Ducks, Geese, and Swans of the World: Tribe Aythyini (Pochards)

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Tribe Aythyini (Pochards)
Drawing on preceding page: Canvasback
Pink-headed Duck

*Rhodonessa caryophyllacea* (Latham) 1790

**Other vernacular names.** None in general English use. Rosenkopfente (German); canard à tête rose (French); pato de cabeza rosada (Spanish).

**Subspecies and range.** No subspecies recognized. Extinct; previously resident in northern India, probably including Assam, Manipur, Bengal, Bihar, and Orissa.

**Measurements and weights.** Folded wing: males, 250–82 mm; females, 250–60 mm. Culmen: males, 50–56 mm; no record for females. Weights: males, 793–990 g; av. (of 5) 935 g; females, 840 g (Schönwetter, 1960) to 1,360 g (Ali & Ripley, 1968). Eggs: 44 x 41 mm, white, 45 g.

**Identification and field marks.** Length 24" (60 cm). *Adult* males have a bright pink head, which is slightly tufted behind, the color extending down the hind neck, while the foreneck, breast, underparts, and upperparts are brownish black, except for some pale pinkish markings on the mantle, scapulars, and breast. The tail and upper wing surface are brownish, except for the secondaries, which are pale fawn to salmon, with white tips. The underwing surface is also shell pink. The bill is bright pink, the iris brownish orange, and the legs and feet brown. *Females* have a less bright pinkish head, while *juveniles* have whitish rose heads and hind necks, and their
bodies are lighter brown, with dull brown underparts and the edges of the feathers whitish.

*e in the field.* the bright pink head and bill of males are unique, although many recent reports of this species are the obvious result of confusion with male red-crested pochards, in which the head is chestnut rather than pink.

**Natural History**

**Habitat and foods.** These birds apparently occupied swampy lowland grass jungles, and even in very early times the birds were shy and not easily observed in this heavy growth. They evidently fed largely on the surface, but were known to be capable of diving readily. Apparently only a single specimen was ever examined as to its food contents, and it contained water weeds and various small shells (Ali & Ripley, 1968).

**Social behavior.** During the winter months this species apparently gathered in flocks of from 6 to 30 or even 40 birds, in lagoons adjoining large rivers. Their displays were observed by Delacour (1954–64) in captives, and he believed that they showed a rudimentary form of dabbling duck postures. The call of the male was a "whizzy whistle," uttered with the neck extended vertically, while the female was said to produce a low quack. Apparently during display the males would swim about with the neck shortened and head resting on the back, then suddenly extend it and call. None ever attempted to nest in captivity.

**Reproductive biology.** Reports summarized by Ali (1960) indicate that pairing occurred by April, nesting was begun in May, and eggs could be found in June and July. Nests were usually placed within 500 yards of water, in clumps of tall grass, and well concealed. The clutches were of from 5 to 10 eggs, which were remarkable in being nearly round. The incubation period was never reported, but the young were normally flying by September, at which time the birds returned to jungle lagoons.

**Status.** According to Ali (1960), the last fairly certain record of this species in the wild was in 1923 or 1924, while the last surviving bird in captivity lived no later than 1936. Prestwich (1974) states that 1935 and 1939 represent the probable last dates for birds being reported from the wild and captivity, respectively. A few sight records have been made in recent years (Singh, 1966; Mehta, 1960), but no convincing evidence for the species' existence has been forthcoming.

**Relationships.** Until fairly recently, the pink-headed duck has taxonomically been placed with the dabbling ducks, usually adjacent to *Anas* as an "aberrant" member of that group. However, I (1961b) located a trachea from a male of this species, and recognized its close affinities with the pochard group (*Aythyini*). At about the same time, Woolfenden (1961) reached the same conclusions on the basis of osteological evidence. These conclusions were confirmed by Humphrey and Ripley (1962), who reexamined the tracheal anatomy, the humerus, and the skeletal elements of the foot. They believed that the dabbling-like locomotor adaptations of the genus were related to environmental changes and modifications from a more typically pochardlike condition during Tertiary times. The studies by Brush (1976) on feather proteins suggest a close relationship between this genus and *Netta*, the more generalized pochards, and a distinction between these groups and the more typical pochards of the genus *Aythya*.


**Red-crested Pochard**

*Netta rufina* Pallas 1773

**Other vernacular names.** None in general English use. Kolbenente (German); brante roussâtre (French); zambullidor de cresta roja (Spanish).

**Subspecies and range.** No subspecies recognized. Breeds chiefly from the lower Danube through southern Russia east across the Kirghiz steppes to western Siberia, south to northern Syria, Iran, and western China. Winters largely in India and Burma, but also in northern Africa and the eastern end of the Mediterranean. See map 94.

**Measurements and weights.** Folded wing: males, 256–78 mm; females, 249–58 mm. Culmen: males, 48–52 mm; females, 44–50 mm. Weights: males, 900–1,170 g (av. 1,135 g); females, 830–1,320 g (av. 967 g) (Dementiev & Gladkov, 1967). Eggs: av. 58 x 42 mm, greenish or light stone, 56 g.
Identification and field marks. Length 22" (58 cm). Plate 46. Males in breeding plumage have a uniformly pale chestnut head, the feathers forming a bushy crest. The back of the head, mantle, and lower back are black, with the lower back and upper tail coverts grading to a greenish sheen. The scapulars are brown, and are separated from the breast by a white patch. The breast and lower parts are entirely black, with the flanks a sharply contrasting white, with some brown mixed in. The tail is gray; the upper wing coverts are generally gray to brown, except for a white area at the carpal joint; and the secondaries and most of the exposed vanes of the primaries are white to cream, with only the tips of the primaries conspicuously darker. The iris is red, the bill is vermilion, with a slightly lighter tip, and the legs and feet are orange to yellowish orange. Males in eclipse are nearly identical to females except for the iris and bill coloration, which remains reddish. Females have a two-toned head of dark brown from the eyes upward and backward along the hind neck, and a uniform grayish brown on the sides of the head, cheeks, and throat. The rest of the body consists of brown to brownish gray tones without strong patterning, although the wing pattern is nearly identical to that of the male. The iris is brown, the bill is dull grayish blue, becoming slightly reddish toward the tip; and the legs and feet are dull yellow. Juveniles closely resemble adult females, but young males soon begin to acquire a crest and exhibit reddish coloration on the bill and iris.

In the field, the reddish shaving-brush crest of the male, contrasting with a black breast and nearly white flanks, is a distinctive field mark; only the Eurasian pochard is at all similar among the species with which it might be found under natural conditions. Females have a strong resemblance to female black scoters in their general patterning, but have longer and narrower bills. In flight both sexes exhibit white underwings and a white stripe on the upper flight feathers that extends the entire length of the wing. The male utters a very distinctive sneeze call during display, and females utter both soft purring sounds and harsher gock calls similar to those of other pochards.

Natural History

Habitat and foods. The breeding habitats of this rather sporadically distributed species seem to be predominantly still, brackish or salt-water areas; only secondarily or locally does it use fresh-water or slowly flowing water areas with extensive submerged and emergent shoreline vegetation. The species is structurally not so well adapted for diving as are the true pochards of the genus Aythya, and additionally the bill is more like that of a typical dabbling duck. The birds apparently do not dive very deeply, and usually remain under water for only short periods, often less than ten seconds. The birds are primarily vegetarians, and feed on such submerged plants as musk grass, hornwort (Ceratophyllum), pondweeds, mare's-tail (Hippurus), and milfoil (Myriophyllum). Small mollusks are sometimes also eaten, probably mainly through accidental ingestion along with the leafy plant materials, and seeds have been found in small quantities. Red-crested pochards are the only waterfowl species known to perform ritualized or ceremonial feeding, in which the male typically dives, surfaces with vegetation or even inedible materials in his bill, and then swims to his mate and passes it to her. This activity seems to be confined to actually paired birds, rather than to birds that are still in the mate-selection phase of courtship (Johnsgard, 1965a).

Social behavior. Red-crested pochards breed in the first year of their life, with a seasonally established monogamous pair bond situation prevailing. Sexual display begins as early as late fall. Female inciting behavior develops from the greeting ceremonial behavior of ducklings after the birds are two to three months old, and the major courtship call of the male develops at the same time, and from the same origins. This posture and call, the sneeze, serves for both aggressive and sexual purposes. Another major display, head raising (or neck stretching) develops after the birds are six months old, and is accompanied by brumm calls, which are used both in social
display and as an alert signal (Platz, 1974). A posture in which the male stretches his head and neck forward over the water and utters a nasal call is also sometimes seen, and seems to correspond to the sneaking posture of the typical pochards. In addition, males fairly frequently preen behind the wing and perform display drinking, but both of these displays are probably more closely associated with precopulatory behavior than typical courtship. Males initiate copulation by interspersing bill-dipping and dorsal preening movements with head shaking, preening behind the wing and elsewhere, and with rudimentary head-pumping movements that are less conspicuous than but distinctly similar to those of *Anas*. Females respond with the same kind of head-pumping movements, and gradually become prone in the water. After treading, the male utters a single sneeze call, and then swims away in the usual pochard bill-down posture (Johnsgard, 1965a).

Reproductive biology. In the U.S.S.R., birds arrive on their nesting areas already paired, although some display and fighting occurs there as a result of the activities of unpaired or "bachelor" drakes. Pursuit flights, involving either a male chasing out of his home range any females that intrude into it, or the chasing of breeding females by one or several males in attempted rape flights, are fairly common early in the nesting season. The nest site is often on dry land...
or at the edge of water, in dense vegetation, but also may be in floating mats of vegetation or amid reed beds. Normal clutch sizes vary considerably, from about 6 to 12, but there is a strong tendency in this species for dump-nesting, with as many as 39 eggs reported in one case, and involving up to three females. Males abandon their mates at about the onset of incubation, which requires from 26 to 28 days. Another ten or eleven weeks are needed for the young to attain fledging (Platz, 1974; Dementiev & Gladkov, 1967; Bauer & Glutz, 1969).

Status. The generally southerly distribution of this species is indicated by the fact that about 10,000 birds winter in northwestern Europe, compared to about 50,000 in the Mediterranean and Black sea region. Probably many of the birds of western Europe winter farther south into Africa, since western Russia is believed to support at least 90,000 pairs. From 3,000 to 6,000 pairs breed in Spain, and smaller numbers are present in southern France, the Netherlands, Austria, East Germany, Czechoslovakia, and Hungary (Ogilvie, 1975). The birds also breed east to Central Asia, but in unknown numbers.

Relationships. Behavioral information (Johnsgard, 1965a) as well as data on the postcranial osteology (Woolfenden, 1961) indicates that *Netta* provides a transitional evolutionary stage between the dabbling duck group and the typical pochards of the genus *Aythya*. Woolfenden believed that the southern pochard should be kept generically separate from the red-crested pochard, but Brush (1976) reported that in their feather proteins these two species and the pink-headed duck appeared to be virtually identical and yet distinct from *Aythya*.


Southern Pochard

*Netta erythropthalma* (Eyton) 1838

Other vernacular names. African pochard; Rotau­genente (German); canard plongeur austral (French); zambullidor austral (Spanish).

Subspecies and ranges. (See map 95.)

*N. e. erythropthalma*: South American southern pochard. Resident in western South America, breeding primarily from northwestern Vene-

zuela to southern Peru, and extending in winter along the coasts of Peru, Colombia, Venezuela, and Brazil. Breeding in these latter areas is uncertain.

*N. e. brumela*: African southern pochard. Resident in Africa, primarily in Ethiopia, the southern Sudan, eastern Zaire, Angola, Uganda, Kenya, Tanzania, Malawi, Zambia, Rhodesia, and South Africa.

Measurements and weights. Folded wing: males, 202–28 mm; females, 201–21 mm. Culmen: males, 40–49 mm; females, 38–49 mm. Weights: males, 600–977 g; females, 533–1,000 g (Middlemiss, 1958). Eggs: av. 54 x 44 mm, creamy white, 59 g.

Identification and field marks. Length 20“ (51 cm).

Adult males have a purplish black head and neck, merging with a glossy black breast, while the rest of the body coloration is a nearly uniformly dark chestnut brown, the mantle tending toward olive brown and the abdomen and under tail coverts grading to fulvous. The tail is dark brown, and the upper wing surface is olive brown to dark brown, except for a white speculum formed by the bases of the secondaries, which have broad brown tips. The iris is bright red, the legs and feet are bluish gray and blackish, and the bill is bluish gray with a black nail.

Females have a brownish black forehead, crown, and nape, grading to umber on the cheeks, with off-white markings extending from the chin to the base of the upper mandible, as a streak behind the eye, and as an ill-defined crescent extending from the throat up the sides of the cheeks to the ear region. The upper parts of the body are generally uniformly olive brown, vermiculated with buffy brown, while the flank feathers are more fulvous, fringed with rusty coloration. The underparts are dull brown, except for the under tail coverts, which are mottled with white. The wing coloration is very similar to that of the male. The iris is brown, the bill dark slate gray, and the legs and feet are as in the male. Juveniles resemble adult
females, but the tip of the head is more brownish, the whitish eye-stripe is less pronounced, and the body coloration is generally a lighter brown.

In the field, this species is likely to be confused only with the female rosybill in South America, which also has a bluish bill and a brown body, but lacks the white facial markings. In Africa no other pochard occurs within this species' range, and confusion with other diving ducks such as the Maccosa seems unlikely. Both sexes exhibit a conspicuous white speculum in flight, which extends into the primaries along their bases. The calls of both sexes are relatively quiet, and no decrescendo call has yet been described for the female. Males are said to utter a repeated prerr note in flight; their usual courtship call is a soft and mechanical eeroow.

Natural History

Habitat and foods. In southern Africa, the southern pochard occurs from coastal areas to about 8,000 feet of elevation, using primarily permanent water areas that may be vegetation-free or have emergent aquatic plants. Generally, rivers are avoided, as are turbid waters, shallow temporary ponds, and flooded areas. The birds are usually found in open water or near the edges of emergent shoreline vegetation. They feed primarily by diving, but also upend in shallow water and occasionally go to shore to forage on vegetation at the water's edge. The available data indicate that the birds are primarily vegetarians, eating the vegetative parts or seeds of such plants as water lilies (Nympaphaeas), bladderwort, duckweeds, bulrushes, cattails, and other similar aquatic or shoreline plants (Schulten, 1974; Middlemiss, 1958). Animal materials that have been found in samples from adults or young include snails, aquatic beetles and hemipterans, ants, and crustaceans.

Social behavior. Southern pochards are relatively gregarious, with flock sizes of several hundred birds recorded at times, and one concentration of 5,000 noted. These, however, are nonbreeding season

Map 95. Breeding or residential distribution of the African ("A") southern pochard, and major breeding (hatched) and nonbreeding or peripheral (stippling) distributions of the South American southern pochard ("S").
counts, and usually occur during the dry season, when the reduction of water areas causes concentrations to develop. The timing of pair formation is not yet clear, but presumably temporary monogamous pair-bonding behavior is the rule. Display behavior has only infrequently been observed in wild birds (Middlemiss, 1958), but observations on captive individuals indicate a nearly typical pochard display repertoire. Inciting is the primary female display, and is accompanied by a harsh \textit{rrrr-rrrr} call; a threatening \textit{quarrk} note has also been reported. The most common display of the male is a courtship call, \textit{ereooow}, sounding like the rapid unwinding of a spring, and accompanied by withdrawal of the head into the shoulders, with the bill held horizontally. The same or a very similar call is uttered during a rapid head-throw display, and a soft three- or four-noted call is uttered during the sneek display, as the male slightly extends his head and neck toward a female. Very frequently a male will respond to inciting by swimming ahead of the female and turning the back of the head toward her, while depressing his crown feathers. In addition, a display preening behind the wing is often performed, usually in response to the same display by females. Copulation is preceded by slight head-pumping movements on the part of the female and by bill dipping and display preening (usually on the back, but also elsewhere) by the male. After treading, the male calls once and then swims rapidly away from the female in a bill-down posture (Johnsgard, 1965a).

Reproductive biology. Records of eggs and broods, when plotted over the entire African range of the species, encompass all months of the year. However, in the more northern parts of the range (Mozambique, Zambia, Malawi, Kenya, Uganda) most records occur between March and August, while in Cape Province, Natal, and Transvaal they are concentrated between August and December. They thus would seem to be associated more with the timing of the rainy season than with the calendar year. The nest is usually located near water and hidden by rank grass, weeds, or low shrubs, or it may be built over water in emergent vegetation, as in sedges, reeds, or in papyrus beds. The clutch size ranges rather widely, from 6 to 15 eggs, but averages 9. Only the female incubates; and the probable normal incubation period is 26 days, although shorter estimated periods of 20 to 21 days appear in the literature. There is some doubt about whether the male ever participates in the rearing of the brood; one report (Middlemiss, 1958) indicates that the male has been seen helping to tend young ducklings. This is not known to be a normal condition in any of the other species of pochards. The fledging period has not yet been established, but the flightless condition of adults during the postnuptial molt is known to last about 31 days.

Status. This species is apparently much more common and widespread as a breeding species in Africa than in South America, but even there is reported as a common resident species in only a few areas such as Kenya, Uganda, Malawi, and Rhodesia.

Relationships. The recommendation by Delacour (1954–64) that this species be included in the genus \textit{Netta} rather than among the typical pochards (\textit{Aythya}), as it traditionally has been, seems to have some merit, at least on behavioral grounds (Johnsgard, 1965a). However, Woolfenden (1961) has argued that the other two species of \textit{Netta} as here constituted do not seem to be closely related, and thus the relationships of these “primitive” pochards has not yet been resolved to everyone’s satisfaction.


Rosybill

\textit{Netta peposaca} (Vieillot) 1816

Other vernacular names. Rosy-billed pochard: Peposakaente (German); canard peposaca (French); pato picazo or pato negro (Spanish).

Subspecies and range. No subspecies recognized. Breeds in central Chile from Atacama to Valdivia, and on the eastern side of the Andes from central Argentina (about 40° south latitude) northward to southeastern Brazil, Uruguay, and Paraguay, and occasionally south to Tierra del Fuego. Winters farther north, to Bolivia and south-central Brazil. See map 96.
Measurements and weights. Folded wing: males, 228–43 mm; females, 220–40 mm. Culmen: males, 61–66 mm; females, 54–60 mm. Weights: 6 males averaged 1,181 g; 5 females averaged 1,004 g (Weller, 1968a). Eggs: 56 x 42 mm, green or creamy, 60 g.

Identification and field marks. Length 22" (56 cm). Adult males are purplish black on the head and neck, while the back and scapulars are greenish black or blackish, finely speckled with white or gray. The breast is black, and the abdomen and flanks are finely vermiculated with black and white. The rump, upper tail coverts, and tail are black, while the under tail coverts are white. The upper wing coverts are greenish brown, with a white patch at the carpal joint, while the secondaries are white, tipped with black. The inner primaries are also white, with black tips, while the outer four are cream-colored on the inner vane and black on the outer vane. The bill is bright red, with a bulbous enlargement at the base and a black nail, the iris is yellow to orange, varying seasonally, and the legs and feet are yellow to orange, with darker webs. Females are nearly uniformly brown, with a darker back and white on the chin, throat, and under tail coverts. The wing pattern is like that of the male. The iris is dark brown, the bill bluish slate with a black nail, and the legs and feet dull orange yellow to grayish. Juveniles resemble females, but have brown rather than silvery white underparts.

In the field, the bright red bill, contrasting with the blackish head and upperpart coloration, readily identifies the male. Females lack the white head markings of the otherwise similar southern pochard, and appear to be a uniform and nondescript brown except for their white under tail coverts. Females utter both a rather harsh quacking note and a krrr sound during inciting, while males produce a similar growling sound and a faint whee-ow during aquatic display.

Natural History

Habitat and foods. This marsh-dwelling pochard is almost like the dabbling ducks in its preference for shallow waters and its terrestrial inclinations. Weller (1967a) never observed it diving, and noted that it was highly terrestrial, spending as much time on land as on water. It preferred to occupy duckweed-covered ponds, and was only rarely found on open lakes or rough water. Its foods have yet to be studied, but appear to be predominantly vegetable in nature. A single specimen collected in Argentina had a large number of seeds of water milfoil (Myriophyllum), as well as the seeds and rootstalk fragments of a grass or sedge (Phillips, 1922–26).

MAP 96. Breeding or residential (hatched) and wintering (stippling) distributions of the rosybill.
Social behavior. This is a highly social species, and even during the breeding season some flocking occurs, presumably by nonbreeding birds. Weller (1967a) doubted that permanent pairing occurs in this species, and he neither observed males participating in brood care nor saw pairs in the early postnesting period. He did observe a possible territorial defense flight, but surprisingly little courtship in view of the presumed annual renewal of pair bonds. In captivity, however, pair-forming displays may be readily observed, and in general are closely similar to those of the other pochards. Females incite with strong neck stretching alternated with bill pointing toward a threatened drake, and utter a harsh krrrr with each movement. They also at times produce a multinoted call rather like the decrescendo call of *Anas* females, and frequently perform a conspicuous display preening behind the wing. They likewise perform the highly stereotyped and exaggerated drinking movements used by males as a greeting ceremony, and extend their heads and necks forward in a sneak posture in the manner of males. These two displays, ritualized drinking and the sneak posture, are the two most conspicuous and frequent of the male postures, but in addition the males sometimes also perform a head-throw display, with an associated wheee-ow call. Males utter two other distinctive calls without strong head or neck movements, and quite frequently preen behind the wing as a display. Preferred males also swim rapidly ahead of inciting females while turning the back of the head toward them. Before copulation, the male alternates bill-dipping and dorsal preening movements, and perhaps also makes rudimentary head-pumping movements, while the female has been observed only to perform head pumping. After copulation the male probably calls, and definitely assumes the usual pochard bill-down posture (Johnsgard, 1965a).

Reproductive biology. Nesting in central Argentina occurs mainly between October and December, with a probable peak in early November according to Weller (1967a). Contrary to earlier descriptions, he never found a nest on land; instead, they were located in water from 10 to 22 inches deep, amid dense vegetation adjacent to open pools. Evidently there is a strong tendency for dump-nesting in available nests of other species; Weller found eggs in an old coot nest, and a nest containing not only 24 rosybill eggs but also 6 eggs of the black-headed duck. The average clutch in nests used by a single female is probably about 10 eggs. He also observed a seemingly low hatching success among rosybill nests, with only one of six successful. Only the female incubates, and Weller found no evidence of male participation in brooding. The incubation period is 28 days, which is relatively long for the pochard group. The fledging period seems not to have been established, but apparently brood mergers are not uncommon, with one early report of a female tending a group of 52 ducklings (Phillips, 1922–26).

Status. Weller (1967a) said that the rosybill was the most common of the marsh-nesting Anatidae in the Cape San Antonio Province of eastern Argentina, which is near the center of its breeding range. Among a survey of ducks killed by hunters in the same general area, Weller (1968a) found that rosybills constituted 16 out of 263 total birds examined, but judged that their fall migration pattern, as well as the type of hunting being done there, affected this relatively low harvest. In general, it would appear that the rosybill is among the most abundant of the South American diving ducks.

Relationships. Although at one time the rosybill was generically separated from the other pochards, Delacour (1954–64) has argued that such separation obscures the close relationships between this bird and the other species he placed in the genus *Netta*, particularly the southern pochard. Woolfenden (1961) rejected this position, while I (1965a) advanced the view that this species of *Netta* is the one most closely approaching *Aythya* in its affinities. Weller (1967a) suggested that perhaps the rosybill should actually be removed from *Netta* and merged with the typical pochards, in *Aythya*, but in most skeletal features the red-crested pochard is closer to *Aythya* than is the rosybill (Woolfenden, 1961).


Canvasback

*Aythya valisineria* (Wilson) 1814

Other vernacular names. Can: Riesentafelente (German); milouin aux yeux rouges (French); pato lomo cruzado (Spanish).
**Subspecies and range.** No subspecies recognized. Breeds in North America from central Alaska south to northern California and east to Nebraska and Minnesota. Winters from southern Canada south along the Atlantic and Pacific coasts to central and southern Mexico. See map 97.

**Measurements and weights.** Folded wing: males, 225–42 mm; females, 220–30 mm. Culmen: males, 55–63 mm; females, 54–60 mm. Weights: adult males, 850–1,600 g (av. 1,252 g); adult females, 900–1,530 g (av. 1,154 g) (Ryan, 1972). Eggs: av. 63 x 45 mm, bright olive, 68 g.

**Identification and field marks.** Length 19–24" (48–61 cm). Adult males in breeding plumage have a dark reddish head and neck, grading to blackish on the face and crown. The midback and scapulars are white, vermiculated with blackish coloration, and grading to brownish black on the rump and upper tail coverts. The under tail coverts are blackish, but the rest of the underparts are white with blackish vermiculations, especially on the sides and flanks. The upper wing coverts are white with gray vermiculations, and the secondaries are pearl gray, the inner ones with narrow black margins. The primaries and their coverts are slate brown, while the underwing surface is white to pale gray. The iris is bright red in spring and duller in winter, the bill is blackish, and the feet and legs are grayish blue. Adult females have a reddish brown head and neck, with a darker crown and more buff around the eyes and on the cheeks, chin, and throat, while the lower neck has a reddish cast. Most of the upperparts are dark brown (more grayish in winter), the feathers having lighter edges and often vermiculated toward their tips. The wing coverts and tertials are mostly grayish brown with vermiculations, the primaries and their coverts are brown, and the secondaries are gray, with paler tips. The sides and flanks are dull brown, the feathers somewhat vermiculated, while the rest of the underparts are mostly grayish white, and the tail is sooty brown. The bill is blackish, the iris brown, and the legs and feet are grayish blue. Males in eclipse resemble females, but the iris remains reddish and the head darker. Juveniles resemble adult females, but have darker backs and more mottled and browner underparts. The head color of young males is darker than that of females, and a yellowish iris color is acquired during the juvenile plumage.

In the field, canvasbacks are most likely to be confused with redheads, which are appreciably darker in both sexes and have a shorter and less sloping bill and forehead profile. Canvasbacks also closely resemble Eurasian pochards, but both sexes lack the conspicuous pale band that occurs near the tip of the bill in that species. In flight, canvasbacks appear to be unusually long-necked and fly swiftly, with rapid and strong wingbeats. Calling by the female seems to be largely limited to the inciting display, when a soft krrr-krrr note is uttered, while males produce a dovelike cooing note during courtship display and a softer breathing sound.

**Natural History**

**Habitat and foods.** Breeding habitats of the canvasback typically consist of shallow prairie marshes surrounded by cattails, bulrushes, and similar emergent vegetation, and which are both permanent and large enough to have sufficient open water for easy landings and takeoffs. Such marshes also usually have an abundance of submerged aquatic vegetation such as pondweeds, which are the single most important group of food plants for this species. On migration and in wintering areas they concentrate on lakes or marshes where wild celery (Vallisneria), arrowhead (Sagittaria), water lily (Nymphaea) and similar succulent aquatics are to be found, and in bays and estuaries where eelgrass (Zostera) and wigeon grass beds are abundant. Brackish estuarine bays, rather than salt-water or fresh-water ones, provide the preferred wintering habitat; in such areas not only these submerged plants but also clams, crabs, and
other small invertebrates are abundant (Stewart, 1962).

Social behavior. Probably at least in part because of their preference for such localized food sources as wild celery and certain pondweed species, canvasbacks typically occupy specific and traditional rivers, lakes, and marshes on their migratory and wintering areas, and in such locations often concentrate in the thousands or even tens of thousands. Chesapeake Bay, San Francisco Bay, and several Gulf Coast areas represent the major areas where the birds concentrate in winter and where pair formation begins in late winter. Courtship is actively performed during the spring migrations, with some females still remaining unpaired at the time of arrival on their Manitoba nesting grounds (Hochbaum, 1944). Most displays are performed on water, but aerial chases are also frequent, especially late in the pair-forming period. Males perform all of the typical pochard displays, including a courtship note uttered in a kinked-neck posture, the same call uttered during a head-throw, a lowered head posture called the sneak, and aggressive chin lifting usually given in response to the same posture in females, who incite in this manner. Wing preening is rare or even absent as a male display, but preening of the dorsal region is the most conspicuous male precopulatory display, being alternated with bill-dipping movements. Females sometimes respond with the same displays, but treading may often occur without such mutual behavior. As the male releases his hold of the female’s nape he utters a single courtship call and swims away from her in a rigidly held posture with the bill pointed sharply downward (Johnsgard, 1965a). During aerial chases the males may at times also try to bite the tail of the female they are chasing, but such behavior may simply be a reflection of attempted rape rather than a specific display.

Reproductive biology. Shortly after their arrival on the breeding grounds nearly all females will have formed pair bonds, although it is believed that yearling females are less inclined to attempt nesting than are older birds, and some may breed later or possibly not at all if conditions are not ideal. Paired birds establish rather large home ranges that may include several ponds and at least in males may exceed 1,000 acres; home ranges of adjacent pairs often overlap and little if any aggressive activity occurs among such mated pairs. Females typically construct their nests in the midst of emergent beds of bulrushes, cattails, or reeds (Phragmites), usually in vegetation between 14 and 48 inches high, fairly close to and often within 40 feet of areas of open water that measure at least 50 by 50 feet in size. One or more nests may be started before a complete clutch is produced, or eggs may be randomly dumped in the nests of other ducks. Eggs are laid at the approximate rate of one per day until a complete clutch, averaging 9 to 10 eggs for initial nesting efforts, has been produced. The addition of "parasitic" eggs of redheads and other canvasbacks often increases the actual clutch to a dozen or more eggs. Incubation periods under wild conditions seem to vary considerably, but probably average about 24 or 25 days. Males abandon their mates early in the incubation period, gathering in large flocks at traditional molting lakes and leaving other males to tend their females should renesting be necessary. In some years excessive flooding or cold weather results in massive nest desertion, and a
resulting high degree of attempted renesting; additionally, predators such as raccoons, skunks, ravens, and crows are all locally serious sources of nest losses. Young canvasbacks have a relatively long fledging period of from 58 to 68 days, and females may abandon their young at a relatively early age to undergo their own molt, particularly among late-hatched broods. The flightless period for such birds is about three or four weeks, and a few females may remain unable to fly well into early fall, even into October in the areas of Delta, Manitoba (Hochbaum, 1944). Both juveniles and adult females suffer unusually high mortality rates for reasons that are still somewhat uncertain, but hunting is known to be an important factor in these losses.

**Status.** During two periods of the 1900s the canvasback has been known to be at perilously low population levels—during the dry years of the 1930s, and again during the 1960s and early 1970s, when a combination of unfavorable breeding years and excessive marsh destruction caused a serious and seemingly irreparable decline in their numbers. Bellrose (1976) reports that winter counts between 1955 and 1974 have indicated a reduction of more than 50 percent in numbers in all flyways but the Central Flyway, and that breeding-ground surveys over the same period suggest an average population of 560,000 birds for the major breeding areas. The badly unbalanced sex ratio of canvasbacks, their declining areas of prime breeding habitats, their sensitivity to oil or other pollution sources in their prime wintering areas, and their vulnerability to hunting all combine to make the future status of the canvasback a most uncertain one.

**Relationships.** In addition to its obvious close relationship to the redhead, the canvasback is even more similar to the Eurasian pochard in morphology and behavior. It is generally believed that the two North American forms must have evolved as a result of a double invasion of the continent from an ancestor similar to the Eurasian pochard, with one species (the redhead) adapting to more westerly and alkaline marsh conditions and the other becoming adapted to the deeper, less alkaline prairie marshes of the central plains and lowlands of North America. Although the two species seem to be effectively isolated from hybridization, they often forage in mixed flocks and probably compete to some degree for the same foods.

**Suggested readings.** Hochbaum, 1944; Erickson, 1948; Stoudt, 1971.
are also gray, with no obvious speculum, while the primaries are more brownish, especially at their tips. The iris is red, the bill is mostly dark bluish, with a pale band between the nostrils and the blackish tip. The legs and feet are bluish gray, with darker webs.

Males in eclipse resemble females, but retain a yellow to reddish iris color and show some vermiculations on the upperparts. Females have a brownish head, which is darker on the crown and hind neck and buff on the chin and throat, and also shows a buffy eyering and a vague pale stripe behind the eyes. The upperparts are brown or gray vermiculated with brown, while the rump, tail coverts, and tail are brownish black. The breast is brown, shading to pale gray on the abdomen and flanks. The upper wing coverts are grayish brown, without vermiculation; the secondaries are gray; and the primaries are dark brown. The iris is brown, the legs and feet are slate gray with darker webs, and the bill is similar in color and pattern to that of the male. Juveniles resemble adult females, but have more mottled underparts, and young males have a ruddier head.

In the field, European pochards are sometimes found with and may be confused with red-crested pochards, but the reddish bill of the latter will separate them. In the unlikely event that they are seen in company with canvasbacks or redheads, the broad and conspicuous pale band across the bill is the best distinguishing mark (redheads may have a narrow and indefinite area behind the black bill tip, too); otherwise the birds look almost perfectly intermediate between these two species and might be regarded as possible hybrids. Females have the usual two general pochard calls, a growling \textit{brrrr} or \textit{errr} associated with inciting, and an aggressive \textit{pack} or \textit{back}. Males produce a soft, breathing \textit{wiwierrr} and a
louder kil-kil-kil during display, but neither is particularly penetrating.

**Natural History**

Habitat and foods. The breeding habitat of this species apparently is identical to the habitats used by the redhead and canvasback in North America—namely, fairly fresh-water or alkaline marshes that are rich in submerged vegetation and are surrounded by emergent shoreline plants. Slowly flowing rivers and sometimes even eutrophic lakes are used for breeding also. Some open water areas are needed for landing and taking off, and most foraging is done at depths of only one to three meters, with the birds usually remaining submerged for periods of 15 to 30 seconds. The leafy parts and stems of aquatic plants such as muskgrass and pondweeds are the primary items of diet, although the seeds of these and other aquatic or shoreline species are also eaten, especially shortly after they have ripened. During the summer, insects are eaten in considerable quantities, not only by ducklings but also adults, with caddis fly larvae and the larvae of midges being particularly important. Birds that winter in coastal regions also consume considerable quantities of animal materials, such as cockles (Cardium) and other mollusks. However, Olney (1968) reported a very low incidence of animal foods among birds taken in inland waters of southeastern England and Northern Ireland, with nearly half of the volume of the food materials consisting of the spores and fruiting bodies of muskgrass.

Social behavior. Pochards become sexually mature their first winter of life, and presumably many females attempt to nest the following spring, but specific data are still lacking on this point. Social display occurs over an extended period, from December through early July in Bavaria according to Bezzel (1959, 1969), who noted that the incidence of paired females remained quite low until about April, when it sharply rose until June, when all females appeared to be paired. This was appreciably later than the other species present in the area. The calls and postures of this species are extremely similar to those of the canvasback. For example, inciting in the female consists of alternated lateral threatening movements and strong neck stretching, with associated errr notes. Males perform kinked-neck and headthrow displays much like those of the canvasback, but the associated call is a soft, breathing uiwierrr. During the sneak posture, performed in nearly the same manner as in the canvasback, the same or a very similar call is also uttered. A louder kil-kil-kil sound is also produced by courting pochards, and perhaps corresponds to the coughing call of other pochard species. There is still very little information available on copulatory behavior in this species, but it possibly lacks display preening as a precopulatory display (Johnsgard, 1965a; Bauer & Glutz, 1969).

Reproductive biology. At least in the U.S.S.R., females often seek out nest sites that are located either in reed beds or on floating mats of reeds or other vegetation. In one area there, nearly half of the nests were among reed beds in shallow water of up to 30 centimeters in depth. During years of high water levels, when there are few emergent reed beds or floating mats, the birds may nest in sedge tussocks, in flooded fields, or under bushes on hummocks. The clutch typically numbers about 8 eggs, but often varies from 6 to 9, and multiple clutches may number as much as 25. Males depart at about the time incubation is initiated. Incubation requires from 24 to 28 days, averaging about 25 days. The fledging period is probably from 50 to 55 days, and females apparently remain with their offspring for most or all of this period (Dementiev & Gladkov, 1967; Bauer & Glutz, 1969).

Status. In contrast to the declining status of the redhead and canvasback in North America, the Eurasian pochard seems to be prospering, at least in northwestern Europe, where about 225,000 birds winter, in addition to some 750,000 that winter in the Mediterranean and Black sea area. The largest breeding concentrations occur in western U.S.S.R., representing some 200,000 pairs, but considerable numbers also breed in Finland, France, the Netherlands, Sweden, and East Germany, and a few hundred pairs occur in Denmark, Britain, and Spain (Ogilvie, 1975).

Relationships. The relationships of the canvasback, redhead, and Eurasian pochard have been considered by numerous writers; and although neither North American species is conspecific with the Old World form, it seems the Eurasian pochard is somewhat closer to the canvasback than to the redhead. This is suggested by its courtship behavior as well as its general ecological adaptations.

Redhead

*Aythya americana* (Eyton) 1838

Other vernacular names. Red-headed pochard; Rotkopfente (German); milouin américain (French); cabaza roja (Spanish).

Subspecies and range. No subspecies recognized. Breeds in North America from central Canada south to southern California, New Mexico, Nebraska, and Minnesota, with local breeding farther east and in Jalisco, Mexico (*Auk* 95: 152). Winters from Washington east to the middle Atlantic states and south to the Gulf Coast of Mexico and Guatemala. See map 99.

Measurements and weights. Folded wing: males, 230-42 mm; females, 210-30 mm. Culmen: males, 45-50 mm; females, 44-47 mm. Weights: adult males in fall average ca. 1,080 g, and females ca. 1,030 g, with maximum fall weights of 1,361 and 1,314 g, respectively. Eggs: av. 62 x 44 mm, white, 65 g.

Identification and field marks. Length 18-22" (40-46 cm). Plate 48. Adult males in breeding plumage have a bright reddish head and upper neck, with the lower neck, foreback, and breast black. The rest of the foreback and scapulars are vermiculated with black and white, producing a dark gray overall effect. The hind back is dusky, grading to brownish black on the upper and under tail coverts, and the tail is sooty brown. The sides and flanks are vermiculated, as is the back, while the rest of the underparts are white. The underwing surface is mostly white, and the upper wing coverts and tertials are fairly uniformly gray. The primaries and their coverts are brownish gray, and the secondaries are silvery gray with paler tips, the inner secondaries being narrowly margined with black. The bill is mostly pale bluish, with a whitish band behind the black tip, and sometimes with a black stripe behind the nostrils. The iris is lemon yellow, and the legs and feet are dark greenish gray, with darker webs. Females have a mostly reddish brown head and neck, darkest on the crown and palest around the base of the bill, with a faint pale eye-ring and postocular stripe. The chin is white, shading into a grayish brown throat and foreneck; the breast, sides, and flanks are brownish, the feathers having buffy tips. The rest of the underparts are whitish mottled with brown, while the upperparts are dark grayish brown, with ashy white speckling or tipping on the feathers. The tail is sooty brown. The upper wing coverts are mostly brownish gray, while the primaries and their coverts are light brownish gray and the secondaries are dark silvery gray tipped with whitish coloration and the inner secondaries are narrowly margined with black. The bill is grayish blue, with a darker tip and a faint pale band behind it, the iris is brown, and the legs and feet are greenish gray. Males in eclipse are similar to females, but have a more reddish brown head and a dull yellow orange iris. Juveniles resemble adult females but are more heavily mottled. Differences in the iris coloration of the sexes appear as early as eight to ten weeks after hatching, and males begin to show brownish red feathers in the cheeks at about this time.

**Natural History**

Habitat and foods. The preferred breeding habitat of redheads consists of nonforested environments with water areas that are sufficiently deep to provide permanent and fairly dense emergent vegetation for nesting. These include potholes and marshes that are usually somewhat alkaline and at least an acre in size, with an interspersion of open water covering from about 10 to 25 percent of the surface, and with emergent vegetation reaching about 20 to 40 inches in height. On the breeding grounds both aquatic vegetation such as the vegetative parts of pondweeds and various small invertebrates, including insect larvae, mollusks, and crustaceans, are consumed. A higher proportion of plant foods occurs on migration and wintering areas. On brackish or salt-water areas wigeon grass and shoal grass (*Diplanthera*) are sometimes especially important, but the rootstalks, stems, leaves, and seeds of a variety of submerged aquatic plants seem to be taken, depending upon their availability (Johnsgard, 1975; Bellrose, 1976).

Social behavior. Like canvasbacks, redheads often form rather large flocks during fall migration where favored foraging areas occur, and such flocks often number in the thousands of birds. By midwinter the birds are in full nuptial plumage, and courtship behavior is apparently initiated on the wintering grounds. Probably all females form pair bonds during their first winter, even though it is believed that a substantial number of presumed yearling females may not attempt to nest. Pair-forming behavior is prevalent during the northward migration in spring.
and probably peaks about late April, when the first birds arrive on their breeding grounds. As in canvasesbacks, most pair-forming behavior occurs on the water, although aerial chasing is prevalent late in the spring. The distinctive and rather catlike call of the male at this time is uttered with an extended and kinked-neck posture, or during a head-throw, in which the nape is brought all the way to the base of the bird’s tail. Aggressive neck stretching is frequent, and a softer sound resembling a weak cough is also produced. Females perform the typical pochard inciting, with strong neck stretching and a rather soft growling note, and this is usually followed by the male’s attempting to swim ahead of the female and turning the back of the head toward her, often with the crown feathers strongly depressed. Copulation is initiated by the male, through alternated bill-dipping and dorsal preening displays that may also be performed by the female. She then assumes a prone posture, and after treading, a single courtship call is produced by the male before he swims away from her in a rigidly held bill-down posture (Johnsgard, 1965a; Weller, 1967c).

Reproductive biology. When the paired birds have become established on their breeding grounds, they establish home ranges that overlap with those of other breeding pairs, although little or no intolerance between them results. Frequently two areas are used by breeding birds, a waiting-site pothole and a nesting-site pothole, which may be from about 50 to nearly 700 yards apart. Evidently a substantial proportion of females do not attempt to nest; Weller (1959) estimated that as many as half the females on the breeding grounds may fall into this category. At least some of these birds may be responsible for the high incidence of eggs that are dropped in the nests of breeding redheads, canvasesbacks, and other duck species. These “parasitically laid” eggs have a low hatching success, and probably increase desertion and reduce hatching success in host nests. Females that do construct nests normally do so in thick beds of emergent vegetation, usually hardstem bulrush, but at times do select sites on dry land, particularly late in the breeding season. The average clutch size is difficult to establish, owing to parasitic nesting, but probably averages about 7 or 8 eggs. At least in some areas, renesting is fairly frequent as a result of nest failures through destruction or desertion caused by intruding females. Most males probably desert their mates shortly after incubation is underway, but in rare instances will remain until the time of hatching or even beyond. Nesting success is evidently quite low among redheads, and the hatching success of parasitically laid eggs is particularly low (Weller, 1959). Olson (1964) believed that about half of the redheads hatched in Manitoba study areas were actually reared by canvasesbacks, the redhead’s most common host species. There is some controversy about how effective redhead females are at rearing their own young; brood mergers tend to make brood counts unreliable estimates of duckling mortality, but many older broods often appear to be untended by adults. The fledging period ranges from 56 to 73 days, and by the time the ducklings are eight weeks of age they will have been deserted by the female. The female then undergoes a relatively long flightless period of five to six weeks, which results in a quite late resumption of flight capabilities and in part might contribute to the relatively high vulnerability of females to hunting mortality in the fall.

Status. According to Bellrose (1976), the breeding populations of redheads during the twenty-year period 1955–74 averaged about 650,000, with
substantial year-to-year variations. Winter surveys during the same period averaged 590,000 birds, with 80 percent of these birds located along the Gulf Coast from Florida to the Yucatán Peninsula. The low average nesting success of female redheads, their high vulnerability to hunting, and the concentration of the breeding populations in areas subject both to marshland drainage and periodic botulism outbreaks makes the long-term outlook for this species extremely pessimistic.

Relationships. As indicated in the section on the canvasback, these two species are clearly closely related, and presumably both are derived from an ancestral type not greatly different from the modern-day Eurasian pochard through a process of a double invasion of the North American continent.


Ring-necked Duck

*Aythya collaris* (Donovan) 1809

Other vernacular names. Ring-billed duck, ringneck; Halsringente (German); morillon à collier (French); pato de collar (Spanish).

Subspecies and range. No subspecies recognized. Breeds in North America from the Mackenzie District through the forested parts of southern Canada, south locally to California, Colorado, Nebraska, Iowa, Pennsylvania, and New York, and from New England to Nova Scotia. Winters along the Pacific coast from British Columbia to Baja California, in most of Mexico and adjoining Central America, along the Atlantic coast from Massachusetts southward, and in the West Indies. See map 100.

Measurements and weights. Folded wing: males, 195–206 mm; females, 185–95 mm. Culmen: males, 45–50 mm; females, 43–46 mm. Weights: adult males shot in the fall average ca. 790 g, and females ca. 690 g, with respective maximum weights of 1,087 and 1,178 g. Eggs: av. 58 x 41 mm, creamy, 51 g.

Identification and field marks. Length 15–18" (40–46 cm). Males in breeding plumage have a black head, with a greenish gloss and a slight crest, terminated by an inconspicuous chestnut collar at the base of the neck. The upperparts are brownish black with a greenish gloss; the breast is black; the sides and flanks are finely vermiculated with black and white except immediately behind the black breast, where a white bar extends in front of the wing to the back. The tail coverts are black, and the tail is slate brown. The tertials and upper wing coverts are mostly dark grayish brown, with the larger coverts and tertials glossed with green, while the primaries and their coverts are dusky brown. The secondaries are dark gray, the outer ones usually tipped with dusky coloration and white, while the underwing surface is white. The iris is yellow; the bill is bluish gray, with a black tip, a white ring at the base of the mandible, and a pale band behind the black tip. The legs and feet are grayish blue, with darker webs. Females have a medium brown head with a blackish brown crown and whitish cheeks, throat, and chin, as well as a definite whitish eye-ring and postocular stripe. The back of the neck, foreback, sides, and flanks are brown, the feathers with lighter margins, while the rest of the back is blackish brown. The rump and upper tail coverts are blackish, the tail is slate brown, and the under tail coverts are white to dusky brown. The rest of the underparts and the underwing surface are white, and the wings are colored as in the male, except that the greenish gloss is lacking. The iris is brown, the bill is generally similar to the male's but duller (and not whitish at base as often depicted), and the legs and feet are grayish, with darker webs. Males in eclipse resemble females but are darker and retain a glossier upper wing surface and a yellowish eye. Ju-
veniles resemble adult females but are darker above and more mottled below.

In the field, male ring-necked ducks are most likely to be confused with scaup, while females are difficult to distinguish from female redheads. The white extension in front of the wing and the nearly black back coloration provide the best criteria for recognizing male ring-necked ducks, while females can usually be distinguished from female redheads by their more obvious eye-ring and postocular stripe, as well as their more grayish and blackish two-toned head pattern, as opposed to the more uniformly brownish head color of female redheads. In flight, ring-necked ducks lack the pale gray to white secondary markings typical of all other pochards, and their generally dark upper wing coloration, as contrasted to their white underwing surface, provides a very useful guide to identification. Females are relatively quiet but utter soft rrrr notes during inciting, while males have a soft breathing note and a louder whistling call that are also uttered on the water during display.

**Natural History**

**Habitat and foods.** The preferred breeding habitats of ring-necked ducks are sedge-meadow marshes, swamps, and bogs with waters ranging from fresh to somewhat acidic in pH, and especially those with surrounding cover of sweet gale (Myrica) or leatherleaf (Chamaedaphne). Floating-leaf aquatic plants that often are associated with nesting ring-necked ducks include water lilies (Nymphaea and Nuphar) and water shield (Brasenia). The seeds of water lilies and water shield and the seeds and vegetative parts of pondweeds are all important foods, as are the seeds of such emergences as bur reed (Sparaganiun), spike rush (Eleocharis) and bulrush, and the tubers of bulrush. In winter the birds occupy a variety of acidic, fresh-water and brackish habitats, including marshes, shallow lakes, estuarine bays, and coastal lagoons, but are generally found on less brackish waters than other pochards. Fall and winter foods include many of the same kinds of plants as consumed during summer and a small proportion of animal materials, such as mollusks and insects (Mendall, 1958; Johnsgard, 1975).

**Social behavior.** Ring-necked ducks are usually found in fairly small flocks during fall migration, and often show considerable sex segregation. A few birds appear to be paired even by October; presumably these are birds that had been mated the previous spring. Extensive social contacts begin on the wintering grounds, where pair-forming behavior becomes frequent, although it probably does not reach a peak until spring migration during March and April. Sexes renew their pair bonds annually, and evidently all females become paired their first year, since it is thought that at least most females breed as yearlings. Courtship behavior in ring-necked ducks is less conspicuous than in canvasesbacks or redheads, since the associated vocalizations are weaker and the posturing is less evident. Males have a rapid head-throw display and kinked-neck call as in these species, associated with a soft whistling note, and often perform neck stretching with the crown feathers distinctively raised to form a triangular profile. A very inconspicuous sneak posture, with the head moved forward while the crown feathers are lowered, is also performed, and males also lower their head feathers
when swimming ahead of inciting females and turning the back of the head toward them. Female inciting is the major display of that sex, and apparently plays an important role in stimulating courtship display as well as in forging pair bonds with a specific male. Copulation is preceded by the usual pochard bill-dipping and dorsal-preening behavior, and is followed by the equally typical single male call and bill-down posture (Johnsgard, 1965a).

Reproductive biology. As pairs return to their nesting areas, they establish home ranges that often overlap with those of other pairs and usually are near the area where the female was hatched. Breeding densities in favorable habitats tend to be higher than those of redheads or canvasbacks, perhaps reflecting less specific nesting requirements and a high degree of tolerance of other resident pairs in the same area. Nest sites are usually chosen on small floating mats of vegetation, amid clumps of emergent rooted vegetation, or on actual islands, with sedges, sweet gale, and leatherleaf being preferred nesting covers. Nests are usually placed but a short distance from open water, and additionally, space for landings and takeoffs is generally within 100 feet of the nest (Townsend, 1966). Clutches are laid at the rate of one egg per day and average 8 to 9 eggs for initial nesting attempts; renest clutches average 7 to 8 eggs. Females are apparently persistent renesters, and at least one case of a second renesting effort has been reported. Incubation is performed by the female alone and requires 26 to 27 days, with the male usually abandoning his mate during the last two weeks of incubation. Female ring-necked ducks are apparently more effective mothers than redheads or canvasbacks, and relatively few abandon their broods before they attain flight at the age of 7 to 8 weeks, even though they themselves may enter their flightless stage before that time. The duration of the flightless period is probably three or four weeks, with females molting about a month later than the males, which typically gather in molting areas some distance from the nesting grounds (Mendall, 1958; Erskine, 1972a).

Status. According to Mendall (1958), ring-necked ducks became much more abundant and extended their range in the northeastern states between the 1930s and 1950s, for reasons still not evident. Breeding-ground inventories between 1955 and 1973 suggest an average population of about 460,000 birds, with major annual fluctuations (Bellrose, 1976). Likewise, winter inventories have produced large annual variations in counts but no discernible trends during this period. Ring-necked ducks are obviously less susceptible to loss of breeding habitat through marsh drainage than are canvasbacks and redheads, and breed in areas of minimal agricultural significance and human disturbance, so there is at present no reason for concern over the long-term outlook for this uniquely North American species.

Relationships. No doubt as a result of their superficial similarity to the scaups, ring-necked ducks have very often been thought of as close relatives of that group. However, comparison of the plumages of downy young and of females points out their close affinities with the typical pochards, and their foraging tendencies as well as their display patterns also confirm this relationship (Johnsgard, 1965a).


Australasian White-eye

*Aythya australis* (Eyon) 1822

Other vernacular names. Hardhead, white-eyed duck; Australische Moorente (German); milouin d’Australie (French); pato ojos blancos de Australia (Spanish).

Subspecies and ranges. (See map 101.)

A. a. australis: Australian white-eye. Resident in Australia, occurring throughout, as well as in Tasmania, with populations of uncertain status (possibly periodic occurrences) in East Java, the Celebes, New Guinea, New Caledonia, and formerly also New Zealand.

A. a. extima: Banks Island white-eye. Resident on Banks Island.
Measurements and weights. Folded wing: males, 183–243 mm; females, 186–234 mm. Culmen: males, 35–50 mm; females, 39–49 mm. Weights (of *australis*): males, 525–1,100 g (av. 902 g); females, 530–1,060 g (av. 838 g). Eggs (of *australis*): av. 54 x 42 mm, pale cream, 60 g.

Identification and field marks. Length 18” (46 cm). Adult males are generally dark brown throughout, with the head, neck, breast, and mantle nearly uniformly rich brown, while the scapulars and flanks are slightly edged or barred with buffy or whitish coloration. The lower breast and abdomen are white to brownish, and the under tail coverts are white. The tail and upper wing surface are brown, except for the secondaries and the inner primaries, which are white with brown tips. The bill is dark gray, with a black nail and a pale grayish bar near the tip, the legs and feet are gray, and the iris nearly white. Females are similar to males, but are generally lighter and have a brown iris. The bill pattern is also more evident than that of the male. Juveniles resemble adult females, but are paler and have more mottled underparts.

In the field. the pochardlike body shape separates this from other Australian ducks, since no other member of this group occurs in Australia. In addition, the white eye of the male is distinctive, and both sexes have relatively conspicuous white under tail coverts. In flight, the white speculum, extending well out into the primaries, is highly conspicuous. Like that of other pochards, the voice of the female is relatively harsh and not very loud, while the male
evidently produces only a soft whistling note and a whirring call, both uttered during display.

NATURAL HISTORY

Habitat and foods. According to Frith (1967), Australian white-eyes exhibit a preference for deep water areas having abundant emergent vegetation such as is present in cattail swamps and lignum-lined creeks. They sometimes also occur on coastal swamps and fresh-water lakes such as those at the mouth of the Murray River, and although they are sometimes found on the deep mountain lakes of the southern tablelands, they rarely if ever breed in these areas. Like all pochards, these birds forage primarily by diving, but they have been observed upending as well, in addition to dabbling in shallow water and stripping seeds from overhead plants. Extensive samples of food remains from birds collected in New South Wales indicate a strongly vegetarian diet, with the seeds and flowers of grasses and sedges alone accounting for more than half of the volume. In a similar number of samples from northern Queensland, grass seeds were nearly lacking but those of water lilies and smartweeds (Polygonum) were correspondingly more important. In both areas animal foods were relatively insignificant, and consisted mainly of aquatic insects and some surprisingly large mussels (Frith, 1967). In a sample of over 300 gizzards from a permanent swamp in New South Wales, pondweeds were found to be the most important single food source, and various mussels and snails were the primary animal foods represented (Frith et al., 1969).

Social behavior. In spite of this species' tendency to inhabit permanent swamp areas, it does at times spread out considerably, particularly in summer, when these swamps become drier and force the birds to move elsewhere. With extended periods of drought very extensive movements to deeper waters may occur, resulting in concentrations of 50,000 to 80,000 birds in extreme cases. On the other hand, during years of interior flooding the birds can also take advantage of this situation and begin breeding rapidly, shortly after the gray teal and black ducks initiate their nesting activities (Frith, 1967). Thus either pair bonding must be relatively permanent, or the birds must have the ability to establish pairs quite rapidly when breeding conditions become favorable. This latter is more probably the case. Pair-forming behavior has not been studied in the wild, and observations of captive birds indicate that the same array of displays is present as in other pochards. The inciting by females consists of direct threatening movements alternated with partial retreats, and is accompanied by a rather harsh and rattling call. Strangely, females also fairly regularly perform the same head-throw display as do males, and infrequently utter the kinked-neck call as well. In the males this latter display is very common and especially conspicuous because it is usually uttered in rapid succession several times, with a strong retraction of the neck each time. The head-throw is strongly developed, and is distinctly asymmetrical, with the bill being tilted in the direction of the courted female as it is brought forward from the back. In both of these displays a soft whirring sound is produced. Males also perform a threatlike sneak display, and at times nod-swim. Display preening is frequent and is especially conspicuous because of the white speculum pattern that is thus exhibited. During precopulatory display the male alternates bill-dipping and dorsal preening displays with slight head-pumping movements, to which the female apparently makes no overt response. After treading, the usual kinked-neck call is uttered, followed by the male's swimming away in a rigid bill-down posture (Johnsgard, 1965a).

Reproductive biology. Breeding in this species varies somewhat with location in Australia. In the winter rainfall area of southwestern Australia, nesting occurs in the spring, between October and November. In the permanent swamps of inland New South Wales, most clutches probably occur between September and December. Progressively farther north the influence of the summer rains becomes more evident, and in Northern Australia nesting may occur as late as April and May. Finally, in the arid interior where flooding is unpredictable, breeding can occur at any favorable time. Nests are usually constructed in water that is several feet deep, and often are in cattail cover, in reeds, or even in lignum or in the butts of flooded trees. Observed clutches have ranged from 6 to 18 eggs, and generally vary between 9 and 12 (Frith, 1967). Incubation is performed by the female only, and has been established to require 25 days. The fledging period is still not known, but there is no current evidence that the male participates in any way in brood care in this species, so that multiple nesting is not likely to occur.

Status. This species is an important game duck in Australia, and in addition to hunting losses, it has
suffered greatly from swamp drainage associated with agricultural development. Frith (1967) comments that it has declined from being the most abundant coastal species of waterfowl to one that is now rare on the coast and elsewhere is only locally common. Like many of the pochard species around the world, its population could rapidly be endangered by drainage and other habitat alterations of permanent swamps and marshes.

Relationships. This species is obviously a typical member of the white-eye group of pochards, which are all associated with Africa, Europe, and Asia, and have no direct ecological counterparts in the Americas. Probably the species' nearest relative is the Siberian white-eye, with which it shares a number of behavioral similarities (Johnsgard, 1965a).


Siberian White-eye

_Aythya baeri_ (Radde) 1863

Other vernacular names. Baer's pochard, Baer's white-eye, Asiatic white-eyed pochard; Schwarzkopfmoorente (German); milouin de Baer (French); pato ojos blancos de Baer (Spanish).

Subspecies and range. No subspecies recognized. Breeds from Transbaikalia to the lower Ussuri River and the Amur, possibly also on Kamchatka. Winters in southeastern China, occasionally in upper Assam and Burma, and rarely in Japan. See map 102.

Measurements and weights. Folded wing: males, 210–33 mm; females, 186–203 mm. Culmen: males, 48–50 mm; females, 47–48 mm. Weights: males, ca. 880 g; females, ca. 680 g (Palmer, 1976). Eggs: av. 51 x 38 mm, cream, 43 g.

Identification and field marks. Length 18” (46 cm). Adult males in breeding plumage have a glossy greenish black head except for a white chin-spot, a dark reddish brown breast that grades into brown flanks, and upperparts that are blackish brown to chestnut brown. The lower flanks, abdomen, and under tail coverts are white, while the tail and upper tail coverts and lower back are black. The upper wing surface is brown, except for a white speculum formed mainly by the secondaries, which are tipped with black. The inner webs of the primaries are pearl gray, producing an extension of the speculum. The iris is white, the legs and feet gray, with darker webs, and the bill is dark bluish, with a lighter tip and a black nail. Females are generally like the male, but have little or no iridescence on the head and have a brown iris, a duller brown breast color, and usually a light brownish spot between the eye and the bill. Males in eclipse resemble females, but retain a white or nearly white iris. Juveniles resemble adult females, but have russet brown on the abdomen.

_In the field_, this species closely resembles the other white-eyes, but is the only pochard with iridescent color on the head. They do not overlap with any other white-eyed pochard except on their wintering range; there they occur with the smaller and more chestnut ferruginous white-eye. Females utter a coarse _gaaaak_ call, and the males also have a very similar, harsh _kraaaaa_ note, uttered during display, that is quite different from the male calls of the other white-eyes.

Natural History

Habitat and foods. In the breeding season, this species is reported to occupy small lowland lakes, preferably those containing aquatic vegetation and reeds. Treeless rather than forested habitats are preferred as well, and it has been said that on migration the birds may be found on rapidly flowing rivers, although this is certainly not typical pochard habitat.
Virtually nothing is known of the foods taken, but in India the birds are said to be fishy and almost inedible, presumably as a result of animal materials in their diet (Dementiev & Gladkov, 1967). Two birds shot in October had the remains of water plants in their stomachs.

Social behavior. Very little has been recorded on the pair-forming or pair-bonding behavior of this species. It is said that the birds arrive in their nesting areas of the Argun River region already paired, while in the Ussuri region and on the lower Iman they are still in small groups after spring arrival, and pair later. The only descriptions of display in this species are my own observations (1965a) on captive birds, which suggest different affinities from those implied in the general belief that this species is simply an eastern variant of the ferruginous white-eye. Females have a harsh inciting call that is very much like those of the Australian and ferruginous white-eyes, and like these two species also perform a head-throw display almost identical to that of the males. Females also have a display preening behind the wing that is directed to preferred males. The male displays are surprisingly similar to those of the Australian white-eye. For example, the kinked-neck call is the most frequent of the male displays, and is performed repeatedly, with strongly exaggerated neck movements and a harsh *kraaaaaa* call. Also in common with the Australian species, the male often stretches his head and neck forward over the water in a sneak posture, followed immediately by the kinked-neck call. The most elaborate display, the head-throw, is accompanied by the same harsh call given during the kinked-neck display, and as the head is swung forward from its extreme position on the rump it is tilted.
in the direction of the courted female. Display preening of the white speculum is a common display by males, and is often performed mutually with females. Males also typically respond to female inciting by swimming ahead of them and turning the back of the head. Copulatory behavior is of the typical pochard type; but as in the Australian white-eye, it is preceded by slight head-pumping movements by males, in addition to mutual bill-dipping and dorsal-preening displays by both birds. After treading, the usual call and bill-down displays are performed by the male (Johnsgard, 1965a).

Reproductive biology. Very few observations are available on the nesting of this species. The birds are said to nest along the shorelines of lakes or on stream banks, and one nest with 10 eggs has been described from the lower Iman Valley, the nest being situated in dense sedge cover about seven meters from water. In captivity, the clutch size ranges from 6 to 9 eggs, and the latter figure is probably close to the normal clutch size. Johnstone (1965) reported that the incubation period was 27 days in the first case of captive breeding of this species, and that the downy young are about midway in appearance between those of the ferruginous and Australian white-eyed pochards.

Status. Apparently this species is common in the southern Maritime Territory of the U.S.S.R. and in the eastern half of Manchuria, but is relatively rare throughout the rest of its range. In winter it is most common in the central part of China's coastal areas south to the mouth of the Yangtze River (Dementiev & Gladkov, 1967). It also winters uncommonly and erratically in Manipur, Assam, western Bengal, and Bangladesh, but its similarity to the ferruginous white-eye makes its status in this area difficult to determine (Ali & Ripley, 1968). The species is probably not so rare as the little information available on it would suggest.

Relationships. The display repertoire and the pattern of the downy young both suggest somewhat different affinities from those implied by the generally held position that this species is a very close relative, possibly only a subspecies, of the ferruginous white-eye. Instead, its nearest affinities are probably with the Australian white-eye, or at least it seems to provide a real phyletic link between the ferruginous and Australian white-eyes (Johnsgard, 1965a).


Ferruginous White-eye
*Aythya nyroca* (Güldenstädt) 1770

Other vernacular names. Common white-eye, white-eyed pochard; Moorente (German); milouin nyroca (French); pato ojos blancos comun (Spanish).

Subspecies and range. No subspecies recognized. Breeds in southern Europe (mainly East Germany, Hungary, Czechoslovakia, and Poland) east to western Siberia (Ob Valley), south to northern Africa (Morocco and Algeria), Iran, Turkistan, Kashmîr, the Pamirs, and southern Tibet. Winters in the Mediterranean region, the Nile Valley, Persian Gulf, and Burma. See map 103.

Measurements and weights. Folded wing: males, 178–93 mm; females, 172–85 mm. Culmen: males, 40–43 mm; females, 36–40 mm. Weights: males in winter, 500–650 g (av. 583 g); females in winter, 410–600 g (av. 520 g) (Bauer & Glutz, 1969). Eggs: av. 50 x 37 mm, deep cream, 43 g.

Identification and field marks. Length 16" (41 cm). Adult males in breeding plumage have a rich reddish chestnut head and neck, with a small white chin-patch, which is separated by a blackish collar from a breast of the same chestnut color. The breast is separated rather sharply from a white abdomen, duller brown flanks, and a uniformly greenish black mantle. The under tail coverts are white, and bounded anteriorly by blackish coloration; the upper tail coverts and tail are also black, with a greenish gloss. The upper wing surface is mostly dark brown, except for a white speculum formed by the bases of the secondaries and most of the primaries, which are tipped with black. The iris is white, the bill is grayish black, paler toward the tip and with a black nail, and the legs and feet are lead-colored. *Males in eclipse* are
a duller reddish brown color on the head and neck, and the lower neck feathers are edged with sandy or white coloration. Females are generally similar to males, but lack the chestnut tones of the head, neck, and breast, which are instead dull brown, like the flanks and mantle. The iris is brown, but the bill and leg coloration is like the male's. Juveniles resemble adult females, but have silvery brown underparts and blackish barring on the breast, and lack the white under tail coverts of adults.

In the field, these white-eyes might be confused with female tufted ducks or perhaps female scaup, but the uniformly colored face and the conspicuous white under tail coverts of white-eyes should separate the species readily. In flight they closely resemble both of these species, as the wing patterning is nearly identical, and the dark brown head of the male may appear blackish in poor light. The female is known to utter a harsh gak call during display and also an inciting errr note, while the male produces soft wheeeoooo and wee'-whew calls while displaying.

**Natural History**

**Habitat and foods.** The breeding habitats of this pochard species are largely shallow pools of either fresh or brackish water, or rivers that have dense shoreline vegetation and an abundance of submerged aquatic plants. It particularly seems to prefer areas with extensive reed beds, and needs a smaller area of open water than does the Eurasian pochard, with which it overlaps in range appreciably (Voous, 1960). It also seems to prefer shallower waters than does that species, frequently foraging in water from one to four meters in depth, but often remaining under water for nearly a minute. Like Eurasian
pochards, the birds are predominantly vegetarians, and feed on the leafy parts and roots of a variety of submerged plants, including pondweeds, duckweeds, and musk grass. Additionally, they consume seeds of various grasses (*Setaria*, *Echinochloa*, *Hordeum*) and herbs such as smartweeds (*Polygonum*) and pondweeds. Aquatic insects and insect larvae constitute a small part of their diet (Dementiev & Gladkov, 1967; Bauer & Glutz, 1969).

Social behavior. It is somewhat uncertain whether this species normally breeds in its first year, although Ogilvie (1975) reports that this is the case. Courtship displays may be seen among captive birds over a rather prolonged period in the winter, sometimes as early as January. Females take an active part in the display, performing an inciting that alternates between overt threats or attacks and swimming back toward the preferred males, neck stretching and repeatedly uttering the *gak-gak-gak* call. Another surprising component of female behavior is their rather frequent performance of a head-throw display and a kinked-neck call that are essentially identical to those same displays of males, except for their associated vocalizations. Displaying males often swim about in a distinctive jerky manner called nod-swimming, usually depressing their tail and partially erecting their crown feathers at the same time. They also often utter the kinked-neck call repeatedly, a soft *wheeeoooo* note that is the same or very similar to a call given in a head-forward or sneaking posture. From this posture the bird quickly lifts his head and performs a neck-stretching display, so that the two phases seem to constitute a single display. Males also perform a head-throw display, uttering the same vocalization as made during the kinked-neck call, and another high-pitched and double-noted call is uttered during coughing, as the bird inconspicuously flicks its folded wings. Preening behind the wing and turning the back of the head toward inciting females have also been observed in this species. Precopulatory behavior apparently consists of the male's making bill-dipping and dorsal-preening movements, and the postcopulatory behavior is of the usual pochard type (Johnsgard, 1968a).

Reproductive biology. Apparently female ferruginous white-eyes have a strong tendency to place their nests very close to water; in the U.S.S.R. they typically nest in reed beds, on floating mats of vegetation, on islets or hummocks, and along the bank in emergent shoreline reeds. The usual clutch size is from 7 to 11 eggs, and in rare instances as many as 14 may be present. Clutches of from 16 to 20 eggs have also been found, evidently the result of two females' efforts, and mixed clutches of this species and the Eurasian pochard have also been reported. Presumably the male deserts at about the time incubation gets underway, or at least before the end of the incubation period, which requires from 25 to 27 days. Another 55 to 60 days are needed for the young to attain flight, but the timing of the molts of adult birds with respect to the development of the young is still essentially unestablished (Dementiev & Gladkov, 1967; Bauer & Glutz, 1969).

Status. Population estimates for this southerly and easterly distributed species are quite limited, but it has been estimated that about 140,000 pairs may breed in the western parts of the U.S.S.R. and a very few additional birds in East and West Germany, Czechoslovakia, Hungary, France, Italy, and Spain. A few hundred birds winter in northwestern Europe, but about 75,000 are to be found in the Mediterranean and Black sea area (Ogilvie, 1975).

Relationships. Behavioral evidence suggests that this species might be somewhat apart from the other more typical white-eyes and have some affinities with the scauplike ducks. Information on the Madagascan white-eye is still extremely scant, but it presumably is the nearest relative of this species.


### Madagascan White-eye

*Aythya innotata* (Salvadori) 1894

Other vernacular names. Madagascan pochard; Madagaskar-Moorente (German); milouin de Madagascar (French); *pato ojos blancos de Madagascar* (Spanish).

Subspecies and range. No subspecies recognized. Limited to Madagascar (Malagsi), primarily or entirely on the northern and eastern parts of the island. See map 105.

Measurements and weights. Folded wing: males, 190–201 mm; females, 188–95 mm. Culmen: males, 46–49 mm; females, 44–46 mm. Weights: no record. Eggs: 55 x 40 mm, buffy gray.
Identification and field marks. Length 18" (46 cm). 
*Adults* closely resemble adults of the ferruginous white-eye but are generally darker in color. The male's head and chest are a darker chestnut than in that species, and there is no white chin-patch, nor is there a distinct collar around the neck. Further, the scapulars are not freckled with brown, nor is the white abdomen so sharply defined. The secondaries have distinct black edges on the outer margins of the white speculum patch. The iris is white or nearly white, while the bill, legs, and feet are blackish. 

*Females* closely resemble female ferruginous white-eyes, and like that species have a brown iris and lack chestnut coloration on the head and breast. *Juveniles* are much like those of common white-eyes, but are darker on the scapulars and mantle. 

In the field, this is the only species of pochard likely to be encountered in Madagascar, and thus its body shape alone should separate it from other ducks there.

**NATURAL HISTORY**

**Habitat and foods.** This species is confined to the plateau region of eastern Madagascar, at elevations of about 3,000 to 4,000 feet, from Lake Alaotra south to Antsirabe. Lake Alaotra, where the birds are most common, is about 25 miles long and 7 miles wide, with extensive marsh areas on two sides, and with large beds of papyrus and reeds in the middle. Delacour (1954–64) says that in their behavior the birds appeared to be typical pochards, but no specific information on foraging behavior or foods is available.

**Social behavior.** Delacour (1954–64) was reminded of redheads by this species' display, which he observed in June of 1929. No further accounts of this species' behavior are available, but it would be of interest to have a comparison of its displays with those of the ferruginous white-eye.

**Reproductive biology.** Delacour (1954–64) judged, from the age of immature specimens he obtained, that the breeding season is probably from October to January. Nests have not been found in the wild, but a 26- to 28-day incubation period has been established for captive birds. Unfortunately, none of the captive stock that was imported into Europe survived World War II, and no more birds have been imported since.

**Status.** No recent information is available on the status of this species.

**Relationships.** As indicated in the account of the ferruginous white-eye, this species is presumably an insular derivative of that more widely ranging form, but no detailed studies of anatomy or behavior are available to provide evidence on this possibility.

**Suggested readings.** Delacour, 1954–64.

**Tufted Duck**

*Aythya fuligula* (Linnaeus) 1758

**Other vernacular names.** None in general English use; Reiherente (German); canard morillon (French); pato de copete (Spanish).

**Subspecies and range.** No subspecies recognized. Breeds in Iceland, the British Isles, and most of Europe and Asia north to 70° latitude and south to central Europe, the Balkan Peninsula, Kirghiz steppes, Lake Baikal, the Amur River, Sakhalin, and the Commander Islands. Winters from its breeding range south to northern Africa, the Nile Valley, the Persian Gulf, India, southern China, and the Philippines. See map 104.

**Measurements and weights.** Folded wing: males, 198–208 mm; females, 189–202 mm. Culmen:
males, 38–42 mm; females, 38–41 mm. Weights: males (in February), 1,000–1,400 g (av. 1,116 g); females, 1,000–1,150 g (av. 1,050 g) (Dementiev & Gladkov, 1967). Eggs: av. 59 x 41 mm, greenish gray, 56 g.

Identification and field marks. Length 17–18" (43–46 cm). Males in breeding plumage have a black head and neck, with a long, narrow crest that nearly touches the back. The upperparts are blackish, the scapulars having a greenish cast and faint vermiculations. The breast, tail coverts, and tail are all black, while the abdomen and flanks are white. The upper wing coverts are dark brown, and the secondaries are white with black tips. The primaries are dark brown, with the inner ones having gray or white on the inner webs. The iris is yellow, the bill is pale blue with a black tip, and the legs and feet are lead blue, with darker webs. Males in eclipse are much like females, but are more grayish throughout, with some vermiculations showing on the flanks. Females are similar to scaup females, but are darker dorsally, have a small occipital crest, and show little or no white at the base of the bill. Some females also exhibit a white area on the under tail coverts, but most are dull brown in this region. The soft-part colors are similar to those of the male, but the bill is more grayish and the iris coloration is less bright. Juveniles are similar to adult females, but young males are somewhat vermiculated dorsally and have darker heads.

In the field, tufted ducks are most likely to be confused with greater scaups, but the crest of the male will normally allow for separation, and even the female exhibits a slight crest. Females also have less white in front of the eyes than do scaup females, but this trait is not useful in summer, when female scaup acquire a brownish face pattern. In flight, tufted ducks are extremely difficult to separate from scaup, and the head characteristics just mentioned provide the best clues. The calls of the male tufted duck consist of a mellow weehoo and a rather windy wha'wa'whew, which are very similar to the corresponding calls of the greater scaup. A low growling call and a gack or quack note are produced by females.

**Natural History**

**Habitat and foods.** The breeding-habitat needs of tufted ducks and greater scaup appear to be quite similar; both species are generally associated with larger and deeper bodies of water that have an abundance of invertebrate foods. Tufted ducks also breed on artificial reservoirs, and even on ponds in cities, especially where islands for nesting are available. They also breed along slowly flowing rivers with abundant foods, and throughout the year they concentrate on mollusks, crustaceans, and insect larvae that they probe for among the mud and silt of the bottom debris. They probably usually dive only to depths of about two to four meters, and probably feed on whatever is present in greatest quantities. Olney (1963a) studied the foods taken from tufted ducks in various areas of England and Northern Ireland and found considerable dietary differences, although mollusks or crustaceans predominated in all the samples, with insect remains and plant seeds occurring in minor quantities. In the U.S.S.R. mollusks are also the predominant food in most areas and most times of the year, with crustaceans occurring most frequently among birds using inland reservoirs. Both inland and coastal waters are used by wintering birds, but the birds probably rarely are found foraging where the water is more than six meters in depth (Dementiev & Gladkov, 1967; Bauer & Glutz, 1969).

**Social behavior.** Probably many, but not all, tufted ducks breed at the end of the first year of their life, and females in particular may not nest until their second year. The pair-bond system is one of seasonal monogamy, with pairing beginning in January and reaching a peak in April, when over 90 percent of the females are likely to have obtained mates. This pattern of pairing is later than that typical of the *Anas* species wintering in Bavaria, but earlier than that of the Eurasian pochard (Bezzel, 1959). As might be expected, the social displays of tufted ducks are very much like those of scaups. Females incite with a scauplike neck-stretching movement while uttering soft karrrr notes, and additionally perform display
preening behind the wing as well as a head-throw display comparable to that of the male. Male displays include a three-noted coughing call in a neck-stretching posture, performed with a conspicuous wing- and tail-flicking movement. The head-throw is performed quite rapidly, and is accompanied by a mellow whistling "whee'oo" call, the same sound associated with the inconspicuous kinked-neck posture and call. Males quite frequently preen behind the wing toward females, and in addition they quickly respond to inciting by turning the back of the head toward inciting birds. In common with the New Zealand scaup, but not the greater or lesser scaups, males also perform a nod-swimming display. Copulation is typically initiated by the male, through bill-dipping, dorsal preening, and preening behind the wing. Females may respond in the same way, but often assume the receptive pose quite suddenly. The postcopulatory behavior is of the usual pochard type, with the male calling once with the kinked-neck call, then swimming away in a bill-down posture (Johnsgard, 1965a).

Breeding biology. Tufted duck females exhibit a moderately strong tendency to return to the same area in which they nested the year before, and in Loch Leven, Scotland, they often nest within 50 meters of the previous nest location (Newton &
Campbell, 1976). They are relatively late nesters, and in several areas including Loch Leven have been found to favor nesting among gull or tern colonies, which seems to improve their hatching success. Additionally they are prone to nest on islands when they are available, and at least in Iceland show a strong preference for selecting low shrubs, broad-leaved herbs (Angelica and Archangelica) and to some extent sedges for nesting cover (Bengtson, 1970), while in Loch Leven most nests are in tall perennial grasses (Deschampsia and Phalaris). Females lay relatively large clutches, generally averaging 10 eggs in Iceland and Finland, but having been found in Scotland to decline from about 14 eggs at the onset of the laying season to about 6 at the end of it, with no indication of attempted renesting. The incubation period is normally 24 days, probably varying from 23 to 25 under natural conditions. The higher nesting success found in nests among gull colonies in Scotland has been attributed to the birds keeping jackdaws away from the nesting area. However, when unusual crowding of nests in such areas occurs, the incidence of nest losses from desertion associated with multiple use of the same nests is increased (Newton & Campbell, 1976). Tufted duck broods are raised by females on habitats rather intermediate between the relatively open waters favored by most pochard species and the vegetation-lined potholes used by most dabbling ducks, and ducklings of this species are more prone to hide in vegetation when disturbed than are scaups and other pochard ducklings (Bengtson, 1971b). The fledging period is probably 45 to 50 days, and females apparently remain with their broods for most of this period before becoming flightless.

**Status.** In general, the tufted duck seems to be increasing through much of its European breeding range, and Ogilvie (1975) estimated the wintering population of northwestern Europe to be 525,000 birds, concentrated especially in Denmark, while southern Europe supports about 300,000 wintering birds. In terms of breeding, Finland alone is believed to support about 40,000 pairs, and the birds also occur in the thousands in Iceland, the Baltic states, and Britain. The size of the populations breeding and wintering farther east cannot be estimated at present.

**Relationships.** As I have pointed out earlier (1965a), this species might well be called the “tufted scaup,” as it is clearly a member of that group, and in particular seems to have strong behavioral similarities to the New Zealand scaup. It overlaps appreciably in its ecologic adaptations with the greater scaup and presumably competes with it locally or seasonally, but like the lesser scaup of North America is less prone to use marine habitats in the nonbreeding season.


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**New Zealand Scaup**

*Aythya nova-zealandiae* (Gmelin) 1789

**Other vernacular names.** Black teal, black scaup; Neuseeland-Tauchente (German); morillon noir (French); pato de Nueva Zelandia (Spanish).

**Subspecies and range.** No subspecies recognized. Resident in New Zealand (both islands), and on the Auckland and Chatham islands. See map 105.

**Measurements and weights.** Folded wing: males, 175–87 mm; females, 170–81 mm. Culmen: males, 38–41 mm; females, 35–38 mm. Weights: males, 630–760 g (av. 695 g); females, 545–690 g (av. 610 g). Eggs: 64 x 41 mm, cream, 63 g.

**Identification and field marks.** Length: 16–18” (40–46 cm). Adult males are almost uniformly dark, with a black to iridescent green head, breast, and back, the
back feathers obscurely vermiculated with brownish coloration. The abdomen is whitish, grading to brown on the flanks, and the tail and tail coverts are black. The upper wing surface is generally dark brown to greenish, except for the secondaries, which form a white speculum with a black trailing edge. The bill is bluish, with a black nail, the iris is yellow, and the legs and feet are gray and blackish. Females are generally dark brown in the areas where the male is black, except for a seasonally developed small white patch behind the base of the bill. Soft-part colors are like those of the male, except for a brown iris and somewhat darker bill. Juveniles are similar to females, but lack the white facial patch and have nearly white abdomens.

In the field, the diving-duck profile and extremely dark body coloration should identify this species. In flight, the white wing speculum and a grayish white underwing coloration contrast with the otherwise dark body coloration. Courting males utter a clear, three- or four-noted whistle, with the last note more prolonged, while females have a fairly high-pitched growling call.

Natural History

Habitat and foods. The preferred habitat of this diving duck is on inland lakes and lagoons near the sea, particularly those with clean waters and that are not extremely deep. They also occur on mountain lakes up to about 3,000 feet elevation, and on hydroelectric reservoirs of the North Island, often colonizing only shortly after they are flooded (Falla et al., 1967). They forage in water five or six feet deep, and when diving remain submerged for 20 seconds or more. At such times they keep their wings closed and use their legs and feet as rudders and for locomotion (Oliver, 1955). Like the other scaups, they probably feed predominantly on invertebrate life, but no studies of their food intake have yet been made.

Social behavior. These birds are fairly gregarious, and even during the breeding season some flocks are apparent, suggesting that breeding may be delayed until the second year of life. Social displays have been observed only among captive birds, but seem to be very much like those of the other scaups. Females produce inciting displays with strong neck stretching and associated errrr calls, to which the males respond with a variety of postures and calls. The most frequent male display is coughing, in which the multi-noted whistle described earlier is uttered. They also utter a second whee-whee call while kinking their extended neck, and rather infrequently perform a head-throw display. A sneaking display, with the head and neck extended toward a female or another male, and accompanied by a soft note, is yet another of the male displays. Males often turn the back of the head toward inciting females, but although females have been observed display-preening, this has not yet been reported among males. Copulation is preceded by alternated bill dipping and dorsal preening by the male, to which the female may or may not respond in the same fashion. After treading, the male calls once and then swims away from the female in a characteristic bill-down posture (Johnsgard, 1965a).

Reproductive biology. The nesting season of this species is said to extend from October through March, and the nests are often situated at the very edge of a lake or other water, in dense cover. Sometimes the nest is placed under an overhanging bank, and at other times it is nearly buried among flax roots. The nest is usually extensively lined with down, and the clutch size varies from 5 to 8 eggs. Normally the eggs are laid on alternate days, and incubation requires 27 to 30 days (Reid & Roderick, 1973). Nests are frequently placed close together, in a colonial fashion, and shortly after hatching the ducklings begin to dive for their food, often to considerable depths (Oliver, 1955; Falla et al., 1967). Within 75 days the young are fully feathered and presumably fledged (Reid & Roderick, 1973).

Status. Since 1934 the New Zealand scaup has been protected in New Zealand, and since that time it has perhaps begun to increase and started to reoccupy its drastically reduced original range. It is probable that the establishment of new reservoirs has also helped its status (Williams, 1964). Like some other pochards, it is extremely sensitive to hunting and, if it is to survive, will probably continue to require protection.

Relationships. As suggested earlier (Johnsgard, 1965a), this species is closely related to the tufted duck and to the other two species of scaups. Interestingly, it is the only Southern Hemisphere species of scaup, and it seems strange that neither southern Africa nor southern South America has a counterpart present.

Greater Scaup
Aythya marila (Linnaeus) 1761

Other vernacular names. Bluebill, broadbill; Beringente (German); milouinan (French); costero grande (Spanish).

Subspecies and ranges. (See map 105.)
A. m. marila: European greater scaup. Breeds in Iceland, Scandinavia, and northern Eurasia across much of Siberia, mainly north of latitude 60°, with the eastern limits still uncertain. Winters on the coast of western Europe, the eastern Mediterranean, the Black Sea, the Persian Gulf, and in northwestern India.
A. m. mariloides: Pacific greater scaup. Breeds on the mainland of eastern Asia perhaps as far west as the Lena River, on the islands of the Bering Sea, and in North America from the Bering coast eastward to Hudson Bay and Ungava Bay, and on Newfoundland. Winters along the coast of China, Korea, and Japan, and on the coast of North America from Alaska to California as well as from the Gulf of St. Lawrence to South Carolina.

Measurements and weights. Folded wing: males, 215–33 mm; females, 210–20 mm. Culmen: males, 43–47 mm; females, 41–46 mm. Weights: mixed-age males of mariloides shot in the fall average about 1,000 g; adult males of marila in winter average 1,250 g; while respective female weights are about 900 and 1,200 g. Eggs: av. 62 x 40 mm, brown to olive, 67 g.

Identification and field marks. Length 16–20" (40–51 cm). Plate 49. Adult males in breeding plumage have a head and neck that are black with a greenish gloss, the breast and extreme foreback are also black, while the rest of the back and scapulars are finely vermiculated with black and white. The rump and tail coverts are brownish black, the tail is blackish brown, while the abdomen, sides, and flanks are white, with slight vermiculations often present on the flanks. The upper wing coverts are blackish brown, with some white speckling; the secondaries are white, with a gray band near the tip and narrowly tipped with white; the tertials are dusky, with a greenish gloss; while the primaries are dark grayish brown, with the inner six or seven having a whitish area on the inner webs. The bill is pale blue with a relatively wide (8 mm or more) black nail, the iris is orange yellow, and the legs and feet are grayish blue to greenish. Females have a brownish head with a darker crown and a white facial patch that extends around the base of the bill and across the forehead; a pale whitish area is present in the region of the ear during summer. The neck, back, scapulars, tail, and upper tail coverts are brown, the rump is blackish brown. The breast, sides, and flanks are grayish brown, the feathers tipped with whitish, while the underparts are mostly white except for a brownish area near the vent. The wing coverts and tertials are dark brown, the tertials often faintly glossed with greenish coloration, the primaries are grayish brown, and the secondaries are white, with a brown posterior border. At least some of the inner primaries are distinctly whitish on the inner webs. The bill is grayish blue with a darker nail, the iris is dark yellow to brownish, and the legs and feet are lead-colored, with darker webs. Males in eclipse resemble females but have a darker head with little or no white on the forehead and cheeks, and a more blackish breast. Juveniles resemble adult females but have less white in the face and are generally duller.

In the field, greater scaups are most likely to be confused with lesser scaups. Besides inhabiting more marine environments, greater scaups exhibit a lower head profile produced by a straighter culmen profile and an uncrested head, which in males is green-glossed and in females has more white on the face than occurs in lesser scaups. In flight, both sexes exhibit a greater amount of white on the primaries than do lesser scaups. Female greater scaups have a slightly louder growling arrr call, and males during

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display utter a very soft, cooing wa’hoo note and a triple-noted week whistle.

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**Habitat and foods.** The greater scaup’s preferred breeding habitat consists of tundra or low forest adjacent to tundra, where shallow water areas occur that have grassy shorelines and a high density of invertebrate life such as amphipods and aquatic insect larvae. Summer foods have not been specifically investigated, but probably are much like those of the lesser scaup. During the fall and winter the birds are found on appreciably larger and deeper fresh-water lakes and on more brackish and salt-water habitats than are lesser scaup, and during that time they concentrate largely on bivalve and univalve mollusks such as *Mytilus*, *Mulinia*, and *Littorina*, and to a smaller degree on crustaceans. Their favored winter habitats in coastal areas are brackish and salt-water estuarine bays and coastal bays with foraging areas available where they can feed by diving to about 25 feet, but preferably where the water is only about five feet deep (Cronan, 1957; Stewart, 1962).

**Social behavior.** To a degree greater than most other pochards, scaups seem to exhibit a deferred maturity, with the result that most of the females do not nest until they are two-year-olds, although pair bonds are seemingly formed by yearlings and at least some hand-raised birds breed their first year in captivity. Scaup are highly gregarious on their migratory and wintering areas, and social display probably begins in winter, judging from observations of captive individuals. The fact that the birds often winter well away from shore and that their calls and postures are not highly conspicuous makes information on this phase of the life cycle difficult to obtain. However, their display patterns are very much like those of the lesser scaup, differing mainly in vocalizations and quantitatively in posturing. There is a soft, whistled coughing call, an even weaker wa-hoo note associated with a rapid head-throw or a kinked-neck posture, and several silent displays such as turning the back of the head toward inciting females and
display preening of the wing, exposing the white speculum pattern. Copulation is preceded by the male’s performing bill-dipping, dorsal-preening, and wing-preening movements, to which the female may respond with the same displays. Treading is followed by the male’s uttering a single kinked-neck call and then swimming away from the female in a stereotyped bill-down posture (Johnsgard, 1965a).

Reproductive biology. Greater scaup are fairly late nesters, and usually arrive on their breeding ground the latter half of May. In favored areas the breeding pairs tend to establish overlapping home ranges that are not defended in any manner approaching typical territoriality. Bengtson (1970) reported on such nesting aggregations in Iceland, and Weller et al. (1969) found a similar condition on Great Slave Lake. In both areas, island nesting seems to be prevalent. In the latter region, the birds often placed their nests in the grassy cover of the past year’s growth, often in cracks in rocks or under woody vegetation. In Iceland, perennial herbaceous vegetation or shrubs under half a meter in height provided cover for most of the nests; there is also a strong tendency for scaup to place their nests among colonies of nesting terns or gulls (Hilden, 1964). Normal clutch sizes seem to be rather variable, ranging from about 8 to 10, but the clumped nesting tendencies of scaup often result in females laying eggs in the nests of other scaup as well as those of different species nesting in the vicinity. The incubation period is probably 24 to 25 days, with some estimates of up to 28 days. Males usually abandon their mates fairly early in the nesting period and gather offshore in large flocks, or may migrate some distance for molting. Females also tend to move their young broods to fairly open water, exposing them to chills and higher predation rates, but there is little tendency for brood mergers as in eiders. The fledging period has not been established, but is likely to be similar to the 45- or 50-day period established for lesser scaups in Alaska.

Status. In North America, the greater scaup is easily confused with the lesser scaup during aerial surveys, and thus its actual numbers are hard to estimate. Along the coastal portions of Alaska, the breeding population of greater scaup was estimated to average about half a million birds between 1957 and 1973, and Bellrose (1976) further estimated that the total Alaska population may be about 550,000 birds, with an additional 200,000 nesting in Canada. Ogilvie (1975) estimated that about 150,000 winter in northwestern Europe and another 50,000 in the Mediterranean and Black sea area. No estimates for the segments wintering in central and eastern Asia are available.

Relationships. This species has the largest and most coastal distribution of all the scaups. It is clearly a very close relative of the lesser scaup, and is slightly less closely affiliated with the New Zealand scaup. It is rather surprising that no other Southern Hemisphere scauplike species exist or that the greater scaup has not colonized the temperate parts of South America.


Lesser Scaup

Aythya affinis (Eyon) 1838

Other vernacular names. Bluebill, broadbill, little bluebill; Veilchenente (German); petit milouinan (French); costero chico (Spanish).

Subspecies and range. No subspecies recognized. Breeds in North America from central Alaska eastward to western Hudson Bay and southward locally to Idaho, Colorado, Nebraska, and the Dakotas. Winters from British Columbia south along the Pacific coast to Mexico, Central America, and Colombia, on the Atlantic coast from the mid-Atlantic states south to Colombia, and in the West Indies. See map 106.

Measurements and weights. Folded wing: males, 190–201 mm; females, 185–98 mm. Culmen: males, 38–42 mm; females, 36–40 mm. Weights: adult males shot in the fall average ca. 850 g, and females ca. 800 g, with respective maxima of 1,087 g and 951 g. Eggs: av. 56 x 40 mm, stone to olive, 44 g.

Identification and field marks. Length 15–19” (38–48 cm). Adult males in breeding plumage resemble males of the greater scaup, but have a purplish-glossed and slightly crested head, more extensive vermiculations on the sides and flanks, coarser vermiculations on the back and scapulars, and no white present on the inner vanes of the primaries, although the innermost ones may be quite

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pale. The soft-part colors are likewise the same, but the bill has a narrower (under 7 mm wide) black nail, which is more concave in profile and slightly smaller throughout. Females are very much like female greater scaup, but tend to have a smaller white facial patch, and their primaries lack white in their inner webs. Males in eclipse resemble females but retain darker heads and have little or no white in the cheek area. Juveniles resemble adult females but are generally duller and have less white in the face.

In the field, lesser scaups are difficult to separate from greater scaups, and the criteria mentioned in that species' account should be used. The display vocalizations of the two species differ slightly, with the male lesser scaup uttering a relatively faint whee-o-o-o note and a single-noted wheew whistle. The tendency of the lesser scaup to inhabit fresh-water areas and marshes rather than deeper lakes and tidewater areas also is a useful aid to identification.

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Habitat and foods. Lesser scaup typically breed in the vicinity of interior lakes and ponds with associated low islands and moist sedge meadows and surrounding environments of prairies or partially wooded
Breeding (hatched) distribution of the lesser scaup, including areas of major concentrations (cross-hatched). Wintering distribution indicated by stippling.

parklands. Lakes of moderate depth, especially those with bulrushes near shore and brushy coves, are also favored, particularly if they have abundant populations of amphipods and aquatic insect larvae, which are major foods during the summer. When on migration and during the winter, fresh to brackish waters are favored habitats, but unlike greater scaup, the birds are not often found in salt-water areas. At this time they also feed on a preponderance of invertebrate foods, including fishes and, particularly, mollusks. In their greater dependence on invertebrate foods than on specific aquatic plants, scaup thus differ considerably from most other pochards, and they thus concentrate in areas of abundant animal life at depths that are usually less than 20 feet below the surface (Johnsgard, 1975; Rogers & Korschgen, 1966).

Social behavior. A high degree of sociality is typical of fall and winter flocks of lesser scaup, which often "raft" in the thousands wherever food and protection allow. During the winter pair-forming behavior is initiated, and although apparently only a small proportion of yearling females actually nest, it is probable that all of them form pair bonds during their first year of life. Social display begins relatively late in lesser scaup, probably normally in January or February, or about the time the northward migration is initiated. It continues at a high level of activity through the migration period, and by late April the migrating females passing through eastern Washington are mostly paired. By the time they have arrived on breeding grounds in the Northwest Territories in mid-May, all of the females are paired (Trauger, 1971). Most courtship occurs on the water surface, but it is also marked by frequent diving by the entire courting party, as well as by aerial chases. The calls of the courting male include a soft *whee-oo* note, uttered with a head-throw or a kinked-neck posture, and a louder whistle associated with a convulsive coughlike movement of the body. A rudimentary sneaking display, with the head lowered and pointed toward the female, is sometimes performed, and males very often swim ahead of inciting females with their crown feathers strongly depressed. Display preening behind the wing, exposing the white speculum pattern, is a fairly common display during pair formation in scaup, unlike most other pochards. This display as well as the usual bill-dipping and dorsal-preening postures are performed before copulation. Postcopulatory displays include the male’s typical stereotyped swim away from the female with the bill pointed downward, probably accompanied by the kinked-neck call (Johnsgard, 1965a).

Reproductive biology. As noted earlier, probably only a minority of yearling females attempt to nest, and Trauger (1971) estimated that less than 15 percent of them succeed in hatching broods, while second-year and older females were successful in progressively greater degrees, with more than 40 percent of the latter age group producing broods. Females have a moderately strong tendency to return to their natal areas for nesting, whereas males do not. Upon returning to their breeding grounds, each pair typically occupies a fairly large and poorly defined home range, which is usually shared with other pairs in apparent harmony. Typically the home range is centered on a permanent pothole or marsh from two to five acres in size, at least ten feet deep and surrounded by trees and ungrazed grassland. Nest sites are often in the grasslands areas well away from shore, but usually are within 50 yards of shore and in
herbaceous cover between a foot and two feet in height. Islands, floating sedge mats, and tern colonies are also preferred areas of nesting in some locations. Nesting in association with terns or gulls is not unique to scaup and indeed is fairly common among ground-nesting waterfowl, which apparently gain added protection from some predators by this device (Vermeer, 1970). Eggs are probably laid on a daily basis until the clutch is complete. Early clutches typically number about 10 eggs, while later ones or renesting efforts average progressively fewer. As many as four nesting attempts by a single female have been documented. Males usually abandon their mates at about the time that incubation gets underway, but may stay until about the midpoint of the incubation period, which averages 23 to 25 days. Renesting is often prevalent in spite of the relatively late initiation of nesting in scaup, but in general scaup appear to be relatively inefficient nesters, with most studies indicating successful hatching by no more than about 30 percent of the breeding pairs in typical years. The fledging period of the young is probably between 45 and 50 days, but females often desert their broods well in advance of fledging, frequently when they are but a few weeks old. Motherless broods often merge, further confusing estimates of productivity, and no good information is yet available on mortality of juveniles during their first fall of life (Johnsgard, 1975; Bellrose, 1976).

**Status.** In marked contrast to the situation with the canvasback and redhead, continental populations of lesser scaup seem to have remained fairly stable over the past few decades. Surveys by federal biologists do not attempt to separate the two scaup species, which between 1955 and 1975 have averaged nearly 7 million birds during the breeding season (Bellrose, 1976). These two species are thus the most abundant of the North American pochards, and in spite of seemingly low nesting effectiveness by females the populations have shown no measurable reduction in recent years. As with the ring-necked duck, adaptations for dryland nesting and the use of habitats in western and northern Canada that are still fairly free of human disturbance or development probably help to maintain the scaup populations in a favorable situation.

**Relationships.** The greater and lesser scaups are obviously very closely related, although hybridization under wild conditions has never been proven to occur. It seems likely that the lesser scaup, like the tufted duck in Eurasia, represents a North American offshoot from earlier stock that gave rise to the greater scaup, and the two scaups currently occupy largely complementary breeding and wintering habitats and ranges, although their food intakes are very similar.

**Suggested readings.** Gehrman, 1951; Trauger, 1971.