2010

Ducks, Geese, and Swans of the World: Tribe Tadornini (Sheldgeese and Shelducks)

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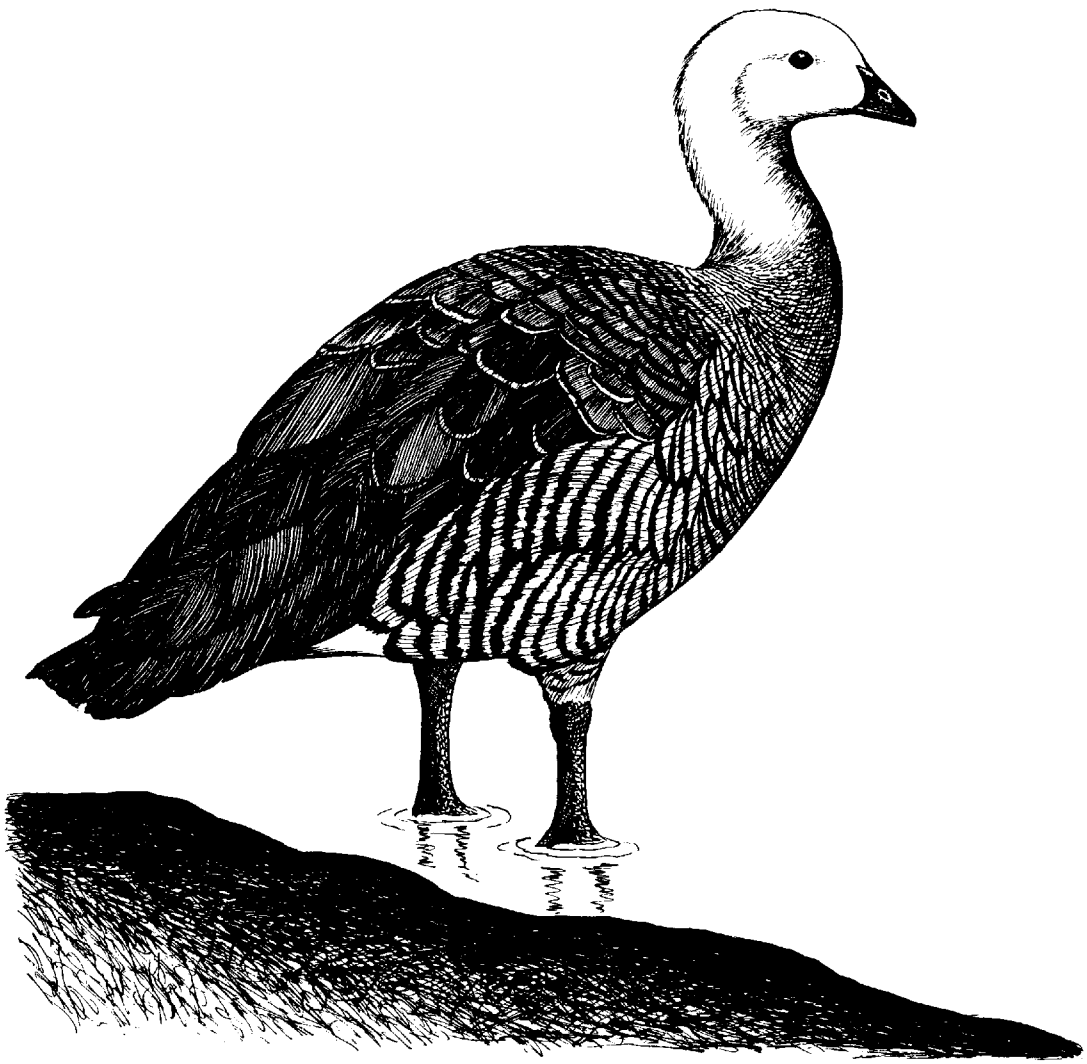
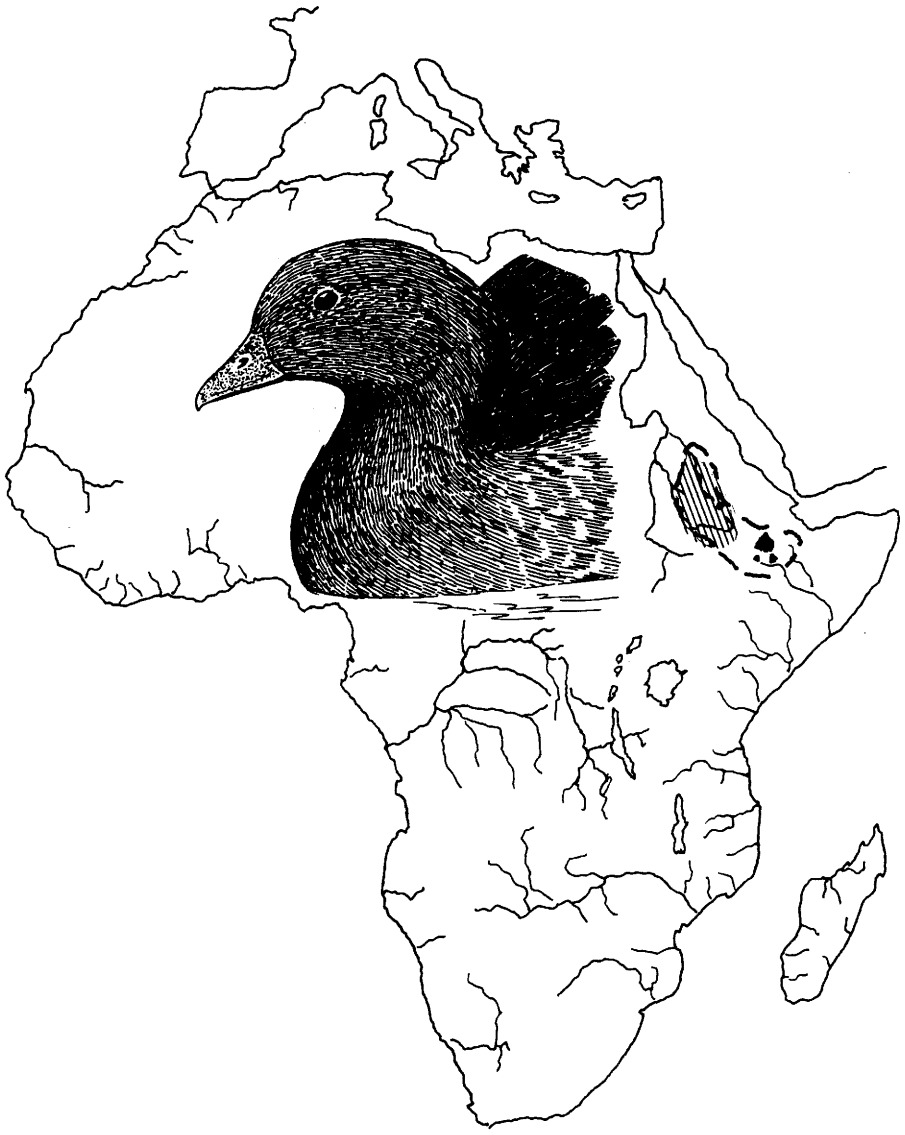
Tribe Tadornini (Sheldgeese and Shelducks)



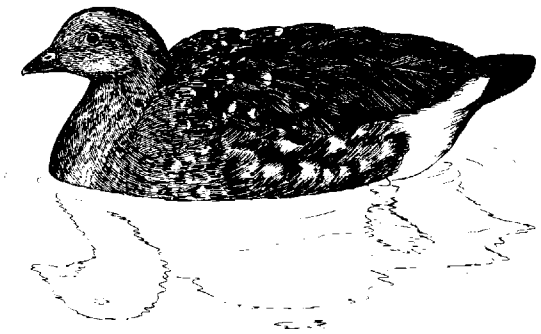


MAP 33. Residential distribution of the blue-winged goose.

Drawing on preceding page: Male Magellan Goose

Blue-winged Goose

Cyanochen cyanopterus (Rüppell) 1854



Other vernacular names. Abyssinian blue-winged goose; Blaüflugelgans (German); bernache à ailes bleues (French); ganso alas azules de Abisinia (Spanish).

Subspecies and range. No subspecies recognized. Limited to the highlands (above 8,000 feet) of Ethiopia, primarily in the area between Lakes Zwai and Tana, but extending north to about 15° north latitude. See map 33.

Measurements and weights. Folded wing: males, 368–74 mm; females, 314–34 mm. Culmen: males, 32–33 mm; females, 30–31 mm. Weights: adult female, about 1,520 g (Lack, 1968). Eggs: av. 70 x 50 mm, cream, 85 g.

Identification and field marks. Length: 23–29″ (60–75 cm). *Adults* are predominantly grayish brown, with paler brown tones on the lower back and upper tail coverts, and the under tail coverts are white. The tail and primaries are black, and the secondaries are glossy green, while the upper wing coverts are a distinctive powder blue except for a small area at the bend of the wing, which is white, as are the underwing coverts. The bill, feet, and legs are black. *Females* are identical to males, but are considerably smaller (see wing measurements above). *Juvenile* birds are somewhat duller in color and pattern than adults.

In the field, no other gooselike bird occurs in the limited geographic range of this species with which it could be confused. The birds often walk and swim with their heads resting on the back, and the male often utters a rapidly repeated whistling note, while the female has a similar but somewhat harsher call.

Natural History

Habitat and foods. The preferred habitat of these birds is the highland rivers of Ethiopia, where the country is open and where meadows of short grass come down to the river banks. They also occur at the edges of swamps that are not overgrown with bushes or banks of reeds, but rarely if ever are they found in the middle of ponds or in deep water. Their major foods undoubtedly consist of grasses, sedges, and similar herbaceous vegetation of these areas, judging from their bill shape. However, the stomachs of some wild birds shot in the wild have revealed such animal life as worms, insects, insect larvae, and snails.

Social behavior. In the wild, blue-winged geese are usually found only in pairs, and seldom in larger groups. They apparently never move great distances, and even when frightened they do not fly very far. They are reportedly somewhat nocturnal under natural conditions. Nothing is known of seasonal movements, but these are likely to be small or lacking.

Reproductive biology. Almost no nests have been described from wild birds, although broods of downy young have been reported in May and June, and one nest containing 5 eggs was found in March. In captivity, nests have been constructed under bushes, in a clump of sedge, and in boxes buried in a bank. Nest-building and mating activities are evidently carried out at night, since almost none of these behavior patterns have been observed by aviculturists. It is known from captive birds that the usual clutch is from 4 to 9 eggs, perhaps averaging 7, and that only the female incubates. The incubation periods reported by various observers range from 30 to 34 days. The downy young are as brightly patterned as those of typical sheldgeese, and grow fairly rapidly. It has been reported that in captivity completion of feathering, except for the wing feathers, is achieved at about six weeks, although the fledging period is probably appreciably longer (Delacour, 1954–64; Kolbe, 1972). The period to reproductive maturity is believed to be two years, but specific data seem lacking.

Status. This species has the most restricted range of all of the sheldgeese, and almost nothing is known of

its actual population size, which must be relatively small.

Relationships. The blue-winged goose is a typical sheldgoose, whose closest relationships are quite clearly with the South American genus *Chloephaga*. In some ways the species is an ecological counterpart of the Andean goose.

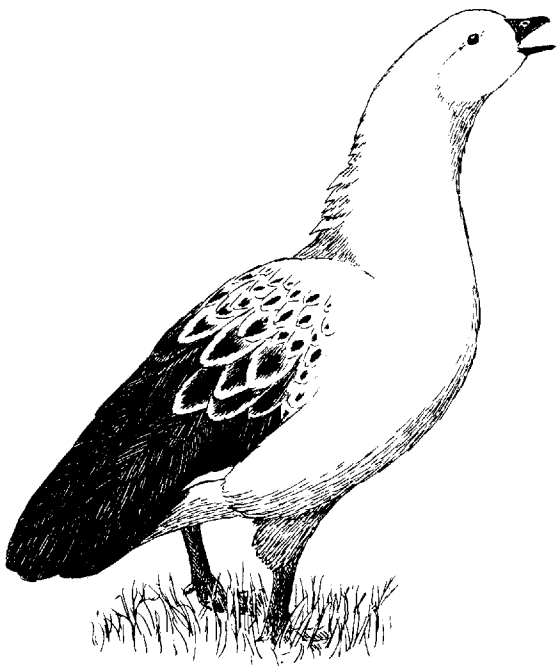
Suggested readings. Delacour, 1954–64.

Andean Goose

Chloephaga melanoptera (Eyton) 1838

Other vernacular names. None in general English use. Andengans (German); bernache des Andes (French); guayata, ganso andino (Spanish).

Subspecies and ranges. No subspecies recognized. Resident in the Andes above 10,000 feet elevation from southern Peru and Bolivia to the latitude of Mendoza Province in Argentina and Nuble in Chile. See map 34.



Measurements and weights. Folded wing: males, 460–75 mm; females, 420–30 mm. Culmen: males, 38–43 mm; females, 34–37 mm. Weights: Both sexes range from 2,730 to 3,640 g (Kolbe, 1972). Eggs: av. 75 x 50 mm, cream, 131 g.

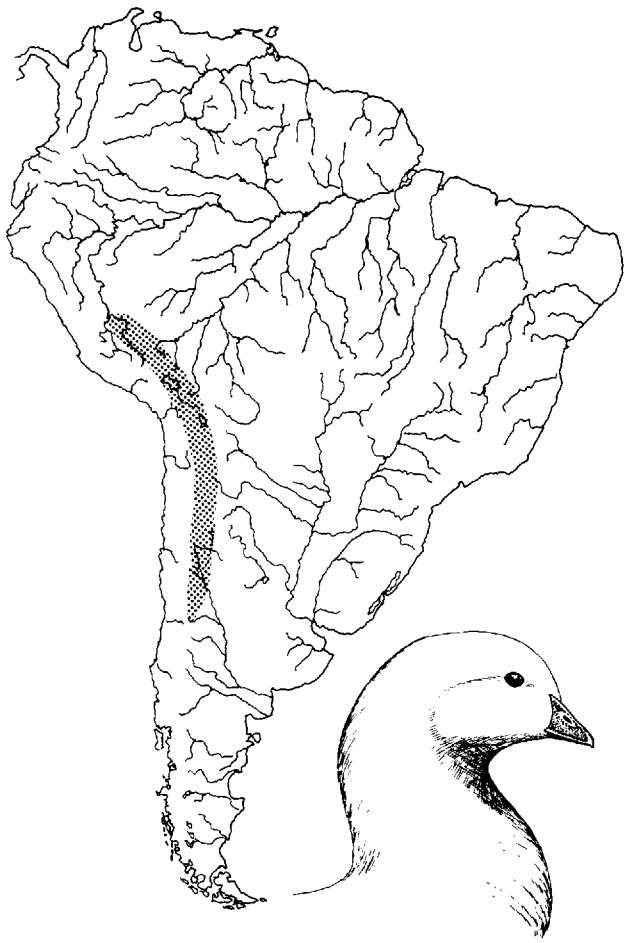
Identification and field marks. Length 29–32″ (75–80 cm). Plate 23. This sheldgoose is the only one having the combination of a coral-red bill and orange legs and feet, and further, its plumage is mostly white except for a black tail. Some flight feathers (primaries and tertials) are blackish, and most of the greater secondary coverts are iridescent purple, while the other coverts and secondaries are white. The longer scapulars are blackish, while the shorter and more anterior ones are white with oblong blackish central markings. *Females* closely resemble males but are considerably smaller, while *juvenile* and *immature* birds are less pure white, and dark gray above rather than blackish.

In the field, since no other sheldgoose occurs in the high Andean habitats used by this species, it can be readily recognized by its gooselike shape and its black and white plumage pattern. The call of the male is a loud and shrill repeated whistling note, while that of the female is a grating growl.

Natural History

Habitat and foods. The habitat of the Andean goose consists of Andean lakes, marshes, and well-watered valleys, where an abundance of fresh green grass and similar herbaceous vegetation is to be found. No studies of the birds' foods under wild conditions have been undertaken, but they are probably entirely of such materials. For most of the year the birds remain at altitudes above 10,000 feet, but in the southern parts of their range they may temporarily move down into the damp meadows and marshes of Chile's central valley after winter snows in the mountains (Johnson, 1965).

Social behavior. During much of the year these birds are found in loose flocks, which are probably quite sedentary and rarely are forced to fly. As in other sheldgeese, the pair bonds are strong and, once formed, are probably permanent. It is believed that all sheldgeese mature in the second year of life, and thus courtship probably occurs when the birds are about one and a half years old. The species is relatively pugnacious, and the sexual behavior of the female consists of a well-developed inciting call and



MAP 34. Residential distribution of the Andean goose.

posture. While uttering a repeated *gack* call, the female walks in high-stepping and erect posture, shaking her tail from side to side. The female often thus walks around her mate, which typically responds with a variety of aggressive and sexually oriented displays. The most conspicuous is a repeated whistling call, uttered with neck and head diagonally outstretched. This appears to be an aggressive call, and is often alternated with an erect and stereotyped march around the female, with neck feathers fluffed, the bill tilted downward and resting against the neck, the tail repeatedly shaking, and a flatulent *humm-pah* sound uttered. Males also have an aggressive wing-flapping display, as well as body-shaking and head-rolling movements that all closely resemble the normal comfort movements of this species (Johnsgard, 1965a).

Reproductive biology. At least in the southern parts of its range, the Andean goose's breeding season begins in November, with young being hatched in late December and early January. The nests are usually simple scrapes generally placed among sparse vegetation, and are often on hilly slopes overlooking water, or even on bare ground directly below snow line. Typically from 5 to 10 eggs are laid and are incubated entirely by the female, although the male remains close by and strongly defends the nest. The normal incubation period is 30 days. After the young hatch, they are led by the parents to the nearest available water; and when swimming, the male always takes the lead, followed by the brood and finally by the female (Johnson, 1965). Judging from observations of captive-raised birds, the young require about three months to become fully feathered, by which time they closely resemble the adults except for the scapular feathers, which are mostly brownish gray, with poorly defined black markings. In captivity at least, breeding usually does not occur in birds less than three years old, but the situation in the wild is not known.

Status. The fairly remote environments of this species probably keeps it well out of reach of most human persecution, and furthermore its habitats are ones unlikely to be seriously modified by man in the foreseeable future. Its population size is completely unknown, but there is no indication that the bird is currently in any danger.

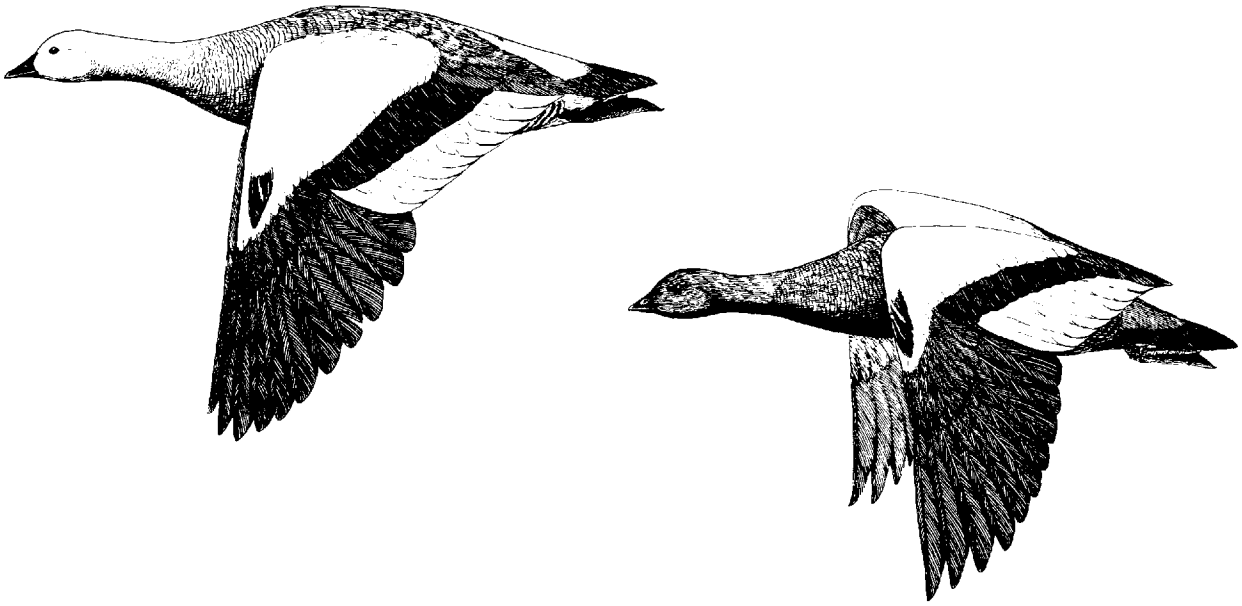
Relationships. The entire genus *Chloephaga* is obviously a close-knit one, and many of this species' minor differences from the others must be related to its high-montane ecological adaptations. The evolution (or retention) of a conspicuous white plumage in the female is curious and deserves some attention.

Suggested readings. Johnson, 1965; Delacour, 1954–64.

Magellan Goose

Chloephaga picta (Gmelin) 1789

Other vernacular names. Upland goose; Magellangans (German); oie de Magellan (French); caiquen, ganso magallánico (Spanish).



Subspecies and ranges. (See map 35.)

C. p. picta: Lesser Magellan goose. Breeds from the latitude (36° south) of Talca in Chile and Río Negro in Argentina south to Tierra del Fuego; occurs north to Colchagua in Chile and Buenos Aires in Argentina during winter.

C. p. leucoptera: Greater Magellan goose. Resident on the Falkland Islands; introduced into South Georgia island but now extirpated.

Measurements and weights. (Both subspecies.) Folded wing: males, 395–462 mm; females, 380–425 mm. Culmen: males, 33–47 mm; females, 31–45 mm. Weights (of *picta*): males, 2,834 g; females, 2,721–3,200 g. Eggs: 74 x 50 mm, cream, 122 g.

Identification and field marks. Length 23–26″ (60–65 cm). Plate 28. This is the only large sheldgoose (folded wing 380 mm or longer) that exhibits black barring on the flanks. In females and males of some individuals of the lesser subspecies the barring is extensive, extending around the abdomen and up the neck, while in males of the greater subspecies and some lessers the barring is restricted to the flanks; the breast, abdomen, neck, and head are entirely white. The tail is black or black tipped with white; the upperparts are gray posteriorly and barred with black on the smaller scapulars; the wing has an iridescent green speculum formed by the greater secondary coverts; the secondaries and lesser coverts are white. The bill, legs, and feet are grayish black. *Females* have yellow legs and feet, and the head, neck, breast, and anterior flanks are overlain with a reddish cinnamon cast, but the black barring pattern remains evident. *Juveniles* and first-year immature males show dusky brown feathers in the head region.

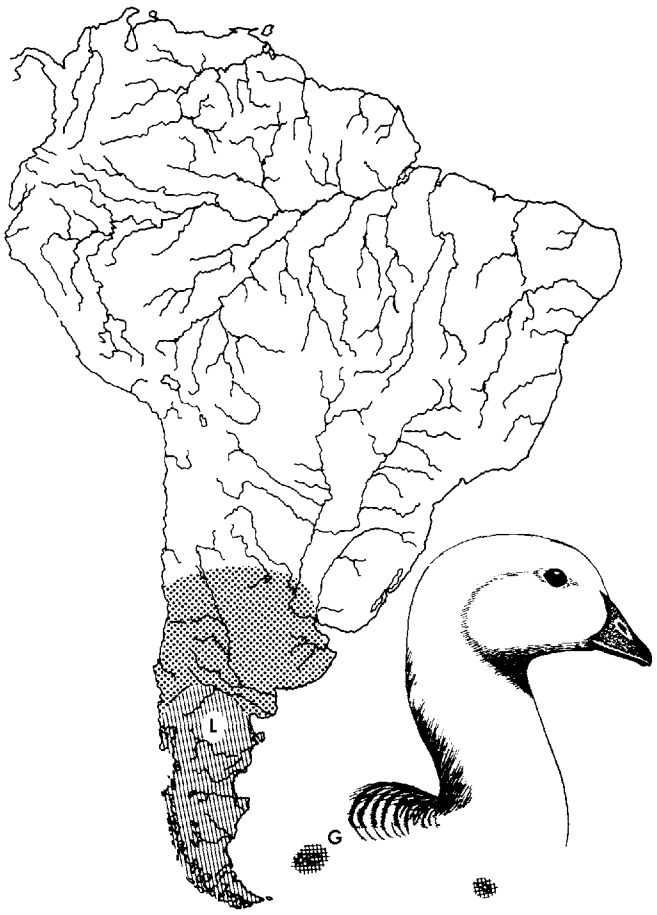
In the field, this sheldgoose may be found in company with ruddy-headed and ashy-headed geese, which are both smaller and lack white heads. Females slightly resemble ruddy-headed geese, but lack that species' white eye-ring markings. In all sheldgeese the call of the male is a repeated whistling note, while the female produces a loud grating sound.

Natural History

Habitat and foods. This is a species of the semiarid, open grasslands of Patagonia, sometimes occurring relatively far from water. Except when flightless or with broods, the birds are completely terrestrial, and are found most often in cultivated pastures and grassy valleys. Grassy islands or stream shorelines are favored territorial and brood-rearing areas in the Falkland Islands, and larger green areas, often far from water, are used by nonbreeding flocks. Grassy areas near the sea are used by birds approaching their

molt, so that they might escape to the sea when flightless. The leaf tips and seed heads of grasses such as meadow grasses (*Poa*) are favored foods of young and adult birds, and even very young birds apparently have an entirely vegetarian diet (Weller, 1972).

Social behavior. This species is the most abundant of all the sheldgeese, and some flocks must be relatively enormous. These flocks move around considerably according to the local food supplies, and strongly compete with sheep flocks. Where they are extremely abundant, their excrement may drive sheep away, and on some sheep *estancias* in Tierra del Fuego as many as 75,000 eggs have been reported destroyed in a single year. On the Falkland Islands, flocks of up to 100 birds are commonly seen. The existence of flocks of nonbreeders indicates that the period of sexual immaturity is at least two years, and Weller (1972) suggests that a three-year period to maturity is more likely. Pair formation is achieved by the combination of female inciting behavior and aggressive responses of her potential mate. In captive birds it is confined to late winter and spring. Aggressive displays include whistling with the neck and head high and often are followed by a rapid running attack with the brilliantly patterned wings partially spread and ready to strike the opponent. One observed case of copulation occurred in shallow water and was preceded by mutual head-dipping movements and followed by apparently mutual calling and partial wing raising by the male (Johnsgard, 1965a).



MAP 35. Breeding or residential distribution of the greater ("G") and lesser ("L") Magellan goose. Wintering distribution of the greater Magellan goose is shown by stippling.

Reproductive biology. In Chile, nesting occurs during November (Johnson, 1965), but in the Falkland Islands it may extend from early August to late November, with most activity between mid-September and late October (Woods, 1975). Chilean nests have been found scattered indiscriminately over the countryside but usually are near water, while in the Falkland Islands the nests are typically placed among ferns, "diddle-dee" (*Empetrum*), or white grass (*Cortaderia*). The usual clutch size is 5 to 8 eggs, and incubation by the female requires 30 days. Males remain near the nest at this time; and shortly after hatching, the young are led to water. Weller (1972) estimated a 9- to 10-week fledging period for this species on the Falkland Islands. By late December, adults have begun their molt and become flightless, and at that time the birds move near the seacoast for protection.

Status. In spite of tremendous persecution by sheep-growing interests, this species remains remarkably common over much of its range. The Falkland Island race is obviously much less numerous than the mainland form, and in some areas the young birds are caught and used for food. Together with the ruddy-headed goose, these birds are considered pests and may be killed at any time. They nevertheless remain relatively common.

Relationships. This species seems to be most clearly related to the kelp goose, judging from adult plumage patterns, but a more detailed anatomical or behavioral analysis of *Chloephaga* must be undertaken before intrageneric affinities become evident.

Suggested readings. Woods, 1975; Johnson, 1965.

Kelp Goose

Chloephaga hybrida (Molina) 1782

Other vernacular names. None in general English use. Tanggans (German); bernache antarctique (French); caranca, ganso del cachiguyo (Spanish).

Subspecies and ranges. (See map 36.)

C. h. hybrida: Patagonian kelp goose. Resident in Chile from Chiloé Islands south to Tierra del Fuego, and rare in Argentina from Santa Cruz and Chubut southward.

C. h. malvinarum: Falkland kelp goose. Resident on the Falkland Islands.

Measurements and weights. (Both subspecies.) Folded wing: males, 363–96 mm; females, 334–80 mm. Culmen: males, 35–40 mm; females, 35–40 mm. Weights: males, 2,607 g; females 2,041 g. Eggs: av. 73 x 53 mm, deep cream, 139 g.

Identification and field marks. Length 22–25″ (55–65 cm). *Male* kelp geese are the only entirely white waterfowl except for swans; and unlike any swans, they have yellow legs and feet and a short, black bill with a crimson spot on the culmen. *Females* have dark brown heads with a white eye-ring, heavily barred breasts and flanks, and a dark brown mantle, with a white tail and tail coverts. The wing pattern of females is like that of the other typical sheldgeese, rather than white as in males. *Juvenile* and immature males are rather like the female but have brown secondary coverts and dull greenish yellow legs and feet, and young females have dark upper tail coverts.

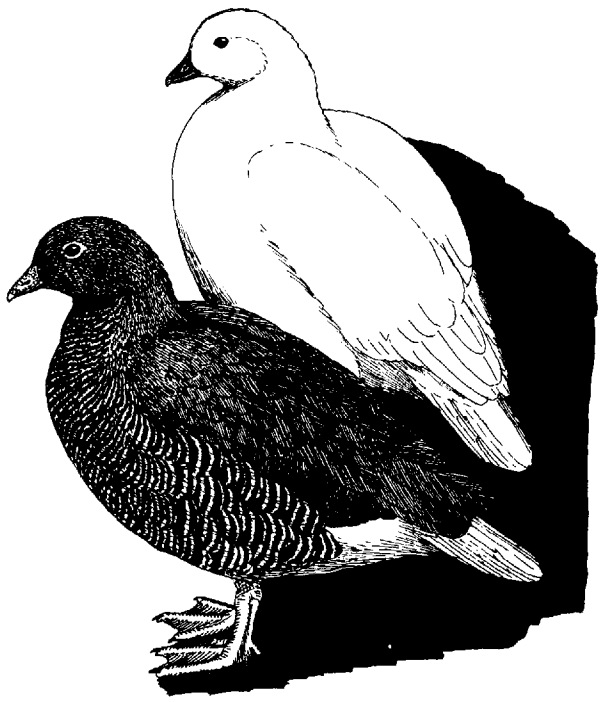
In the field, the entirely white plumage of the adult male is unmistakable, and females appear generally dark except for their white hindquarters. The call of the male is a repeated whistle, that of females a raucous snarling note.

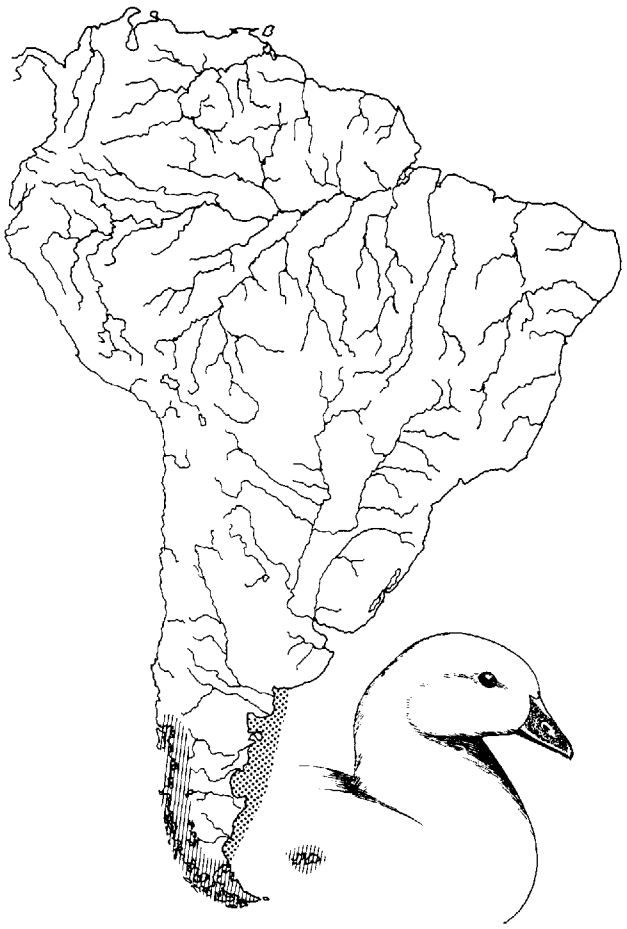
Natural History

Habitat and foods. The habitat of kelp geese consists of rocky shorelines and shingle beaches. Occasionally the birds visit fresh-water ponds for bathing and drinking. Nesting also occurs near fresh-water areas less than a kilometer from the coast. Foraging is restricted largely to filamentous algae (*Enteromorpha*), sea lettuce (*Ulva*), and leafy algae (*Porphyra*) growing on tidal rocks. When nesting, adults also consume green grasses near the nests, and in winter the berries of "diddle-dee" (*Empetrum*) may be an important food. Young birds apparently eat much the same foods as adults, with animal materials only a very minor component (Weller, 1972).

Social behavior. Kelp geese form moderately large flocks of nonbreeding and molting birds; Weller (1972) reported a group of 232 adults feeding at low tide in one bay, and Gladstone and Martell (1968) saw a flock of over 300 molting birds. The Falkland Island population is essentially sedentary, with only local movements during winter, leaving breeding areas in March and April, and returning in September and October. The continental population undertakes substantial northward migrations during winter, but the details are still largely unstudied. Pair formation presumably occurs in wintering flocks; Woods (1975) reports that display may be seen from September to late November. Observations by Gladstone and Martell indicate a behavior much like that of the Andean goose. Pair bonds are almost certainly permanent; Pettingill (1965) reported seeing birds in solitary pairs from February through October on the Falkland Islands. The period to reproductive maturity is still uncertain but must be at least two years.

Reproductive biology. Nesting gets under way on the Guaitecas Islands of southern Chile in November





MAP 36. Breeding or residential (hatched) and wintering (stippling) distributions of the kelp goose.

(Johnson, 1965) but begins appreciably earlier on the Falklands, with most nesting in late October and early November. Nests are almost always placed within ten yards of the high-tide line, often on low cliff ledges, in clumps of tall tussock grasses, or even under old planks on the beach. Ledges from four to eight feet up a cliff, with a cover of stunted tussock grass, are favorite locations (Gladstone & Martell, 1965). The nest is lined with vegetation and gray down, and the normal clutch size ranges from 3 to 7 eggs, with 6 the most commonly encountered number. The incubation period is 30 days, and the conspicuous male remains close by throughout the period, thus often revealing the nest's location. The adaptive significance of the male's white coloration is obscure, but may be related to its effectiveness as a dominance signal in territorial encounters. Territorial defense of limited shoreline food resources may be a significant factor in maintaining the fairly low population densities of the bird. Upon hatching, the goslings are quickly led to water and feed, during the low-tide periods of each day, mainly on algae of the filamentous (*Enteromorpha*) type. This restricted foraging period probably accounts for their slow growth rate; Weller (1972) estimated the fledging period at 12 to 13 weeks, compared to 9 or 10 in the upland goose. The flightless period of adults extends from late November through February on the Falkland Islands.

Status. This species is still reasonably common over most of its range, and is not in competition with human sheep-raising interests, as are the other sheldgeese.

Relationships. Apart from its dietary specializations, the kelp goose does not diverge very far from the other species in this genus. The entirely white plumage of the male, even including the greater secondary coverts, is of special ecological interest, and is in strong contrast to the dark, concealing coloration of the female. Most probably the species evolved from stock not very different from the modern Magellan goose.

Suggested readings. Gladstone & Martell, 1965; Pettingill, 1965.

Ashy-headed Sheldgoose

Chloephaga poliocephala Sclater 1857

Other vernacular names. None in general English use. Graukopfgans (German); bernache à tête grise (French); canquen, avutarda de cabeza gris (Spanish).

Subspecies and range. No subspecies recognized. Breeds from southern Magellanes Province of Chile, and southern Argentina (Santa Cruz) southward to Tierra del Fuego and the Falkland Islands. Winters north to Buenos Aires in Argentina but only to Colchagua in Chile. See map 37.

Measurements and weights. Folded wing: males, 355–80 mm; females, 335–40 mm. Culmen: males, 30–33 mm; females, 26–28 mm. Weights: males, 2,267 g; females, ca. 2,200 g. Eggs: av. 70 x 50 mm, pale buff, 89 g.

Identification and field marks. Length 20–22″ (50–55 cm). Plate 25. This rather small sheldgoose is essentially tricolored, in both sexes, with a gray head (whitish eye-ring), a chestnut breast, and white sides and abdomen overlaid with vertical black barring. The rump and tail are black and the under tail coverts pale chestnut, while the mantle is brown. The bill is black, and the legs and feet are two-toned orange and black. The wings are as in the other species, with white secondaries and iridescent green secondary coverts, the other coverts being white. *Females* are smaller and have somewhat barred breasts, and *immature* birds are more extensively brownish and have brown rather than iridescent coverts.

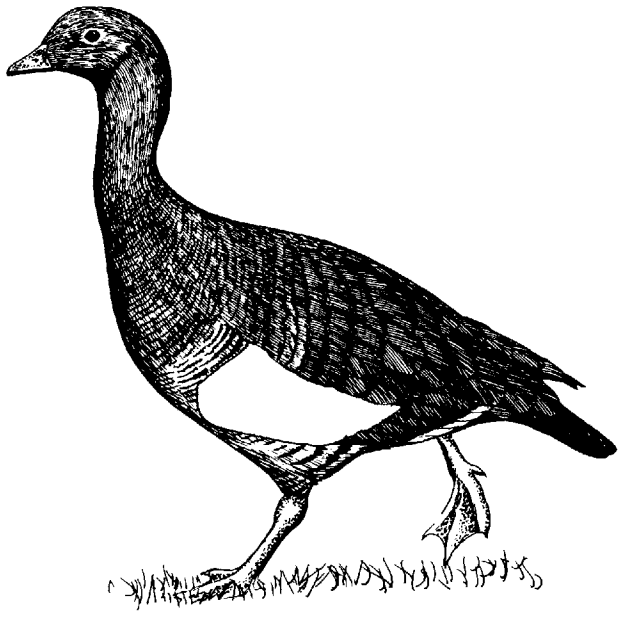
In the field, this species is most likely to be confused with the ruddy-headed sheldgoose, but the grayish head color and pure white abdomen will serve to identify it. The calls of all sheldgeese are similar, consisting of repeated whistling notes in the males and grating calls by the females.

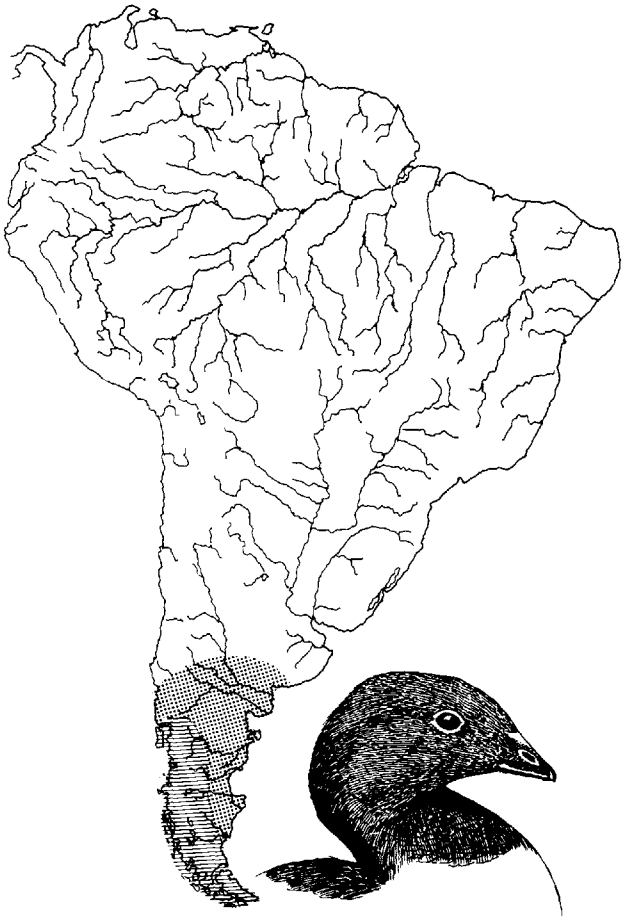
Natural History

Habitat and foods. Although the ashy-headed sheldgoose often associates with the open-country Magellan goose, it is relatively scarce where that species is most common, and is far more prevalent in wooded areas. In mountains it is most closely associated with swampy areas where rushes and associated plants occur amid small clearings in the forest (Johnson, 1965). Unlike the other *Chloephaga* sheldgeese, these birds perch readily in trees and normally nest among them. Since they often feed in company with Magellan geese, they presumably eat much the same grassy foods, but so far no studies have been carried out on this problem.

Social behavior. The relatively few descriptions of this bird in the wild indicate that it is usually to be found in small flocks outside the breeding season. Flock sizes of up to as many as 200 birds have been recorded. In southern Chile it is probably most abundant in the vicinity of Chiloé and the Guaitecas Islands to the south, becoming rare in the open grasslands of northern Tierra del Fuego and the southern part of Magellanes (Johnson, 1965). It presumably breeds at two or three years of age, and in captivity its social behavior shows all of the typical sheldgoose features. Captive birds tend to remain in pairs all year, and often threaten intruders. Females are easily stimulated to incite other birds, and the male's normal response is an intensely performed alternation of extreme body erection and quick bowing movements of the bill nearly to the ground, accompanied by a huffing call (Johnsgard, 1965a). The same display serves as a kind of triumph ceremony following an attack or threat by the male, and no doubt is important in pair bonding. Behavior associated with copulation has not yet been described.

Reproductive biology. Very few nests of this species have been found, and only Johnson's (1965) report provides much information. On the Guaitecas Islands he found several nests during November, usually hidden in long grass and with an overhead half dome of the same material, abundantly lined with down. In the mountains of northern Aysen Province of Chile, he found the birds nesting abundantly in November, in the hollows of burned trunks and branches of large trees. By late November many nests had hatched, and the young were taken to the nearby lakes for rearing. The clutch size is typically 4 to 6 eggs, with a probable average of 5, and the eggs are somewhat darker than those of other *Chloephaga.* The incubation period is 30 days, and only the female is known to incubate. There is no information on the rate of growth of the young under wild conditions. After the fledging of the young and the completion of the postnuptial molt by adults, they begin to move





MAP 37. Breeding or residential (hatched) and wintering (stippling) distributions of the ashy-headed sheldgoose.

north, with the Argentine population arriving in Buenos Aires Province about the middle of March, seldom in flocks of more than 100 birds.

Status. This species is apparently more common in Chile than anywhere else in its range, and it is rare on the Falkland Islands and is also relatively scarce in Tierra del Fuego. It is not in direct conflict with humans over most of this range, but at times does feed on sheep pastures with Magellan geese and thus might be locally persecuted.

Relationships. Several adult plumage similarities between this species and the ruddy-headed sheldgoose support the view that they are very closely related to one another, and the downy young of the two species are also very similar. Likewise, the social display patterns are almost identical.

Suggested readings. Johnson, 1965.

Ruddy-headed Sheldgoose

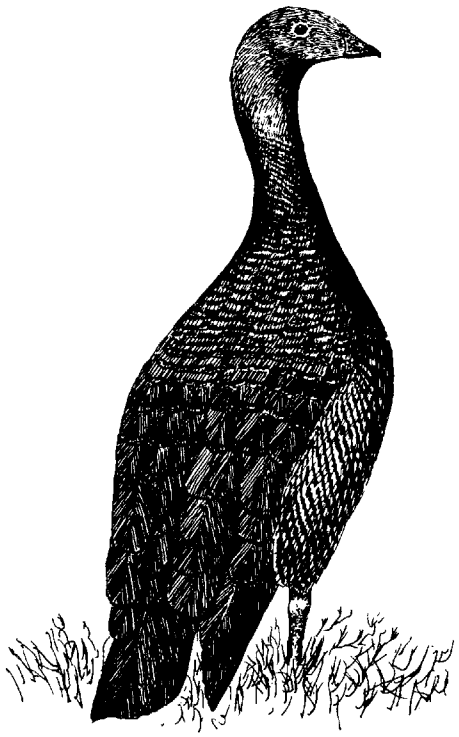
Chloephaga rubidiceps Sclater 1860

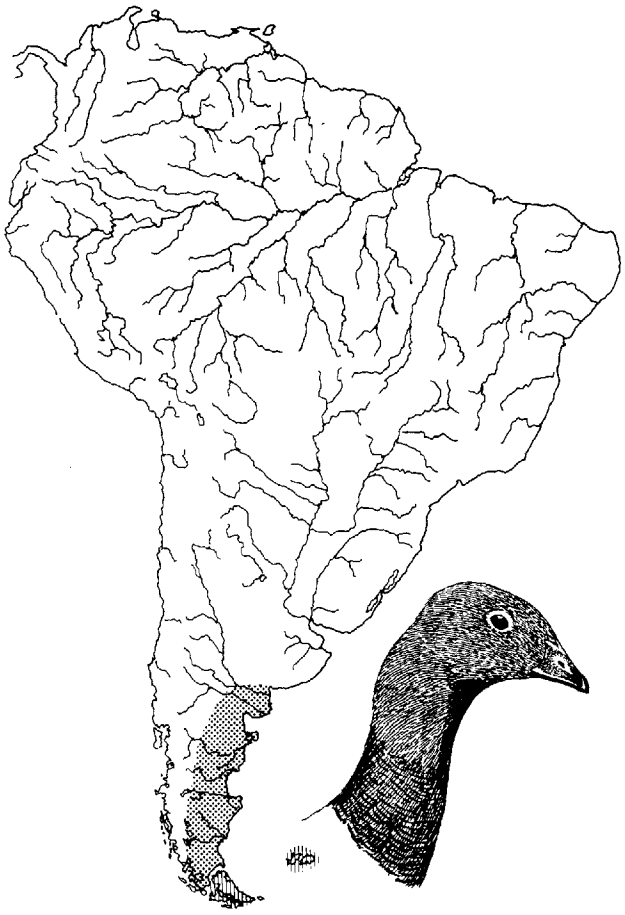
Other vernacular names. None in general English use. Rotkopfgans (German); bernache á tête rousse (French); avutarda cabeza colorada (Spanish).

Subspecies and range. No subspecies recognized. Breeds in southernmost Argentina and Chile from southern Magellanes and Santa Cruz south to Tierra del Fuego, and on the Falkland Islands. Winters north in Argentina to about 37° south latitude. See map 38.

Measurements and weights. Folded wing: males, 330–50 mm; females, 310–20 mm. Culmen: males, 28–30 mm; females, 25–28 mm. Weights: both sexes ca. 2,000 g. Eggs: av. 65 x 48 mm, deep cream, 90 g.

Identification and field marks. Length 18–20" (45–50 cm). This smallest of the sheldgeese has a bright chestnut-colored head and neck, with a white eye-ring, while the breast, abdomen and flanks are all finely barred black over a buff background, becoming chestnut on the under tail coverts. The rump and tail are black and the upper parts pale





MAP 38. Breeding or residential (hatched) and wintering (stippling) distributions of the ruddy-headed sheldgoose.

grayish. The wing coloration is like that of the other sheldgeese, with an iridescent area formed by the greater secondary coverts, while the secondaries and the other coverts are white. The bill is black, and the legs and feet are bright orange, variably spotted with black. *Females* are slightly smaller than males (see folded wing measurement), but otherwise essentially identical. *Juveniles* and subadults through their first year have noniridescent greater secondary coverts.

In the field, this species most closely resembles the female Magellan goose and may be seen with it, but is much smaller and has a conspicuous eye-ring and finer barring on the body. Males utter a repeated whistling note and females a rasping quack.

NATURAL HISTORY

Habitat and foods. The ruddy-headed goose, like the Magellan goose, is characteristic of open plains and meadows, and is appreciably more restricted than the latter to coastal areas having a fine grass cover. The two species often feed together on the Falkland Islands, but the ruddy-headed goose is evidently more of a grubber than primarily a clipping, grazing bird, and thus consumes roots and entire small plants as well as leaves and seed heads (Weller, 1972). The extent to which it thus avoids direct foraging competition with the larger Magellan goose is unknown, but is of some interest.

Social behavior. Up until recent years, this species was one of the most abundant of the sheldgeese in Tierra del Fuego, and often occurred in quite large flocks. There they most often mix with ashy-headed geese, and less often with the much larger Magellan geese. The two smaller species more often are to be found in the vicinity of farms, while the Magellan geese are more generally distributed around the countryside. This population is strongly migratory, and is on the breeding grounds only from April to September, while on the Falkland Islands the birds are resident throughout the year. Scott (1954) believes that probably both ashy-headed and ruddy-headed sheldgeese have a relatively prolonged wing molt that avoids a completely flightless period; this has not been confirmed with wild birds, but my own observations of captive ruddy-headed sheldgeese support this view. The ruddy-headed sheldgoose is extremely pugnacious and aggressive in spite of its small size, often attacking larger birds, and males precede such attacks by repeatedly calling with whistled notes in a highly erect stance, holding the wings slightly away from the flanks and thus exposing the conspicuous white coverts. When displaying before the female in a triumph ceremony, the male rapidly alternates between this erect posture and one in which the bill almost touches the ground in a bowing display (Johnsgard, 1965a). These displays appear to be the basic pair-forming and pair-maintaining activities of the species. Copulatory behavior in this species has never been described, and it would be of interest to learn if it ever occurs on land.

Reproductive biology. The nesting season of this species in the Falkland Islands is from late September to early November; likewise, in Tierra del Fuego it is reported to nest in October and November. In Tierra del Fuego the nests are placed in the same situations as those of the Magellan goose, but can readily be distinguished by the cinnamon-colored down (Johnson, 1965). On the Falklands, the nests are usually well hidden in long grasses or rushes, are placed

under rock outcrops, or may even be situated in old penguin burrows (Woods, 1975). From 5 to 8 eggs are normally laid, and incubation is performed by the female alone, while the male typically waits at the nearest pond, which may be a considerable distance from the nest. After an incubation period of 30 days, the newly hatched young are led to water and thereafter the family leads a semiaquatic life. There is no specific information available on the fledging period or growth rate of the goslings.

Status. This species has greatly decreased in numbers on Tierra del Fuego since the 1950s, and Weller (1975a) suggests that this might be the result of egg-destruction programs aimed primarily at the Magellan sheldgoose or because of the intentional introduction of foxes (*Dusicyon griseus*) into the islands. In any case, the species' present stronghold is the Falkland Islands, where it is numerous only in some areas of West Falkland (Woods, 1975). The continental population may be under 1,000 birds (A. E. Rumboll, unpublished m.s.).

Relationships. As indicated in the account of the ashy-headed goose, there is good evidence that these two species are very closely related to each other. However, the entire genus is one of great morphological and ecological similarities, and deserves a thorough analysis from these standpoints.

Suggested readings. Johnson, 1965; Woods, 1975.

Orinoco Goose

Neochen jubata (Spix) 1824

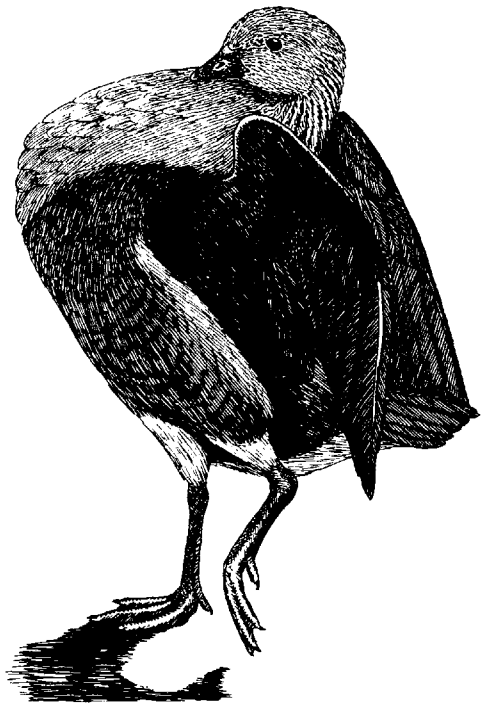
Other vernacular names. None in general English use. Orinokogans (German); oie de l'Orenoque (French); oca del Orinoco (Spanish).

Subspecies and range. No subspecies recognized. Resident in the Orinoco and Amazon basins, south to southern Amazonas, northern Mato Grosso, and São Paulo in Brazil, Paraguay, and Salta in Argentina. See map 39.

Measurements and weights. Folded wing: males, 315–33 mm; females, 300–310 mm. Culmen: males, 38–40 mm; females, 35–37 mm. Weights: females, 1,250 g. Eggs: av. 60 x 44 mm, cream, brownish, or pale greenish, 63 g.

Identification and field marks. Length 24–26" (61–66 cm). The Orinoco goose has a head, neck, and upper breast of pale yellowish brown color, with the neck feathers noticeably elongated and slightly furrowed as in geese. The sides and abdomen are chestnut, paling to buff on the upper flanks, and with white under tail coverts. The tail and back are glossy black, except for chestnut scapulars that are broadly buff-tipped. The upper wing surface is mostly purplish black, except for iridescent green secondaries that have white on the basal portion of their outer vanes. The bill is red and black, and the legs and feet are bright salmon or pink. *Females* resemble males but are slightly smaller, and *juveniles* have washed-out colors and paler legs and feet.

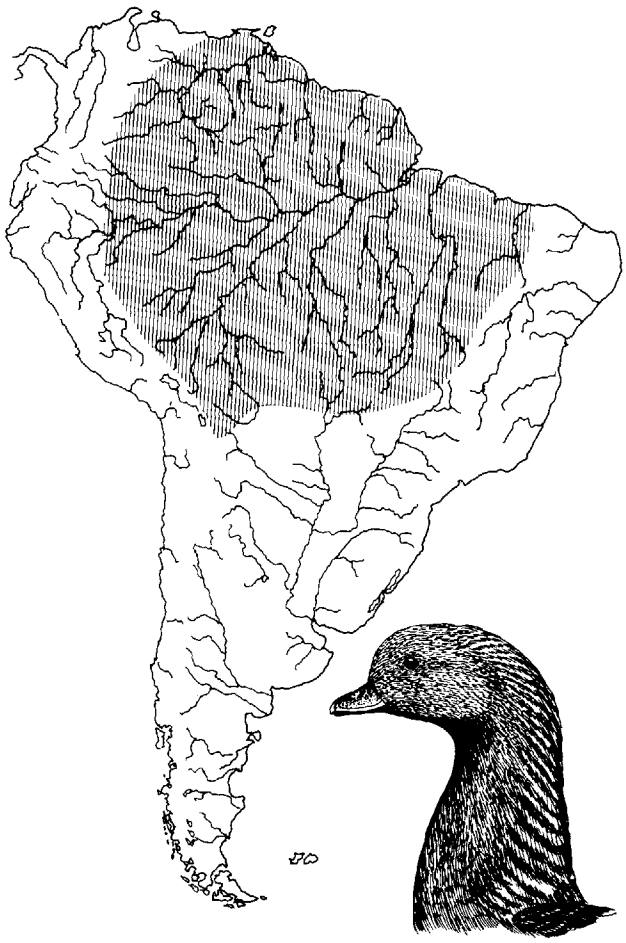
In the field, the tropical forested and savannah habitats of this species separate it from all other sheldgeese, and its long, ruffled neck and chestnut flanks are also distinctive. Males utter a strong



whistling note, and females produce a harsh cackling sound.

Natural History

Habitat and foods. The Orinoco goose is a truly tropical goose, and is most often associated with forest-lined rivers or wet savannah areas. It is reportedly the commonest species of waterfowl on the Orinoco River, but is rarely found on the coast. Very little is known of the birds' foods under natural conditions, but a variety of such animal materials as butterfly larvae, aquatic insects, small mollusks and worms have been reported in addition to the plant materials that are presumably the species' primary dietary component. In captivity the birds graze on greenery to much the same degree as the more typical sheldgeese.



Map 39. Residential or breeding distribution of the Orinoco goose.

Social behavior. Orinoco geese apparently rarely occur in large flocks; postbreeding groups of from 5 to 20 individuals appear to be the largest aggregations that are normally encountered. No obvious migratory movements are undertaken. Rather, the birds are usually in pairs or family groups throughout the year. Delacour (1954–64) reports having seen, in December, paired birds spaced at distances of about a mile apart along Venezuelan rivers, where breeding is said to occur during the winter months. In Bolivia, families with well-grown young have been observed in September, supporting the idea that breeding occurs during the dry season (Kolbe, 1972). Pair-forming behavior and territorial display are similar to that of the other sheldgeese, but one unusual feature is the high degree of social preening that occurs between birds, presumably normally between pair members. Male aggressive displays consist of a repeated whistling note uttered with the neck held diagonally outward and the feathers somewhat ruffled; as the male turns toward his inciting mate, he assumes a strongly erect position with head held far back and with one or both of his wings strongly lifted, and he utters a wheezy *wi-chuff* note (Johnsgard, 1965a). No observations on copulatory behavior are yet available.

Reproductive biology. Few nests of this species have been found in the wild, but they are evidently normally situated in hollow trees. The range of eggs in the clutch is from 6 to 10, probably averaging 8, and the nest is well lined with white down. Incubation requires about 30 days, and is performed by the female. Males rejoin the family when the goslings hatch, and closely guard them. No specific information on growth rates or fledging time is yet available.

Status. This species is apparently still fairly common over its relatively broad range, and its habitats are unlikely to be extensively modified in the near future.

Relationships. This species is unique among the sheldgeese in having black upper and under wing coverts, and in having a bicolor wing speculum composed of the secondary feathers. In a few respects, as in female inciting behavior, *Neochen* seems to bridge the evolutionary gap between the typical sheldgeese and the shelducks (Johnsgard, 1965a).

Suggested readings. Delacour, 1954–64; Phillips, 1923–26.

Egyptian Goose

Alopochen aegyptiacus (Linnaeus) 1766

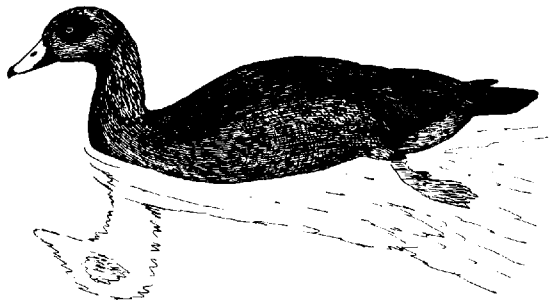
Other vernacular names. Nile goose; Nilgans (German); oie d'Egypte (French); ganso de Egipto, oca del Nilo (Spanish).

Subspecies and range. No subspecies recognized. Resident in Africa south of the Sahara; also occurs throughout the entire Nile Valley. Occurs casually in southern Europe and northernmost Africa. Feral in parts of southeastern England. See map 40.

Measurements and weights. Folded wing: males, 400–430 mm; females, 350–85 mm. Culmen: males, 52–56 mm; females, 49–53 mm. Weights: males, 1,900–2,250 g; females, 1,500–1,800 g. Eggs: av. 68 x 50 mm, creamy white, 97 g.

Identification and field marks. Length 28–29″ (71–73 cm). Plate 26. The *adult* plumage is predominantly grayish on the head, neck, breast, underparts, flanks, and back, with darker chocolate brown tones around the eyes, the nape, on the upper wing coverts, and as an irregular blotch on the lower breast. The primaries and tail feathers are black, as is the rump, while the secondaries are iridescent green and the upper coverts white except for a narrow black bar extending across the front of the greater secondary coverts. The bill, legs, and feet are pink. *Females* are virtually identical to males, but smaller. In *immatures* the white upper wing surface is tinged with sooty coloration, and the brown marks around the eyes and on the breast are lacking.

In the field, the species resembles a large shelduck rather than a goose, and might be confused with the ruddy shelduck, which is smaller and more uniformly buffy brown. Males have a loud, gusty breathing note, and females a loud cackling call. In flight, the white upper and under wing coverts are very conspicuous.



Natural History

Habitat and foods. Nonforested environments of wide diversity, including fairly arid open plains, are this species' preferred habitats. However, the birds do perch at night in trees, and usually return to the same location each night. Clancey (1967) describes the habitats as including shores or flats bordering lakes, marches, vleis, dams, reservoirs, rivers, and other bodies of water. The diet of the adult is exclusively vegetable materials, particularly the shoots and seed heads of grasses and the shoots and flowers of herbs, as well as the corms of cyperus (*Cyperus*). The species often feeds in fields of sprouting grain crops, and sometimes does considerable damage there. Most foraging is done in early morning and again at dusk, but the birds also forage at night and rest during the hottest part of the day (Clancey, 1967).

Social behavior. This species is believed to form strong and potentially permanent pair bonds, and thus the basic social unit is the pair or family. In the wild, it may be seen in pairs, small parties, or flocks of 100 or more birds. Egyptian geese often associate with other large species of waterfowl, and sometimes are also seen with herons or storks. The birds fly well, and outside the breeding season vagrants may occur almost anywhere in northern Africa or southern Europe. However, they are not regularly migratory. The breeding season is very prolonged and irregular, and thus the period of pair formation is probably also quite prolonged. In captivity Egyptian geese do not breed before their second year, and presumably the same applies in the wild. During pair formation a great deal of inciting behavior is performed by the females, and intensive threatening or fighting behavior among males is typical. However, display may even occur in the absence of other males. The male response to female inciting is to stand extremely erect, utter a repeated breathing note, and suddenly flash open his wings, exposing white coverts. Copulation apparently occurs in shallow water, and probably is preceded by head-dipping movements by one or both birds. After treading, the male lifts his wing on the side opposite the female to a nearly vertical angle (Johnsgard, 1965a).

Reproductive biology. Nesting is extremely prolonged in some areas; in Zambia records extend

MAP 40. Residential or breeding distribution of the Egyptian goose.

from January to November, but the largest number of records is from June through September. In South Africa the peak nesting activity occurs from July to October. In tropical Africa breeding occurs most of the year, while in the northern parts of the species' range it breeds from July to October (Senegal), July to September (Sudan), and July and August (Ethiopia). The nest site is extremely variable, ranging from burrows or holes in the ground to nests in trees or on cliffs, amid herbaceous ground cover, or on top of an old or incomplete nest of some other bird, particularly the hammerhead (*Scopus umbretta*). There are even records of the birds' nesting among colonies of cliff-nesting vultures. The nest is usually well constructed of available materials and lined with smoke-gray down by the female. Clutch sizes are quite variable, ranging from 6 to 12 eggs and averaging about 7. Incubation requires 30 days, and according to Clancey (1967) it is shared by both sexes, but this requires confirmation, as it is certainly not typical of captive birds. The fledging period of the young has been reported at 14 weeks, which seems incredibly long for a bird of this size, and from about 4 to 7 weeks longer than has been established for various species of *Tadorna* (Lack, 1968). The adults undergo their wing molt between May and July in South Africa, and are flightless for about 30 days (Clancey, 1967) or 40 days (D. Skead, pers. comm.).

Status. This species is relatively abundant over most of its range, and in some areas is considered an agricultural pest. It is considered by sportsmen to be a good gamebird, but has coarse flesh and at times is unpalatable. There should be no concern for its population status at present.

Relationships. In many respects the Egyptian goose might be regarded as a large shelduck, even though it is primarily a grazing bird. There can be little doubt that *Tadorna* represents the nearest living relative of *Alopochen*, and it is somewhat more distantly related to the other genera of sheldgeese.

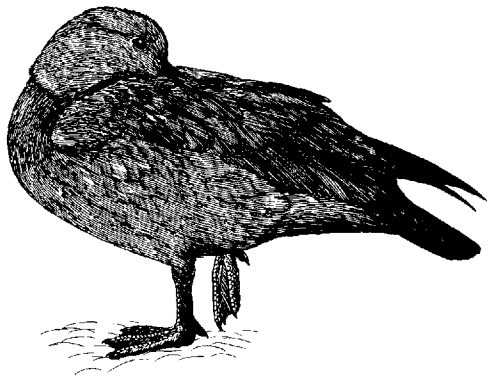
Suggested readings. Clancey, 1967; Cramp & Simmons, 1977.

Ruddy Shelduck

Tadorna ferruginea (Pallas) 1764

Other vernacular names. Brahminy duck; Rostgans (German); casarca roux (French); oca colorada (Spanish).

Subspecies and range. No subspecies recognized. Breeds chiefly from southeastern Europe and the western Mediterranean lands north and east across Asia to Transbaikalia and the upper Amur, south to Iran, the Himalayas, and southeastern China.



Winters in the southern part of its breeding range and south to the Nile Valley, India, Burma, Thailand, and southern China. See map 41.

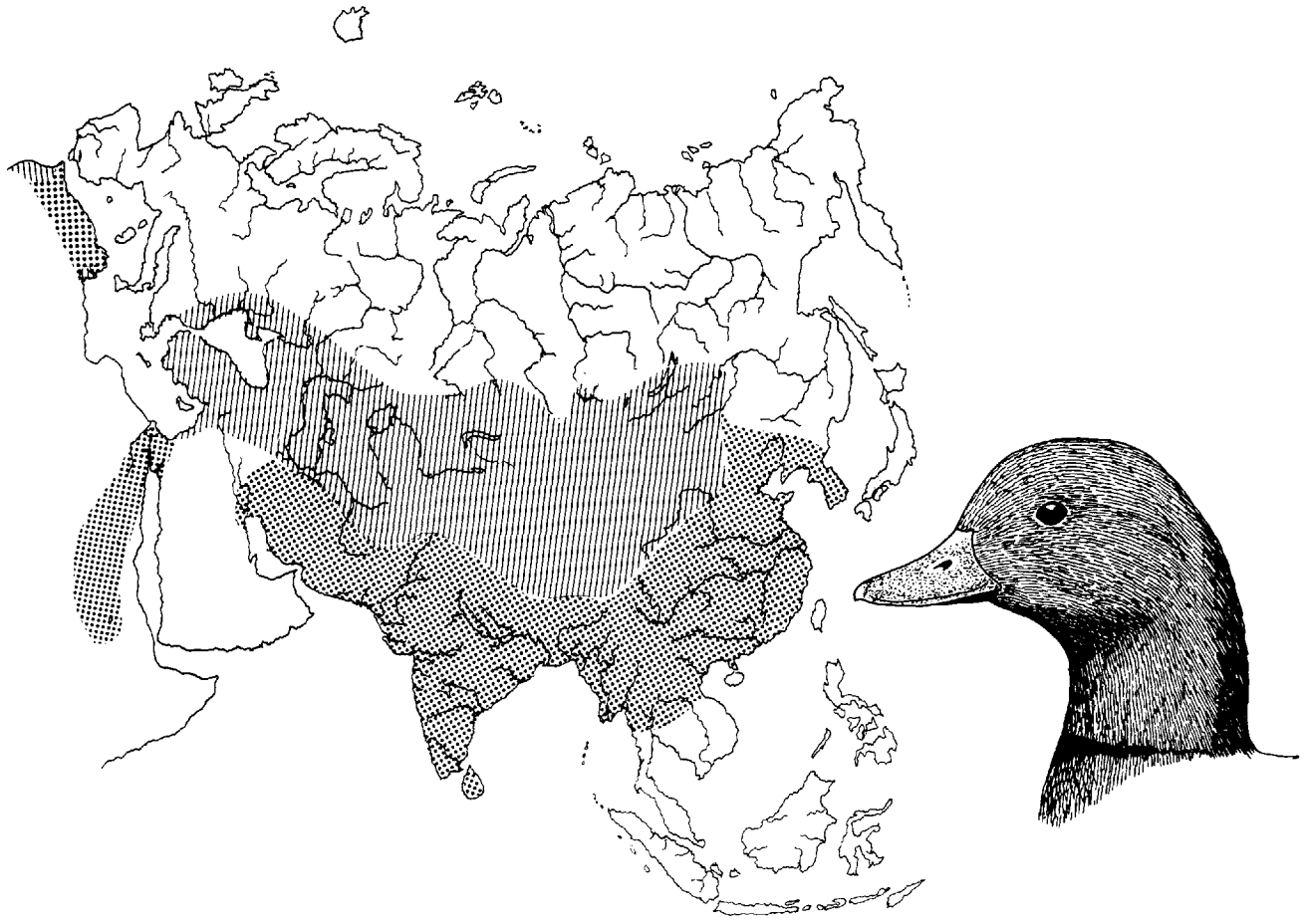
Measurements and weights. Folded wing: males, 365–87 mm; females, 340–55 mm. Culmen: males, 43–48 mm; females, 38–42 mm. Weights: males, 1,200–1,640 g; females, 925–1,500 g. Eggs: av. 68 x 46 mm, creamish color, 83 g.

Identification and field marks. Length 25–26″ (63–66 cm). *Adults* of both sexes are almost entirely buffy brown to rust colored, with pale buff but not white faces, blackish primaries and tail, and white upper wing coverts and an iridescent green speculum on the secondaries. The bill, legs, and feet are blackish. *Females* lack the narrow black neck-ring of males and have a paler face. In *immatures* the plumage is paler, the white upper wing coverts are tinged with sooty coloration, and the head is white.

In the field, this species' strongly golden to rusty brown body coloration separates it from all other dabbling ducks in its range. It is relatively terrestrial and often found away from water. In flight, the white upper and under wings coverts contrast strongly with the other, darker tones of the wing and body. The female has a loud, nattering call, and that of the male is a loud *choor* or *cho-hoo'* note.

Natural History

Habitat and foods. Habitats used in the U.S.S.R. are quite varied, but include steppe lakes and rivers in hilly regions, especially where waters are salty or brackish. Although open country seems to be the preferred habitat, the birds also nest around alpine lakes and in the timberline belt of birches, but avoids tiaga forest. In some areas they reach elevations of



Map 41. Residential or breeding (hatched) and wintering (stippling) distributions of the ruddy shelduck.

4,000 to 4,500 meters, but generally spend the fall and winter months in lowlands, where they concentrate on broad rivers, salty lakes, and lacustrine floodwaters. Spring and summer foods are mostly of vegetable matter, especially green plant shoots, while fall flocks may concentrate on millet, wheat, or other cereal grains. In the winter, sprouting greens are taken when available, but the birds also feed on garbage and sometimes even carrion (Dementiev & Gladkov, 1967). Much of the daytime hours are spent in resting, while feeding often occurs at night or during twilight hours.

Social behavior. Ruddy shelducks are usually found in pairs or family groups, and large flocks are probably limited to molting assemblages on certain U.S.S.R. lakes. Flocks of moderate to large size have also at times been seen on the wintering grounds in India, but the basic aggressiveness of this species probably tends to keep flock sizes small. Pair bonds are fairly strong and tend to be permanently held; two years are required to attain sexual maturity in this species. Pair formation consists of female inciting and male threat or attack behavior toward other individuals, in the usual manner of shelducks. Copulation probably normally occurs in water of swimming depth (but has also been reported on land) and is preceded by mutual head-dipping movements. After treading, both sexes call and the male slightly raises his folded wing on the side opposite the female (Johnsgard, 1965a). Migratory movements are well developed in this species, and generally involve southward flights of varying distances. However, at least until recently there was a regular flight of birds from Morocco northward to the coast of Spain for the winter season, the only known case of an African bird species wintering in Europe. Probably the major wintering grounds are in Persian Azerbaijan, where about 40,000 birds winter around Lake Rezaiyeh, and the primary breeding area is from the Caspian Sea eastward (Hudson, 1975).

Reproductive biology. In the U.S.S.R., breeding birds arrive already in pairs, and they often appear in the breeding areas before the lakes are ice-free. Egg dates in U.S.S.R. range from the last half of April through June, with a few records of newly hatched young in July. Nests are placed in hollow cavities, including the hollows of larches, at heights of up to ten meters, in ground burrows, in rocky cliff crevices, or even in ruined buildings. Like many other hole-nesting birds, females of this species may make a snakelike hissing sound when disturbed on the nest. The clutch averages from 8 to 12 eggs, which are deposited daily, and incubation begins with the last egg. It requires from 27 to 29 days, and is carried out entirely by the female. However, the male warns of danger, and may make threatening flights toward intruders. Both adults closely tend the brood, which feeds in the shallows on aquatic insects, brine shrimps, or even locusts. Fledging has been reported to require 8.5 weeks in this species; in the U.S.S.R. recently fledged young have been seen from mid-July to late August. Postnuptial molts in adults begin about the time that the young become independent, or in August and September. The juvenile birds molt again in the winter, with the young males attaining their black neck-rings in February (Dementiev & Gladkov, 1967).

Status. In Europe this species is considered endangered, with both the population and the breeding range contracting. It is probable that fewer than 50 pairs breed outside of Russia in Europe; these may occur in Greece, Bulgaria, and Romania. In the northern part of Africa the birds breed primarily in Morocco, in the Atlas Mountains, and on the coastal desert south to Cape Juby. The causes of the European decline are still uncertain, but loss of habitat, shooting, and egg collecting may all be involved (Hudson, 1975).

Relationships. This species is obviously a close relative of the Cape shelduck, and the two may be regarded as constituting a superspecies (Johnsgard, 1965a).

Suggested readings. Dementiev & Gladkov, 1967; Cramp & Simmons, 1977.

Cape Shelduck

Tadorna cana (Gmelin) 1780

Other vernacular names. South African shelduck, gray-headed shelduck; Graukopfkasarka (German); casarca du Cap (French); oca Sud Africana (Spanish).

Subspecies and range. No subspecies recognized. Resident in Cape Province, Orange Free State, Transvaal, southeastern Botswana, and South-West Africa north to the highlands of Damaraland. See map 42.

Measurements and weights. Folded wing: males, 365–80 mm; females, 330–40 mm. Culmen: males, 46–51 mm; females, 43–45 mm. Weights: males average 1,758 g; females average 1,417 g. Eggs: av. ca. 70 x 50 mm, creamish, 83 g.

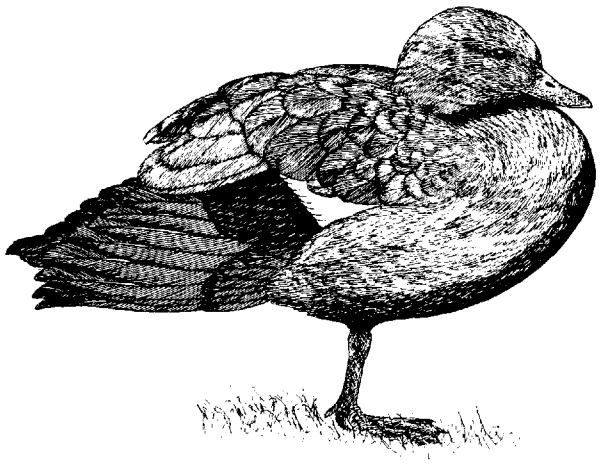
Identification and field marks. Length 24–26″ (61–66 cm). Plate 27. *Adults* of this species have a clear golden brown to rust breast color, which becomes darker hazel and vermiculated with blackish lines on the flanks and anterior back. The longer scapulars, lower back, and upper tail coverts and tail are blackish and the under tail coverts are cinnamon. The head is uniform gray in males, but is extensively white around the eyes in females, and the upper and lower wing surfaces are patterned exactly as in the ruddy shelduck. *Females* exhibit the white face markings only when adults; *immature* birds of both sexes resemble males but are paler and duller throughout, with brownish edging on the upper wing coverts and with a relatively dull speculum.

In the field, Cape shelducks do not resemble any of the other ducks of southernmost Africa, and are the only ones with white upper and lower wing coverts except for the Egyptian goose, which is appreciably larger and more grayish overall. The call of the female is a loud and repeated nattering, while the male has low-pitched *korrr* and *ka-thoo'* notes.

Natural History

Habitat and foods. This species' preferred habitats consist of shallow fresh-water lakes, pan, dams, reservoirs, and pools in river courses, especially where exposed mud flats can be found. Feeding is done mostly while standing or swimming in shallow water, and the birds frequently consume such algae as *Zostera* and *Spirogyra,* as well as herbaceous greens and the heads of flowers. Some animal materials such as phyllopods (*Brachiopoda*) have also been reported as foods, and the birds have been known to enter food crops and do damage to them (Clancey, 1967).

Social behavior. Although essentially sedentary, these birds do at times, during the period October through February, gather in flocks of as many as 400 individuals on various water areas suitable for undergoing the flightless period during molting. At this time the birds spend their days on deep water, moving at night to shallow areas and banks for feeding.



In adult flocks the sex ratio is often strongly unbalanced in favor of females, which leads to a competition among females for mates. Nevertheless, it is believed that the species is basically monogamous, and that once pair bonds are formed they are relatively permanent. Displays consist of the usual combination of female inciting and male aggressive responses to intruding birds, especially other males. The male's two-noted call is, like that of related species, the one typically directed toward females, while the single-noted call is more directly a threat. As in the other shelducks, the conspicuous white wing coverts also make an effective threat display. The timing of pair formation is not clear, but it is certain that two years are required for the attainment of sexual maturity in shelducks. Copulatory behavior occurs in water of swimming depth, and is typically begun by head-dipping movements on the part of the male, which may be also performed by the female. Treading is followed by a strong wing-raising display by the male as he treads water in a high and erect posture. Both birds then begin bathing (Johnsgard, 1965a).

Reproductive biology. The breeding season of this species extends from the latter part of July until October or November. Nest sites are often at considerable distances from water, and may be in surprisingly arid and open country. The nest is often on the slope of a ridge or hill, at the end of a burrow. Frequently the burrow of an antbear, porcupine, or other mammal is used, and some nests have been located as far as 27 feet from the entrance of the hole, although a few have also been found among rocks. The nest is constructed primarily of the female's down and

MAP 42. Breeding or residential distribution of the Cape shelduck.

feathers, but occasionally a small amount of vegetable material is also incorporated. While the clutch size in the wild usually ranges from 6 to 13 eggs, up to 15 have been reported. Only the female is known to incubate, but the male always remains fairly close to the nest site. Incubation requires 30 days, and shortly after hatching, the young emerge to be led to water by both parents. They are raised mainly in areas of shallow water and mud, retreating to deeper water only when danger requires. A surprisingly long 10-week fledging period has been reported. Further, there is a substantial molt migration to permanent water areas, where the 40-day flightless period is passed.

Status. Although this species has a relatively restricted range, it is fairly common in some areas, particularly in the Karroo regions of the Cape. It is also more common in South-West Africa than previously believed, and this apparent change in status may be the result of dam and reservoir construction (Clancey, 1967).

Relationships. As noted in the last account, the ruddy shelduck and Cape shelduck are extremely closely related, and constitute a superspecies. The Cape shelduck is only slightly less closely related to the Australian and New Zealand species of shelducks.

Suggested readings. Clancey, 1967.

Australian Shelduck

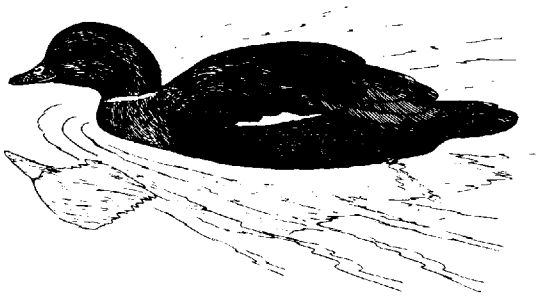
Tadorna tadornoides (Jardine and Selby) 1828

Other vernacular names. Mountain duck, chestnut-breasted shelduck; Australische Kasarka (German); casarca d'Australie (French); oca Australiana (Spanish).

Subspecies and range. No subspecies recognized. Resident of southern Australia, including Tasmania, from the Southern Tablelands of New South Wales across Victoria and South Australia to Western Australia and north to Cape Leveque, with uncertain occurrence in the Australian Bight. See map 43.

Measurements and weights. Folded wing: males, 318–92 mm; females, 304–55 mm. Culmen: males, 44–49 mm; females, 38–45 mm. Weights: males, 990–1,980 g (av. 1,559 g); females, 878–1,850 (av. 1,291 g). Eggs: av. 68 x 49 mm, creamy white, 93 g.

Identification and field marks. Length 25–28″ (63–71 cm). In *adults,* the head is largely or entirely black, the breast is cinnamon-colored, and the underparts, flanks, and mantle are a vermiculated brown and black. The tail, tail coverts, and primaries are black; the secondaries are iridescent green for most of their length, and the upper and under wing coverts are white. *Females* exhibit small white patches behind the bill and around the eyes (these may be continuous in some birds), and the breast is a brighter chestnut color. In *immatures* the upper wing coverts are flecked or margined with gray, and some white edging is present at the tips of the secondaries.



In the field, these birds are likely to be confused only with radjah shelducks or magpie geese; no other Australian waterfowl have white wing coverts. The chestnut or cinnamon breast color, as well as the major differences in body size, should serve to identify this species. Females have a loud and raucous call, often repeated, while the usual call of the male is a loud honk. His threat call is a strong *ho,* and the sexual display call sounds like *ho-poo.* In flight, a harsh *chank chank* call is frequent.

Natural History

Habitat and foods. The preferred habitat of this species consists of muddy shorelines of large brackish lakes or estuaries, but the birds also occupy fresh-water lakes, lagoons, and billabongs. In spite of their name "mountain duck," they do not prefer such habitats. On open plains, they show a preference for lightly timbered areas, but occasionally may be seen on small claypans and ground tanks. Although often found on salt water, the species apparently must drink fresh water, and often flies to fresh-water soaks for this purpose. Relatively few studies of food habits have been undertaken, but in a sample of 30, all but 3 contained both animal and vegetable materials. The plants most frequently found were clover (*Trifolium*) leaves and seeds, green algae (*Chlorophyceae*), couch grass (*Cynodon*), muskgrass, and azolla (*Azolla*). The commonest animal foods were insects, especially midges (*Chironomidae*) and water boatmen (*Corixa*), as well as cladocerans and other aquatic invertebrates (Frith, 1967).

Social behavior. Since these shelducks are found in pairs and family groups throughout the year, it is believed that pair bonds are potentially permanent. Some banding studies have supported this view, since pairs have been found together in the wild for several years, and at times have used the same tree hole for breeding in several successive years. Sexual maturity is attained when the birds are nearly two years old, although temporary pair bonds may be formed by younger birds. Further, birds that fail to breed successfully often dissolve their pair bonds (Riggert, 1977). The only time that substantial flocking occurs is during the molting period, when flocks concentrate on lakes and estuaries. On Lake George, near Canberra, up to 2,000 birds gather between November and January, and similar concentrations have been seen in Tasmania, South Australia, and Western Australia. As winter approaches, these groups disperse to breeding grounds, over distances as great as 400 miles (Frith, 1967). Pair-forming and pair-maintaining displays in this species are essentially identical to those of the other shelducks already discussed, with the major differences being apparent in male vocalizations. Copulation occurs in water of swimming depth, and is preceded by alternated head dipping and calling in an erect posture by the male. After treading, both birds typically rise in the water, at least the female calling, while each vertically raises its wing on the side opposite its partner (Johnsgard, 1965a).

Reproductive biology. The relatively few available breeding records indicate that in Western Australia and perhaps South Australia eggs are laid between the middle of June and the end of September. In New South Wales breeding begins in July and may persist until November, while in Tasmania eggs are found in August and September. The favored nest site is a tree hole, often situated as high as 60 or 70 feet above the ground. In treeless areas the birds may nest in rabbit holes, or even on the ground surface, amid thick grass or other concealing vegetation. Riggert (1977) reports that on Rottnest Island, Western Australia, the birds nest in limestone crevices or burrows and the female may spend days seeking out a suitable site while her mate stands guard nearby. Breeding density is determined by the availability of areas suitable for brood territories, which require sources of fresh water, since newly hatched ducklings are unable to utilize salt water. The nests may be as far as a kilometer from the ocean or up to 9.5 kilometers from a salt lake, and the eggs are laid at approximately daily intervals. Various studies indicate that the clutch size is typically from 10 to 14 eggs. Incubation is performed entirely by the female, and requires from 30 to 32 days. During this time the male defends the brood territory and the pair have very little contact with each other. However, when the ducklings are two

days old, they are led from the nest by both adults and taken to the brood territory. The fledging period varies from about 50 to 70 days, when the family groups break up. At about the time of fledging, or slightly before, the adults begin their molt, which includes a flightless period of 26 days. At that time the juveniles begin to flock, reaching their greatest concentrations in November. By December the young have dispersed from Rottnest Island.

Status. Frith (1967) reports that these birds are still numerous and are not extensively hunted over their entire range, partly because of their very poor table quality. In some salt-water areas, however, these birds are regularly hunted. Further, the species may do local damage to crops, especially sprouting pastures and fields of wheat and peas. At present, its conservation is not a serious problem.

Relationships. Probably the New Zealand shelduck is the species' closest living relative, as mentioned in the account of that bird.

Suggested readings. Frith, 1967; Riggert, 1977.

New Zealand Shelduck

Tadorna variegata (Gmelin) 1789

Other vernacular names. Paradise shelduck; Neuseeländische Kasarka (German); casarca de paradis (French); oca del paraíso (Spanish).

Subspecies and range. No subspecies recognized. Resident on New Zealand, occurring on both islands, but more common on South Island and absent from the northern parts of North Island. See map 43.

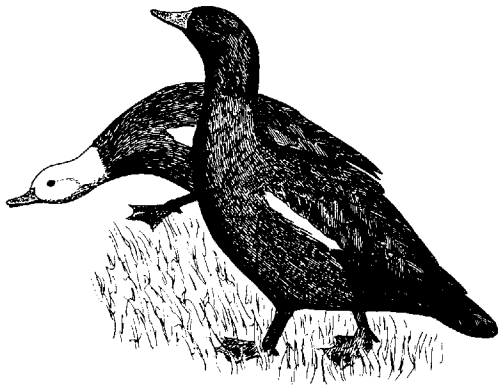
Measurements and weights. Folded wing: males, 365–80 mm; females, 325–55 mm. Culmen: males, 42–45 mm; females, 37–40 mm. Weights: females, 1,260–1,340 g. Eggs: av. 65 x 47 mm, creamish, 91 g.

Identification and field marks. Length 25–28" (63–71 cm). The sexes are quite dimorphic in adults. *Males* have greenish black heads; blackish breasts; gray to brownish vermiculated underparts, flanks, and mantle; and black rump and tail. The under tail coverts are bright chestnut; the upper and under wing coverts are white, while the secondaries are iridescent green and the primaries blackish. *Females* have entirely white heads as adults, while their body color changes seasonally from dark reddish chestnut (breeding) to grayish brown (nonbreeding) in general tone. Vermiculations are also present on the female, especially on the mantle. *Immatures* of both sexes resemble males, but young females show irregular white feathering on the head, which gradually increases in amount, and young males are tinged with brown on the head. In both, the margins of the upper wings coverts may be narrowly edged with dull fulvous brown.

In the field, this species is unlikely to be mistaken for any other New Zealand species of waterfowl; the female's white head and the conspicuous white wing coverts of both sexes make for easy identification. The female has a shrill, nattering call, while the male utters gutteral *horr* and *ha-hoo'* notes as threat and sexual display calls, respectively. (The Maori name "Putangi," or "wail of death," refers to the call of this species.)

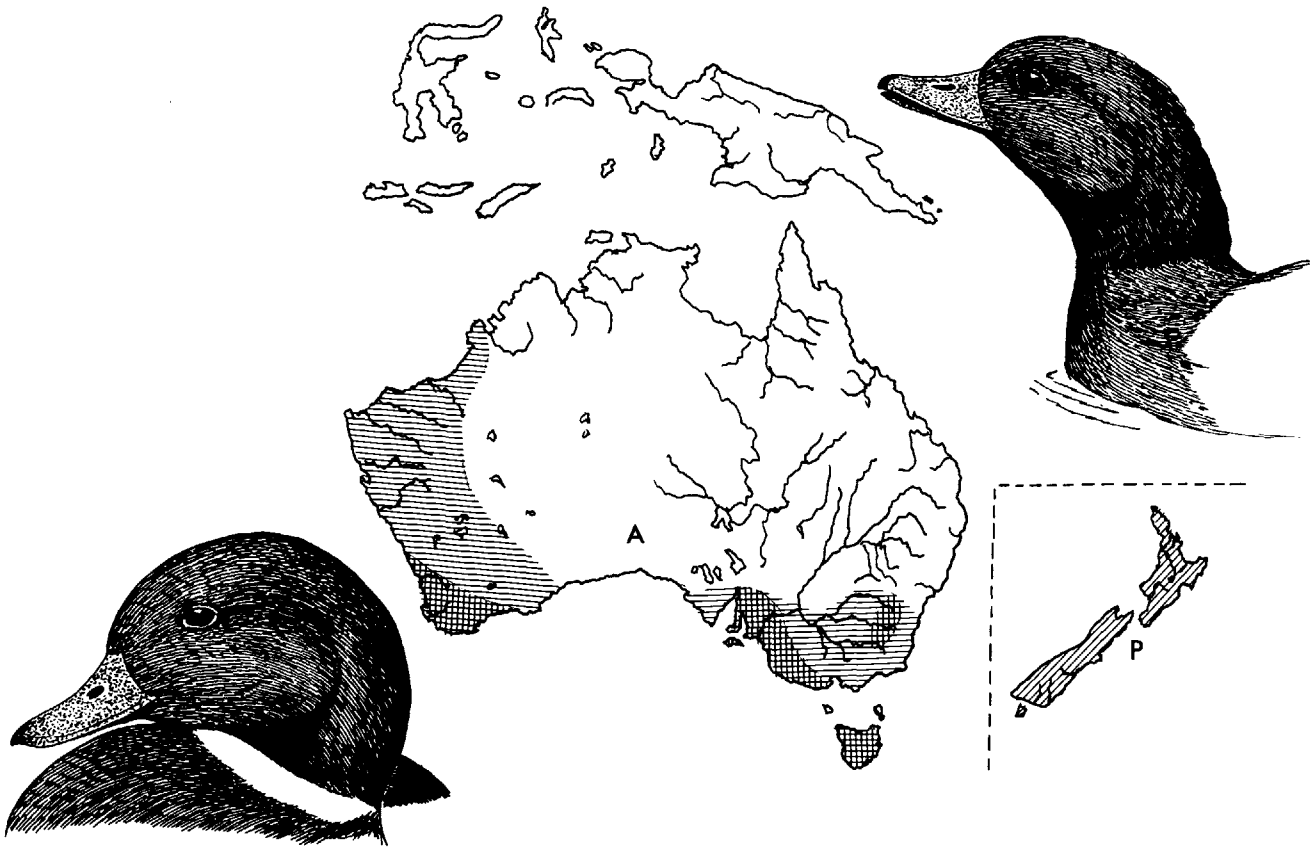
Natural History

Habitat and foods. These shelducks are widespread in New Zealand, occupying both fresh-water and coastal areas. They are found along mountain streams, river beds, open grassy plains, and lowland downs, and around lakes and coastal waters.



Favored breeding habitats are the tussock flats in South Island's mountain areas. The bird is obviously highly adaptable and in these varied habitats no doubt consumes a wide variety of foods. Among those that have been reported are soft grasses and herbs, insects, and crustaceans (Oliver, 1955).

Social behavior. Like the other shelducks, this species is most often encountered in pairs, and perhaps more than the others is likely to be in such groups rather than in flocks, as the birds are highly aggressive at most times of the year. The only time that flocking on a large scale occurs is during the postbreeding molt, when fairly large flocks develop on various lakes and estuaries, such as those in south Westland. Other than local movements to molting and breeding areas, no major migratory patterns are evident in this species. Wintering birds occur on the Bay of Plenty, the Firth of Thames, and sometimes Manukau. The social pair-forming behavior of the New Zealand shelduck has the same general pattern as that in the other species, but it represents an extreme in the trends that are apparent in the group. The sexes differ more in overall size and in plumage dimorphism than any of the other shelducks, and this species is the only one to exhibit definite breeding and nonbreeding, or eclipse, plumages. Further, unlike those of other waterfowl, the females exhibit these seasonal changes more than the male, a point related to the fact that it is the female among shelducks that takes the initiative in forming pair bonds. This is done through intensive inciting behavior toward males, which stimulates both aggressive and sexual responses in the males. The white head of the female is especially conspicuous during inciting, as it is lowered and moved from side to side rapidly. Copulatory behavior in this species apparently has not yet been adequately described (Johnsgard, 1965a).



MAP 43. Breeding or residential distributions of the Australian ("A") and New Zealand or paradise ("P") shelducks. The primary range of the Australian shelduck is indicated by cross-hatching, and the peripheral range by horizontal hatching.

Reproductive biology. The normal breeding period for this species in New Zealand is from August to January; reportedly two broods are often reared during this prolonged period. Females seek out nest sites that may be a ground location well hidden by tussock grasses, in a rock crevice, on a cliff face far away from water, or in a tree cavity that may be 15 to 20 feet above the ground. The nest is typically well lined with down, and only the female incubates. The normal range in the clutch is from 5 to 11 eggs; 8 is the typical number. As in the other shelducks, the normal incubation period is 30 days, with the male remaining close to the nest to help protect it and the female from danger. After hatching, the young are immediately led to water and initially feed on insects and crustaceans (Oliver, 1955). The fledging period has not yet been established, but, judging from the other shelducks, is likely to require from about 7 to 10 weeks.

Status. This species is now absent from a few areas in which it once occurred before intensive settlement, but nonetheless it is still widespread and is even extending its range northward, largely as a result of liberations on the North Island. Although a game species, it is protected in some districts, and the short open season on it does not seem to be significant. It is probable that this species has been less seriously affected by man's activities than any other New Zealand waterfowl except the shoveler and gray teal (Williams, 1964).

Relationships. This species is obviously a very close relative of the Australian shelduck and the two perhaps should be regarded as a superspecies.

Suggested readings. Oliver, 1955.

Crested Shelduck

Tadorna cristata (Kuroda) 1917

Other vernacular names. Korean shelduck; Schopfkasarka (German); tadorna huppé (French); oca de Corea (Spanish).

Subspecies and range. No subspecies recognized. Presumably extinct; the species is known only from three extant specimens, of which two are from Korea and one from near Vladivostok.

Measurements. Folded wing: male, 320 mm; female, 310 mm. Culmen: male, 45 mm; female, 41.5 mm. Weights: unknown. Eggs: unknown.

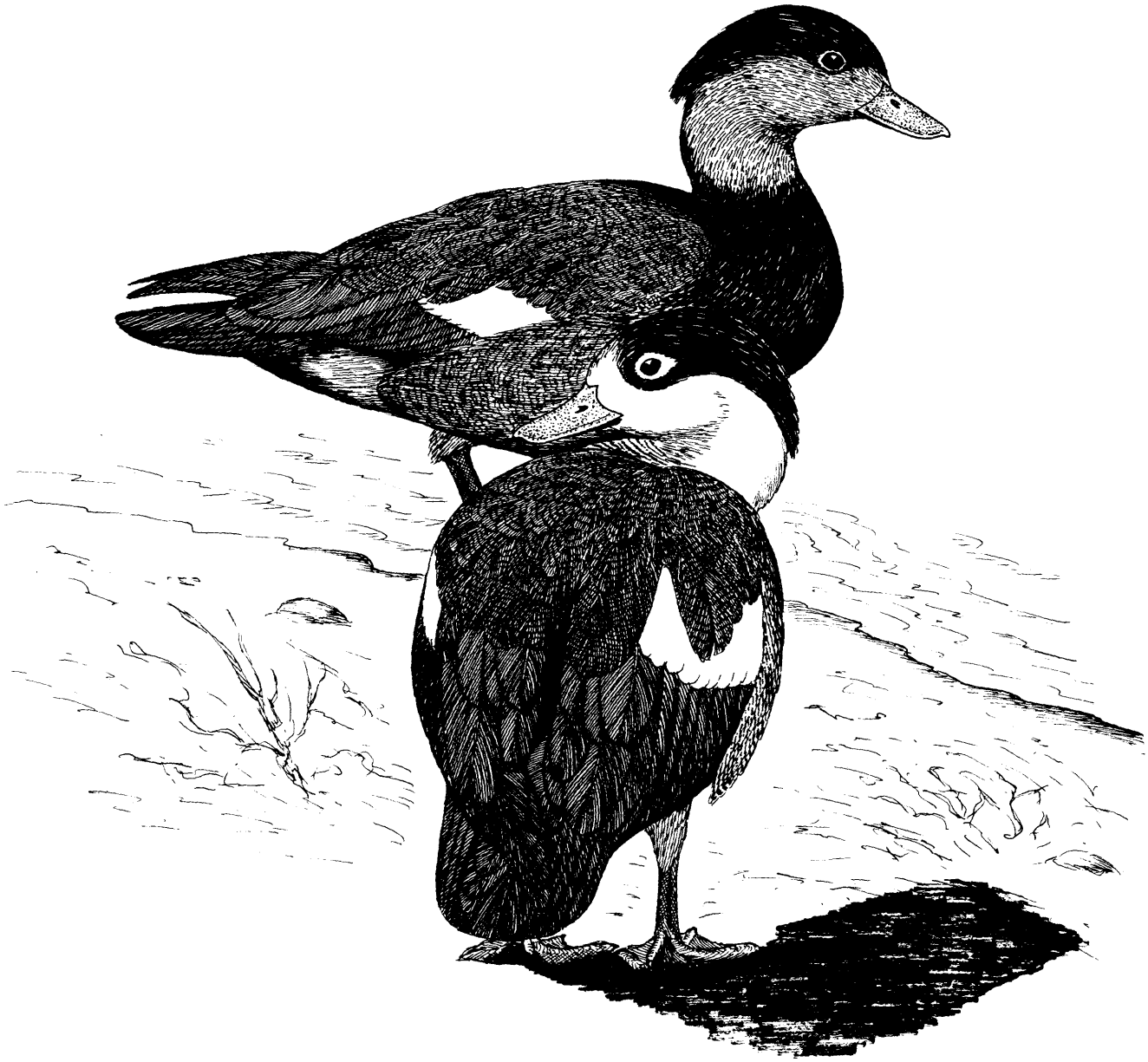
Identification and field marks. Length ca. 25–28″ (63–71 cm). The *adult male* is black on the crown of the head, nape, breast, upper tail coverts, tail, and primaries; the rest of the head is brownish black. The underparts, flanks, and mantle are dark gray with black vermiculations, while the coloration of the wing is like that of other shelducks. *Females* have a small white eye-ring, and the head and neck are also white except for the crown stripe and crest. Most of the rest of the body is dark brown with narrow white lines. *Immature* plumages are unknown.

Discussion

This history of this species is one of the major mysteries in ornithology, inasmuch as so far only three extant specimens are known, and their validity has been doubted. The bird was first described in 1890 by W. Sclater, from a male specimen shot near Vladivostok and presumed to be a hybrid between the falcated duck and the ruddy shelduck. In 1917, N. Kuroda described a second, apparently female, specimen, taken near Fusan in Korea, and regarded it as a new genus and species of shelduck. Another bird, a male, was taken about the same time near Kunsan, Korea, and a fourth, another male, was shot in 1924 near Seoul. Reportedly three were shot from a flock of six birds seen in northwestern Korea in 1916, but none was preserved. As Kuroda has described, the species was apparently known to early Japanese aviculturists as the chosen-oski (Korean mandarin duck), and was allegedly imported regularly from Korea in the early 1700s. What appears to be this species was also figured on various old Chinese tapestries and paintings.

The only possible recent record of the Korean shelduck dates from 1964, when three shelducks bearing crests were seen among a group of harlequins in the Rimskii-Korsakov archipelago southwest of Vladivostok by two Russian observers. The drake reportedly had a pinkish bill and legs and was crested, which would eliminate the possibility of its being some other shelduck. This sighting has renewed hopes that the species may yet survive in small numbers, perhaps breeding in Russian Ussuriland (Fisher et al., 1969).

Suggested readings. Phillips, 1923–26; Fisher et al., 1969.



Northern (Common) Shelduck

Tadorna tadorna (Linnaeus) 1758

Other vernacular names. Sheldrake; Brandgans (German); tadorne de belom (French); oca común (Spanish).

Subspecies and range. No subspecies recognized. Breeds along the coasts of Norway, Sweden, Great Britain, France, and northern Europe east to Estonia, and locally around the shoreline of the Mediterranean. Also breeds inland from the Black and Caspian seas eastward on the saline lakes of Central Asia to eastern Siberia, Mongolia, and Tibet. Winters from the southern part of its breeding range to northern Africa, Iran, India, southern China, and Japan. See map 44.

Measurements and weights. Folded wing: males, 318–50 mm; females, 290–334 mm. Culmen: males, 52–60 mm; females, 44–54 mm. Weights: males, 980–1,450 g; females, 801–1,250 g. Eggs: av. 65 x 47 mm, creamy white, 78 g.

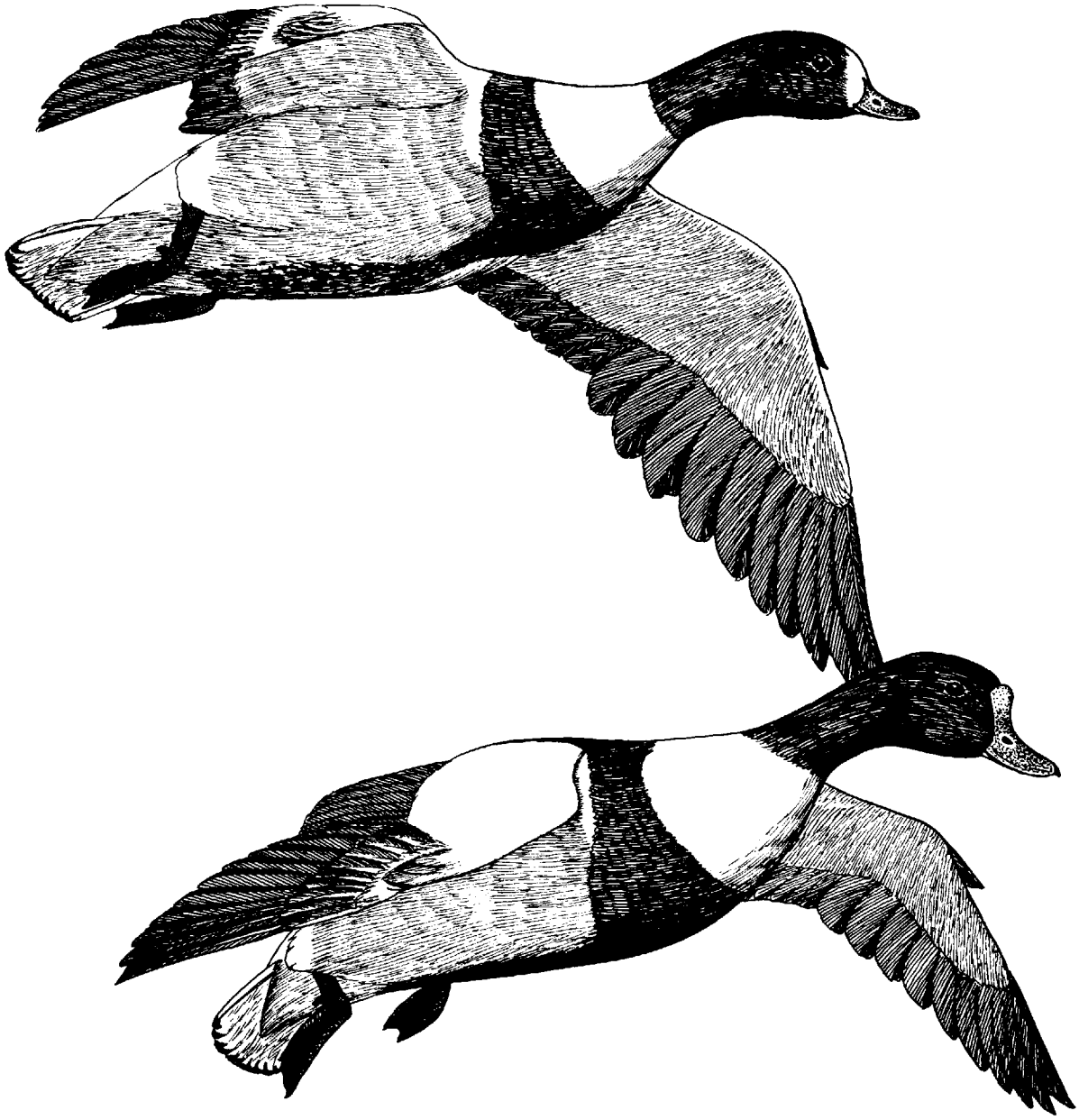
Identification and field marks. Length 24–25″ (61–63 cm). *Adults* in breeding season have greenish black heads and necks, white breasts, and a broad chestnut brown band over the lower breast, while the underparts (except for a median blackish band), flanks, mantle, and tail coverts are white. The outer scapulars, primaries, and tail are black, and the secondaries are iridescent green. The upper and under wing coverts are white, while the tertials are brownish. The bill is bright red, and the legs and feet are pink. In the nonbreeding season the bill is less bright and less enlarged at the base, and the colors and patterning of the feathers are noticeably duller. *Females* are noticeably smaller than males, have white feathers between the eye and bill, and the bill is not enlarged basally. *Juveniles* of both sexes are mostly white on the underparts and dull black to gray dorsally, with no trace of the chestnut breast band. The head is blackish above and white on the cheeks and throat, and the upper wing coverts are whitish or dull gray. By midwinter young males assume their first adult plumage and can be distinguished from females by their solid blackish head color.

In the field, the strongly patterned white, chestnut, and black plumage combination is distinctive and virtually unmistakable with any other species. The loud whistling call of males and the raucous quacking calls of the females are frequent and can be heard for considerable distances.

Natural History

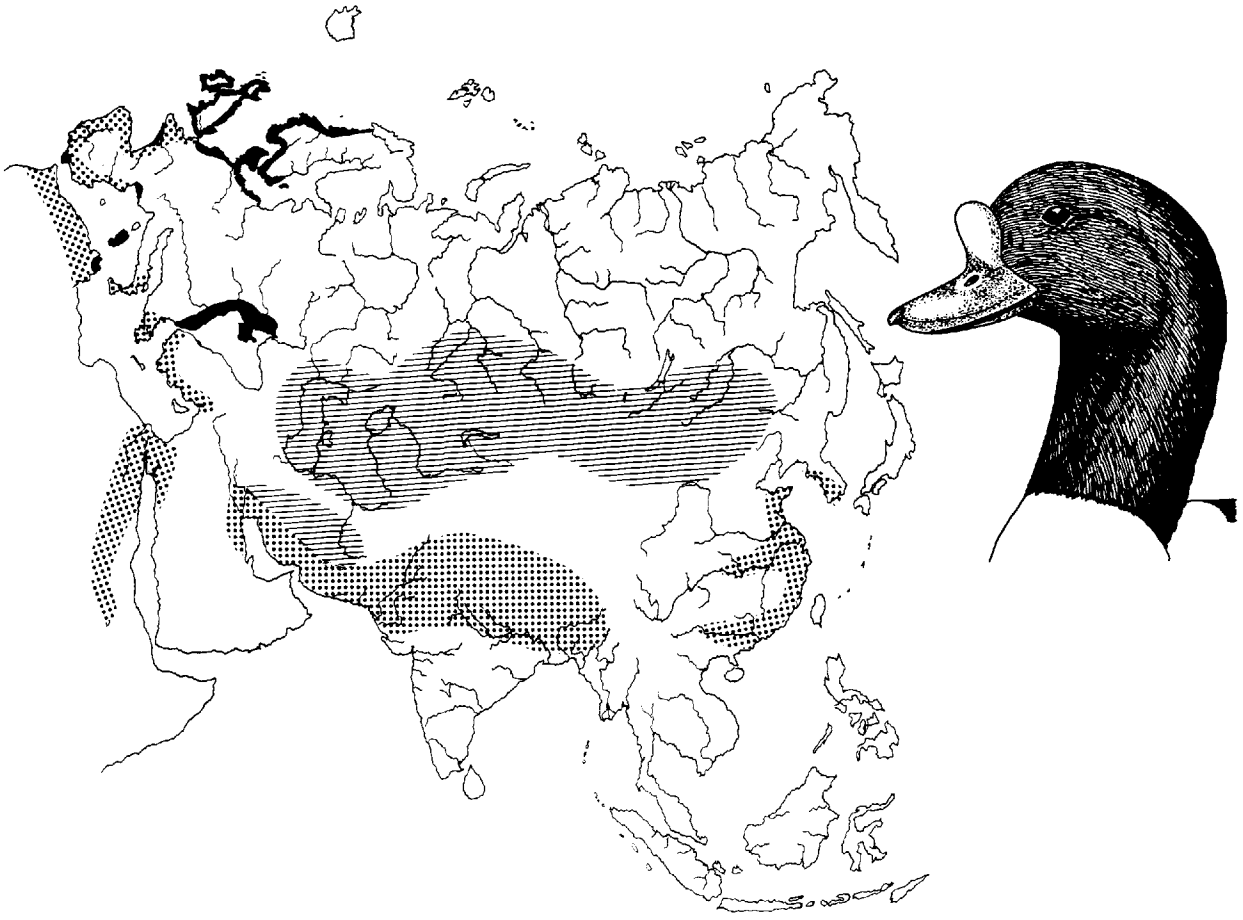
Habitat and foods. To an apparently greater degree than that of most other shelduck species, the northern shelduck's ecology is closely associated with the availability of small mollusks, especially the estuarine snail *Hydrobia.* To a much smaller extent, small fish and fish spawn, insects and insect larvae, and very small amounts of algae are consumed. Olney's (1965) summary of foods taken in the British Isles confirms the importance of *Hydrobia* in the species' diet. All of 46 specimens containing food remains had eaten this snail, regardless of locality or time of year. This mollusk is present in great quantities in estuarine and salt-marsh mud flats and in muddy sands, but does not extend into fresh-water environments. Bryant and Leng (1975) closely investigated the relationship between the abundance of *Hydrobia* and foraging activities of shelducks, and found a strong relationship between the intensity of feeding and the distribution and abundance of this food source. Feeding was done mainly on the flood tide and at times of high water, while the ebb tide and low-water periods were times of nonfeeding. The usual method of feeding was by standing on shore or in shallow water and probing for food, while head dipping or upending was done in water of swimming depth. Diving for food is not done by northern shelducks.

Social behavior. During most of the year northern shelducks are gregarious and occur in flocks of varying sizes. Pair formation occurs in wintering areas, and pair bonds are thought to be relatively permanent. Most birds reach maturity and presumably normally breed when two years old (Hori, 1964). Inciting by the female seems to play an important role in pair formation; and unlike any of the other shelducks, this species has a ritualized form of preening behind the wing (exposing the iridescent speculum) as an important part of pair-forming behavior (Johnsgard, 1965a). With the spring migration to their breeding areas, most pairs take up mutually exclusive feeding territories, although a part of the population remains together in a communal flock, presumably unable to establish territories within the area of favorable food supplies. The territories were



from 1,000 to 2,000 square meters in size in Young's (1970) study area, and were directly related to *Hydrobia* densities. A majority of the pairs reclaimed the same territories in subsequent years; and although the territories were defended primarily by males, the females had the stronger territorial attachment. When territorial males lost their mates, they soon abandoned their territories, while females whose mates had been shot quickly acquired new mates. Two of eight marked females whose mates had died or deserted them had different consorts in three years, and one changed mates three times in a single year. Since nesting does not occur on the territory, its role is probably to restrict the number of breeding pairs to the available food supply (Young, 1970), and perhaps it also helps to maintain an effective pair bond (Hori, 1969).

Reproductive biology. The studies of Hori (1964, 1969) on the breeding of northern shelducks in northern Kent, England, are unusually complete, and provide an excellent source of information. In that area,



MAP 44. Known European breeding areas (inked) and presumptive Asian breeding distribution (hatched) of the common shelduck; wintering distributions of both populations indicated by stippling.

most birds arrive in March, although intensive nest-site prospecting does not begin immediately. The nests are often used by the same pair repeatedly, and may be from 20 yards to two miles from the foraging territories established by the pair. Tree sites, hay or straw stacks, rabbit holes, and miscellaneous cavities are used about equally frequently, but open sites are used only rather rarely. There is no marked dispersion of nesting sites, and adjacent trees are sometimes used. Both members of the pair search for a nest site, but the female does so more actively. The male uses a variety of postures when directing his mate toward a prospective nest, but there is no observable indication to confirm that the female has chosen a particular site. Multiple use of a nest site by two or more females is not uncommon, judging from the number of clutches in excess of 12 eggs, but there was no indication of reduced hatching success in unusually large clutches. Sometimes two females may attempt to incubate the same clutch of eggs, and little or no antagonism occurs among breeding "communes." The normal clutch size is about 9 eggs, but multiple clutches may contain from 14 to 30 (rarely 50) eggs. Incubation requires 30 days and is performed entirely by the female, with the male close at hand. Although no renesting occurs, pairs which have failed remain attached to other birds in their nesting "commune" and associate with them until the last eggs are hatched. As each clutch is hatched, the pair takes their young to brackish or salt water and have no further contact with other pairs. For the first two or three weeks the broods remain in family units, but larger groupings, or crèches, gradually develop, especially in broods hatched late. At times, groups of 100 or more ducklings may be seen together. They are cared for by their actual parents, and other adults, presumably failed breeders, also attempt to care for them. The fledging period is apparently between six and a half and eight weeks, at the end of which time the birds begin to disperse toward late-summer molting areas. Most of the British population migrates in July to the German coast of the

North Sea to undergo their postnuptial molt, but a limited number also move to Bridgwater Bay, Somerset (Eltringham & Boyd, 1960). The flightless period is from 25 to 31 days, with females averaging 27 days and males 29 days.

Status. The gathering of 90 percent or more of the European population in the North Sea molting areas provides an excellent basis for estimating population trends in this species, which appears to be on the increase. In recent years this population has exceeded 100,000, while the population that gathers in the Mediterranean and Black Sea areas numbers about 30,000 birds (Ogilvie, 1975). The population of the more easterly areas is still unknown.

Relationships. I have earlier suggested (Johnsgard, 1965a) that this species and the radjah shelduck represent rather isolated offshoots from the general group of shelducks, without especially close affinities to each other or to the other *Tadorna* forms. The juvenile plumage of the northern shelduck has some slight similarities to that of the Egyptian goose, and perhaps the bird provides an evolutionary link between *Alopochen* and *Tadorna*.

Suggested readings. Hori, 1964, 1969; Young, 1970.

Radjah Shelduck

Tadorna radjah (Garnot) 1828

Other vernacular names. Burdekin duck, white-headed shelduck; Radjahgans (German); casarca radjah (French); oca rajá (Spanish).

Subspecies and ranges. (See map 45.)

T. r. radjah: Black-backed radjah shelduck. Resident in the Moluccas, New Guinea, western Papua Islands, Fergusson Island, and the Aru Islands.

T. r. rufitergum: Red-backed radjah shelduck. Resident in northern and eastern tropical Australia, from the Fitzroy River to northern Queensland.

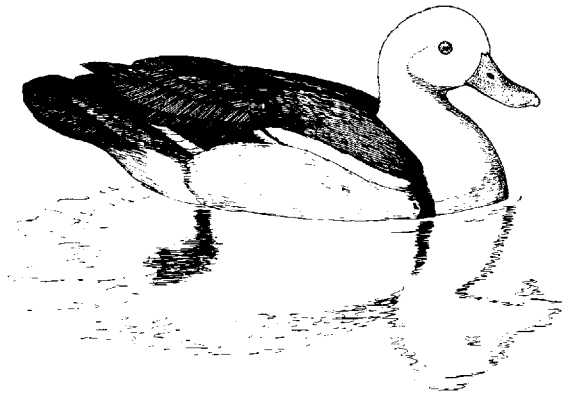
Measurements and weights. Folded wing: males, 260–68 mm; females, 246–98 mm. Culmen: males, 40–54 mm; females, 42–55 mm. Weights: males, 750–1,101 g (av. 750 g); females, 600–1,130 g (av. 839 g). Eggs: av. 60 x 42 mm, white, 59 g.

Identification and field marks. Length 20–24" (51–61 cm). *Adults* of both sexes have white heads, breasts, underparts, and flanks, the white broken by a narrow blackish band around the lower breast. The upperparts from the scapulars back to the tail are generally black (brownish in *rufitergum*); the wing is white except for black primaries, white-tipped iridescent green secondaries, and a narrow black line formed by the greater secondary coverts. The bill, legs, and feet are pink, and the eyes of both sexes are uniquely white. *Females* are identical to males, and *immatures* resemble adults but the speculum is duller, the upper wing coverts are margined with blackish coloration, and the black band on the greater secondary coverts is broader.

In the field, the predominantly white coloration of this species sets it apart from all other shelducks and all other ducks of the area except for the much smaller pygmy geese. The sexes may sometimes be identified in the field by the female's rattling call and the male's wheezy whistle.

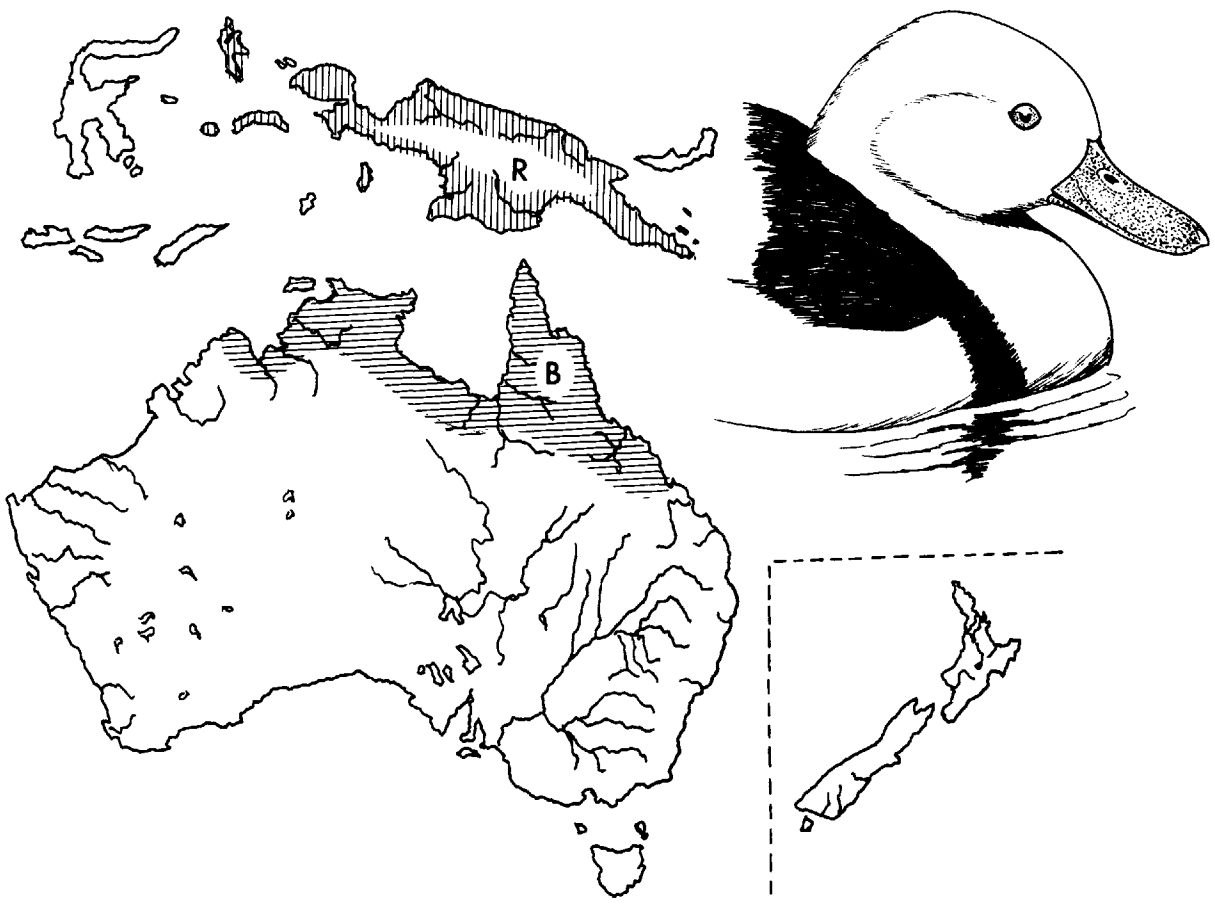
Natural History

Habitat and foods. According to Frith (1967), this species' preferred Australian habitat consists of brackish water, mud flats, and mangrove swamps in coastal areas. Fresh-water ponds are seemingly avoided at all times other than the dry season, and



the littoral strip extending inland about a mile or so from the coastline is most commonly utilized. In New Guinea the birds utilize very similar habitats, particularly mangrove and sago swamps, and the muddy banks and shoals of the larger rivers. Few data on foods are available; but of 21 samples from Australia, the predominant materials present were animal life, consisting almost entirely of mollusks. Some large insects were found, and the only plant materials present were sedge materials and small quantities of algae. Reportedly, the birds feed almost exclusively on land or in water only a few inches deep. They usually forage in pairs, with each pair maintaining its own feeding territory and visiting this territory each morning and evening (Frith, 1967).

Social behavior. Like other shelducks, this species has strong pair bonds, and thus flocks consist of pairs and family units that are the basic social unit. Concentrations of birds and moderately large flocks may develop during the dry season, when groups of up to 50 or 60 may occur locally. These are usually on rivers or permanent lagoons, particularly in the Northern Territory of Australia. The birds probably do not move very great distances between the dry and wet seasons, and probably most of the seasonal migrations are within rather than between river valley systems. With the start of the wet season in the Northern Territory, movements back toward the breeding grounds again occur. Breeding is timed to occur at the end of the wet season and early in the dry season, when floodwaters are receding and bare mud flats are exposed between the water and the fringe of pandanus. Radjah shelducks are unusually aggressive and highly territorial for their small size. Quite possibly the strongly white plumage is associated with this need for territorial advertisement. Frith (1967) reports that the average density of territories on the Adelaide River in one year was about one pair per one and three-quarters miles, a surprisingly low



MAP 45. Breeding or residential distributions of the red-backed ("R") and black-backed ("B") radjah shelducks.

density for a bird of seemingly generalized foraging needs. The breeding territory includes both a foraging area such as a stretch of river bank and a suitable nesting site, and territorial establishment and defense is probably an important part of pair-bonding behavior. Observations on copulatory behavior are still inadequate, but it evidently occurs on water and preliminary displays involve head dipping by the male. The postcopulatory display is relatively weak, if the single observed instance was at all typical (Johnsgard, 1965a).

Reproductive biology. Nesting occurs in the Northern Territory between February and July, but most records are for May and June, while it has been reported to be considerably earlier (December to February) in Queensland. Apparently the yearly variations in the onset of the rainy season may affect the timing of reproduction. Nesting is most often done in trees, and both members of the pair may spend considerable time looking for a suitable location in a hollow limb or sprout. Nests are typically near water, and have only a little down present for lining. Few nests have been seen in the wild, and the clutch size is estimated to range from 6 to 12 eggs. Incubation is performed only by the female, and requires 30 days. After hatching, both parents lead the ducklings to water and in most cases probably raise the brood within the confines of their territory. As water areas dry up, the fledged young and adults may be forced to move to more permanent waters; otherwise they are likely to remain on the breeding territory until the next breeding season (Frith, 1967).

Status. This species is unusually vulnerable to destruction through hunting, and in many areas of Australia where the bird was once common it is now rare or absent. It is probable that more effective protection from hunting will have to be forthcoming if the species is to be saved from complete eradication (Frith, 1967).

Relationships. This shelduck seems to be the most atypical of the entire genus, and its precise relationships to the other species are not at all clear. Its bill shape is adapted for dabbling much like that of the northern species, and might reflect either real evolutionary affinities or simply ecological convergence to a comparable foraging niche.

Suggested readings. Frith, 1967.