory work, I would like to thank the following groups and individuals: The MacIver and Runnacles families of General Lavalle and Hurlingham, Peter and Martha Miles of Venado Tuerto, Maurice Rumboll of

Hurlingham, Dr. C. Olog of Tucumán, the late Dr. William Partridge, and Dr. J. Navas of the Museo Argentino de Ciencias Naturales, Senorita M. A. Torres of the Museo de la Plata, Dr. and Mrs. Gardiner Bump of Buenos Aires, and Mr. A. W. Johnson of Santiago, Chile. Senors Horno and Vanini provided access to study areas at General Lavalle as Senor Iturralde did at Venado Tuerto. Mr. Desmond Macadam of La Forestal (S. A.) arranged for facilities in the Chaco. Dr. Philip Humphrey made helpful comments on the plumage section of the paper.

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