Ducks, Geese, and Swans of the World: Tribe Mergini (Sea Ducks)

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Tribe Mergini (Sea Ducks)
Eider (Common Eider)

Somateria mollissima (Linnaeus) 1758

Other vernacular names. Eider duck; Eiderente (German); eider ordinaire (French); eidero comun (Spanish).

Subspecies and ranges. (See map 107.)

S. m. mollissima: European eider. Breeds on the coasts of Scotland and northern Eurasia from Scandinavia to Novaya Zemlya and Vaigach Island. Largely sedentary, wintering as far south as France and occasionally to Spain and Italy.
S. m. faeroensis: Faeroe eider. Resident on the Faeroe Islands.
S. m. dresseri: American eider. Breeds along the coasts of Labrador, Newfoundland, Quebec, Nova Scotia, New Brunswick, and Maine. Winters mostly from the Gulf of St. Lawrence to Massachusetts and eastern Long Island.
S. m. sedentaria: Hudson Bay eider. Breeds on the coast and islands of Hudson Bay from Cape Fullerton to the east coast, south of Southampton Coats, and Mansel islands, and south to James Bay. Winters mostly in the vicinity of the Belcher Islands.
S. m. borealis: Northern eider. Breeds from Somerset and Elsemere islands south to Southampton Island, Hudson Strait, and northern Labrador, and probably also on Greenland and Iceland (the Iceland population is sometimes considered mollissima, and sometimes is separated, along with birds from Greenland, Spitsbergen, and Norway, as a distinct form, islandica). Winters from southern Greenland and Labrador south to Nova Scotia and rarely to New England.
S. m. v-nigra: Pacific eider. Breeds in eastern Siberia, on the islands of the Bering Sea, and in northwestern North America from Cook Inlet northward and around the Bering Sea coast and also west of the Arctic Ocean to Victoria Island and Coronation Gulf. Winters in the Bering Sea, primarily around the Aleutian Islands.

Measurements and weights. Folded wing: males, 269–328 mm; females, 266–95 mm. Culmen: males, 49–61 mm; females, 44–57 mm. Weights: adult males of sedentaria, 2,450–2,725 g (av. 2,500 g); females, 1,575–1,825 g (Freeman, 1970). Males of dresseri shot in the fall average ca. 2,000 g, and females ca. 1,500 g. Males of v-nigra shot in the fall average ca. 2,600 g, and females ca. 2,500 g. Eggs (of mollissima) average 77 x 50 mm, olive green, 110 g.

Identification and field marks. Length 22–28” (56–71 cm). Plate 50. Adult males in breeding plumage have a black forehead and black area around the eye and crown, which is divided in the middle by a white streak to the hind neck. The rest of the head is white except for a gray green patch extending from the ear to the occiput, interrupted by a narrow white line near the back of the head, and (in v-nigra only) a black V-mark passing from the chin back along the sides of the throat. The neck, breast, and mantle are white or creamy white, the rump, tail coverts, and tail are black, and the rest of the body is black except for a white patch on each side of the rump. The sickle-shaped tertials and most upper wing coverts are white, except for the greater secondary coverts, which are black. The secondaries are black, and the primaries and their coverts are grayish black. The iris is dark brown, the feet are olive green to yellowish, with blackish webs, and the bill varies from greenish or olive to bright orange (in v-nigra), with a variably wide upward extension toward the eyes and a grayish nail. Females have a grayish brown head and neck that is finely streaked with black. The breast is dusky brown with blackish barring, and the sides, flanks, back, and upper tail coverts are brown (grayish in sedentaria) with darker brown barring, as are the upper wing coverts, except for the greater secondary coverts, which are unbarred and tipped with white. The primaries and their coverts are brown, the secondaries are brownish tipped with buff, and the underparts are unmarked brown. The iris is brown, the bill gray, and the legs and feet greenish yellow, with...
darker webs. *Males in eclipse* are mostly dark-colored except for the white wings, the body being generally blackish brown except for a few white feathers on the breast, a light brown crown, and usually some white feathers on the back. *Subadult males* resemble adults, but have gray tertials and wing coverts and duller black underparts. *Juveniles* do not resemble adult females, but are dull brown, lacking strong barring or white markings on the feathers. Males develop a whitish breast during their first winter and generally resemble an adult in eclipse plumage.

In the field, the large size and marine habitat of eiders separates them from most waterfowl except scoters, and no scoter species exhibits white on the back and breast. Common eiders are the only eiders in which the males have a black crown stripe that effectively hides the eye, and they also are more extensively white on the breast and back than are the other large eiders. Females have strong vertical barring on their sides and flanks, and thus differ appreciably from female king eiders. They also lack the eye-ring markings of the spectacled eider. In flight, eiders are slow and ponderous in spite of a rapid wingstroke, and males may be easily identified by the black crown markings and their more extensively white upper wing and back coloration. During display, males utter several courtship notes that are all dovelike cooing sounds, and females produce several loud and rather hoarse-sounding calls. Calling during flight is apparently infrequent.

**Natural History**

**Habitat and foods.** During the breeding seasons, eiders seek out low-lying rocky coastlines with numerous islands, with more limited usage of sandy islands and coastal fresh-water lakes or rivers. Boulder-covered islands are preferred to gravel- or rock-covered ones, and grassy islands are chosen over shrubby or wooded ones. In some areas the birds nest well away from the coast, near tundra ponds, but usually they remain close to marine foods. Even during the summer, foods consist mostly of such invertebrates as amphipods, isopods, and bivalve mollusks, especially mussels (*Mytilis*) and periwinkles (*Littorina*), and smaller amounts of univalve mollusks and echinoderms. During fall and winter the birds are found well away from shore, but apparently continue to concentrate on mollusks and crustaceans as dietary staples, usually foraging over mussel beds between two and ten meters below the surface. They evidently rarely dive to depths of more than 16 meters when foraging, and most dives are probably of no more than a few meters. At times the birds dig in muddy shorelines with their feet, evidently for small clams or worms (Palmer, 1976).

**Social behavior.** So far as is known, eiders become sexually mature in their second winter of life, when the males attain their nuptial plumage for the first time. However, some females may not nest until their third year of life. Pair formation presumably begins when the birds are still at sea, but most observations stem from the breeding grounds or from captive individuals. Spurr and Milne (1976) reported that in the European eider most of the pairs that were formed before midwinter were of older birds that probably remated with earlier mates, while later pairs were formed by younger females that did not nest or laid late in the season. Many of the birds are obviously already paired when seen on spring migration approaching their breeding grounds, but displays often continue well after arrival there. Inciting by the female is the common and apparently important display of that sex, and the call is accompanied by strong bill-pointing and chin-lifting movements. There are several male displays, and the major postures are associated with cooing sounds and thus are called cooing movements. There are three major cooing movements, as well as some compound cooing movements caused by linkage of the single display elements. In addition, some silent displays, such as neck stretching, lateral head turning, dorsal preening, bathing, and wing flapping, are commonly performed. Many of these same male displays occur in the precopulatory situation, after the female has assumed a prone position in the water, with a moderate degree of predictability. After treading, the male performs a single display (third cooing movement) and then swims away while performing lateral head turning (Johnsgard, 1965a; McKinney, 1961).

**Reproductive behavior.** When the birds arrive at their nesting grounds they spend a good deal of time seeking out and contesting ownership of suitable nest sites, with females occasionally engaging in severe fights. Many birds use old sites of their own or of other females. In particular they tend to favor locations with rocky overhangs and which are well drained and become snow-free early in the nesting season. In most areas the birds nest in distinct colonies, presumably as an antipredator adaptation, and on occasion will nest in tern colonies,
apparently for the same reason. Nest densities in such favored locations are often extremely high, with "territories" averaging no more than 100 to 300 square feet per nest not uncommon in such locations. The birds use communal loafing areas, and males typically visit the nest site only during the egg-laying period. Shortly afterwards they desert their mates and gather before molting. Females lay their eggs at the rate of one per day, and clutch sizes tend to be strongly correlated with the timing of nesting, with early clutches often averaging about 5 eggs and late clutches considerably smaller. There is also a relationship between clutch size and latitude, with birds nesting in midlatitudes for the species having the largest average clutches (Johnsgard, 1973). Estimates of the normal incubation period range from 25 to 30 days, and perhaps 26 days represents the most typical span. Females quickly take their broods to water, and in many areas considerable brood merging occurs, with dozens of ducklings and several adult females associated in single groups. An eight-week fledging period has been estimated, and apparently females begin their own flightless period before the young birds reach their flight stage, so that adults and young probably gain their powers of flight at about the same time. In some areas a long migration, involving all males and a substantial number of the females, is undertaken prior to molting (Cooch, 1965; Hilden, 1964).

Status. Without attempting to consider the subspecies separately, Bellrose (1976) suggested that a total North American population of this species might be from 1.5 to 2.0 million birds, the bulk of which are presumably of the American race. The Pacific race is probably next most abundant, and may consist of about a third of a million birds. The size of the Greenland population is unknown, but Iceland supports about half a million pairs, Great Britain about 10,000 pairs, and the Baltic area, including Sweden and Finland, about 300,000 pairs (Ogilvie, 1975). Beyond that, there is the U.S.S.R. population. Of the three subspecies represented there, Dementiev and Gladkov (1967) provided estimates for only mollissima, which they estimated at a minimum of 90,000 nests. Palmer (1976) provided some summaries of historical eider down harvests for various countries, and suggested that at one time down from over half a million nests was obtained annually in the U.S.S.R., but the colonies there now are greatly reduced in size.

Relationships. This is the most widespread and geographically variable of the eider species, and in at least some respects seems to be the least specialized in behavior and morphology of the Somateria group. Its nearest relative is certainly the king eider, and some wild hybrids with it have been reported.


King Eider

Somateria spectabilis (Linnaeus) 1758

Other vernacular names. None in general English use. Prachteiderente (German); eider royal (French); eidero rey (Spanish).

Subspecies and range. No subspecies recognized. Breeds in a circumpolar distribution in Greenland, northern Russia, Siberia, northern Alaska, and the arctic coasts of Canada including most of the Arctic islands and perhaps also the northern coast of Labrador. Winters on the north Pacific, especially around the Aleutian Islands, but occasionally as far south as California, and on the Atlantic coast from Greenland to Newfoundland, with stray individuals occurring south to Georgia and inland to the Great Lakes. See map 108.

Measurements and weights. Folded wing: males, 275–90 mm; females, 260–82 mm. Culmen: males, 28–34 mm; females, 30–35 mm. Weights: males in spring, 1,530–2,010 g (av. 1,830 g); females, 1,500–1,870 g (av. 1,750 g) (Brandt, 1943). Eggs: av. 64 x 43 mm, bright olive, 73 g.

Identification and field marks. Length 19–25" (43–63 cm). Plate 51. Males in breeding plumage have the crown and back of the head a pale bluish gray, forming a smooth crest, which is separated from greenish cheeks by a whitish line. There is a black spot below the eye, a black V-mark on the sides of the throat, and black feathers bordering the enlarged base of the bill. The neck, throat, and forehead are white, the breast is creamy white, and the rest of body and tail are brownish black except for a large white patch on each side of the rump. The middle and lesser wing coverts are white, the marginal coverts are dusky, and the greater coverts, secondaries, and sickle-
shaped tertials are black. The primaries and their coverts are brownish black. The bill is bright orange to red, with a whitish nail and a seasonally enlarged orange to reddish forehead knob. The iris is dark brown, and the legs and feet are yellowish to dull orange, with darker webs. Females have a cinnamon buff head and neck, finely streaked with black, averaging darker on the crown and lighter on the throat, and a rudimentary crest evident on the hind neck. The neck is brownish black, the feathers edged with tawny and buff coloration; and the rump, tail coverts, breast, sides, and flanks are cinnamon buff, with darker U-shaped markings, especially on the flanks. The tail is dark brown, the upper wing coverts and tertials are brown, while the primaries and secondaries are blackish brown, with the secondaries and their coverts tipped with white. The iris is brown, the bill is gray, and the legs and feet are greenish gray to dull yellow, with darker webs. Males in eclipse are dark brownish black and generally lack the crescentic markings of the female, and additionally retain the white upper wing coverts and usually some white feathers on the breast or forehead. Subadult males in their second year resemble adults, but the median wing coverts are margined or shaded with dusky coloration. Juveniles of both sexes are initially quite brownish, but during late winter the males gradually acquire a darker back, scapulars, and flanks, and develop a varying amount of white on the breast and rump.

In the field, male king eiders may be separated from common eiders by their more extensive black coloration, especially on the back, and by their orange red bill-knob. Females lack the vertical barred pattern of the common eider, but instead have more Anas-like crescentic markings and lack the definite eye-ring of the spectacled eider. In flight, the more extensively black upperparts (back and tertials) are evident, and the red bill and enlarged knob at its base are conspicuous for great distances. Females utter distinctive hollow-sounding notes similar to those made by a hammer striking a hollow wall, while dur-
ing courtship on water the males utter tremulous cooing sounds.

**Natural History**

**Habitat and foods.** Preferred breeding habitats of the king eider include fresh-water ponds, lakes, and streams on arctic tundra, usually near coastlines, with occasional nesting just above the high-tide line of seacoasts. For the rest of the year the birds are at sea, often resting on drift ice or feeding some distance off the coastline in fairly deep waters. During the summer months the birds probably feed largely on the larvae of aquatic insects such as caddis flies and particularly on midges, supplemented by small quantities of vegetable materials such as grasses, sedges, and some broad-leaved herbs. During the rest of the year they concentrate on invertebrates, particularly mollusks, sea urchins, sand dollars, and crustaceans. Practically the only plants consumed while the birds are at sea are small quantities of algae, eelgrass (*Zostera*), and wigeon grass (*Ruppia*) (Palmer, 1976; Johnsgard, 1975).

**Social behavior.** Little is known of the sociality of eiders during the nonbreeding period, but they are known to concentrate in enormous flocks in some areas, such as off St. Lawrence Island, where one flock in February was estimated to include 15,000 birds. Presumably pair formation must begin in these flocks; but as the birds begin to move back to the coastlines for breeding, the earliest arrivals are preponderantly males, with flocks of nearly equal sex ratios arriving only later. Pair bonds are thought to be formed in the second winter or second spring of life, and social display is frequently seen among spring migrants as well as on the breeding grounds as soon as they have arrived. May and June are thus presumably the major period of courtship activity, but this would mean that pair bonds in this species may last no more than about two months, or until the time the female has begun incubation, usually by early July. Displays of king eiders, based on observations of captive birds and supplemented by some observations in the wild, are rather similar to those of the common eider. Beside a number of activities that are only slightly modified from their corresponding comfort movements, such as head rolling, bathing, and body shaking, a more stereotyped form of wing flapping occurs in the king eider than in the other eiders, and it seems to expose the black abdomen and throat markings effectively. Two displays are associated with cooing calls, reaching (the homologue of the common eider's third cooing movement), and a repetitive display called pushing (the homologue of the common eider's second cooing movement). Head turning is performed more conspicuously and ponderously than in the common eider, and often follows one of the other displays. Displays often occur in fairly predictable sequences, with the time intervals separating them often as fixed as the duration of the displays themselves. The major female display is inciting, to which males often respond by swimming rapidly ahead of her while performing head turning. Females solicit copulation by extending themselves prone on the water, while the male performs all of the same displays used during pair formation, but primarily those derived from comfort movements. After treading, he performs a single display, then swims rapidly away while performing head-turning movements (Johnsgard, 1965a).
Reproductive biology. Females often do not arrive on their high-arctic nesting grounds until about mid-June, and tend to spread out over the tundra habitats except in certain locations, such as where river islands provide protection from arctic fox predation. Nests are usually well away from water, often being situated on dry and rocky slopes as far as a quarter mile from the nearest water. Egg laying often begins in late June, with one egg per day being laid until a clutch averaging 5 eggs has been completed. In spite of frequent high rates of nest predation by foxes, there is little or no indication of renesting efforts, which are probably precluded by the short breeding season. Incubation is by the female alone; and as soon as the clutch is completed, the males begin to leave the nesting area, migrating in vast flocks to molting areas at sea, often more than a thousand miles from the nesting areas. Incubation requires 22 to 24 days, and shortly after hatching, broods begin to merge, with créches of up to 100 or more ducklings often being thus formed, with several females in attendance. Unsuccessful females and females that are displaced from their broods once the nurseries are formed soon flock and also undergo a long molt migration (Salomonsen, 1968). About 100,000 molting eiders concentrate off the coast of western Greenland, probably including most of the population of eiders from eastern Canada, while those from the remainder of Canada and Alaska migrate west over Point Barrow to molt in waters of the Bering Sea. Probably at least a million eiders, including common eiders, cross Point Barrow in late summer during this migration (Thompson & Person, 1963).

Status. The North American population of king eiders is probably between 1 and 1.5 million birds (Bellrose, 1976), and in addition there is an obviously substantial but unestimable Asian population. Dementiev and Gladkov (1967) indicate that, together with the long-tailed duck, the king eider is the commonest duck species of coastal tundras, especially in the eastern U.S.S.R.

Relationships. The king eider and common eider are clearly close relatives, as indicated by the many similarities in their behavior and their plumage patterns. Additionally, wild hybrids between them have been reported on several occasions, especially in Iceland, where male king eiders sometimes form bonds with female common eiders (Palmer, 1976).


Spectacled Eider

Somateria fischeri (Brandt) 1847

Other vernacular names. None in general English use. Plüsskopfente (German); eider de Fischer (French); eidero de Anteojos (Spanish).

Subspecies and range. No subspecies recognized. Breeds in eastern Siberia from the Chukot Peninsula to the Yana River delta and probably sporadically to the Lena River. In North America it occurs sporadically from the Baird Inlet north and east to Demarcation Point, but is locally distributed and nesting is common only on the lower Kuskokwim delta. Probably winters in the Bering Sea, but is rarely observed during that season. See map 109.

Measurements and weights. Folded wing: males, 255–67 mm; females, 240–50 mm. Culmen (to feathering): males, 21–26 mm; females, 20–25 mm. Weights: adults of both sexes average ca. 1,630 g, with a maximum of 1,850 g reported. Eggs: av. 64 x 45 mm, olive, 73 g.

Identification and field marks. Length 20–23" (51–58 cm). Plate 52. Adult males in breeding plumage have a somewhat shaggy crest of greenish feathers on the sides and back of the head, and a velvety area of similarly colored feathers in front of the eye and extending forward into the bill. These two areas are separated by a large white area around the eye, framed narrowly with black so as to suggest spectacles. The throat, neck, and back are creamy white, the hind back and rump are dark brown, and the tail coverts and tail are grayish brown. Except for large white patches on either side of the rump, the rest of the underparts are dark grayish brown to grayish black, with a somewhat silvery bloom on the breast and sides. The sickle-shaped tertials and lesser and middle wing coverts are creamy white, the marginal coverts are dusky, and the secondaries and their coverts are blackish. The primaries and their coverts are dark grayish brown. The iris is whitish, ringed with light blue, the bill is orange with a paler nail, and the legs and feet are dull yellowish to olive brown. Females are generally like female common eiders, but differ in having dark brown feathering extending out on the bill from its base diagonally upward to a point just above the nostrils and a light brown ring around the eyes of the same size and shape as the "spectacles" in the male, and they
average somewhat more rust-colored throughout. The iris is brown and pale bluish, the bill is gray, and the legs and feet are yellowish brown. Males in eclipse are predominantly gray to grayish black, the head is grayish white where it is normally green, and the white "spectacles" are a darker gray. The body is mostly grayish, except for the white upper wing coverts, and the scapulars are also gray. Subadult males in their second winter resemble adults but have a somewhat less well developed crest, light gray scapulars, and darker gray tertials. The white patch on the sides of the rump is poorly developed, and there is some dark gray mottling on the sides of the neck, based on observations of captive birds. Some first-year males may also reach this stage, while others remain very femalelike. Juveniles are quite different from adults in that the juvenile male has only slightly developed "spectacles" and somewhat resembles the adult female, but is darker above, with the underparts faintly but uniformly barred with dusky coloration, while the wings are brownish black. In juvenile females the wings are more like those of adult females, but the underparts are spotted rather than barred.

In the field, the distinctive "spectacles" of both sexes provide the best field mark; in males the silvery black underpart coloration that extends part way up the breast is also distinctive. The dark brown area ahead of the female's "spectacles" contrasts strongly with the "spectacles" and the rest of her head plumage; this is also evident on flying birds. In flight these eiders are swifter and more agile than their larger relatives, and the blackish color of the underparts of males extends well forward of the leading edge of their wings. Both sexes are relatively quiet, and the cooing calls of the males carry but a short distance. The female's vocalizations are very much like those of the other large eiders.

**Natural History**

**Habitat and foods.** The preferred breeding habitat of this eider in Alaska consists of rather luxuriant lowland tundra having small ponds and reasonable proximity to salt water. The birds nesting in the U.S.S.R. occupy similar habitats of moist tundra, especially low areas that are flooded in June and are
vegetated with sedge and mare's-tail (Hippurus), sometimes extending as far as 50 kilometers from the coast. During the summer the birds concentrate on coastal shallows that are inhabited by the larvae of crane flies and caddis flies, which provide the bulk of the summer foods for adults and probably also for juveniles. Mare's-tail is one of the few plant foods of importance to young birds, along with pondweeds and crowberries (Empetrum). When the birds return to the sea, they again resort to an almost exclusively animal diet, with mollusks apparently one of the major foods. Echinoderms such as sand dollars and sea urchins are very minor components of the spectacled eider's diet, which is markedly different from the king eider's in this respect (Palmer, 1976; Kistchinski & Flint, 1974).

Social behavior. Almost nothing is known of the social behavior of spectacled eiders away from their breeding grounds, as their whereabouts during winter remains essentially unknown. In captivity they seem to be much like the other eiders in their general gregariousness, and as wild birds return in spring to their nesting areas they are found in small flocks composed mainly of already paired birds, plus a small percentage of unmated males. Few courtship activities have been seen on the breeding grounds; my (1964a) observations are virtually the only ones of wild birds, and they have subsequently been supported by some observations on captives. Display observed on the breeding grounds appeared to result when unpaired males located untended females, and was thus sporadic and often broken up when the female's mate approached. Male displays consist of several that are common to the other species of Somateria and include as well some elements found in the Steller eider, thus providing a link between these two groups of eiders. The usual ritualized comfort movements such as wing flapping, preening, bathing, body shaking, and head rolling occur, plus a few more specialized displays. One is a rapid backward movement of the head on the shoulders, much like rearing in Polysticta, but usually preceded by a movement of the head forward and downward, as in the king eider's reaching display. The other is a pushing display much like that of the king eider, and a backward bill-toss that is followed, and at times also preceded, by a forward neck-jerk similar to one of the display combinations of the common eider. Not many copulatory sequences have been seen, but evidently the precopulatory behavior consists primarily of the ritualized comfort movements already mentioned, particularly preening movements. Treading is often preceded by a single body-shaking movement, and in the cases observed has always been followed by a single head-forward-rearing display, which is in turn followed by a few head-turning movements (Johnsgard, 1964a).

Reproductive biology. These eiders typically arrive on their Alaskan nesting grounds in May, and often must wait several weeks for the lowland tundra to become sufficiently snow-free for nesting. The nests are most commonly located around the edges of tundra ponds in Alaska (Dau, 1974; Johnsgard, 1964b), but observations in the U.S.S.R. indicate that small islets of such ponds are also favored. In both instances the past year's growth of tall grasses and sedges is the usual nest cover. Nests are sometimes also located in colonies of small gulls and terns, whose behavior tends to ward off larger gulls and probably also foxes from the nest vicinity. Clutches are laid at the rate of one egg per day, and although the earliest clutches may exceed 5 eggs, normal and late clutches are usually noticeably smaller and may average about 4 eggs. Males leave their females early in the incubation period, and most observations indicate that females rarely if ever leave their nests willingly once incubation is underway. The incubation period is normally 24 days. After hatching, the young are not immediately led to salt water, but instead broods tend to remain separate and are reared to fledging on fresh to slightly brackish ponds within a mile or two of the nest. The fledging period is about 50 days, or at most no more than 53 days (Dau, 1974; Johnsgard, 1964b).
Status. It has been estimated that the Alaskan breeding population of this species may number about 100,000 birds (Johnsgard, 1975), and it is also believed that this population is the bulwark of the world’s population. In Siberia the species occurs over a fairly wide area, but is almost nowhere extremely abundant. Kistchinski and Flint (1974) estimated about 17,000 pairs in the Indigirka delta, where it is perhaps more common than anywhere else, except possibly for the Kolyma delta. It is thus likely that the world population of breeders is no more than 200,000 birds, with an equal or greater number of immatures. This estimate is fairly close to one of a half-million birds made earlier by Uspenski (1972).

Relationships. Although there seems to be no justification for maintaining a separate genus (Lampronetta) for the spectacled eider, it does in many ways appear to provide an evolutionary bridge between the typical large eiders and the genus Polysticta.


Steller Eider

*Polysticta stelleri* (Pallas) 1769

Other vernacular names. None in general English use. Scheckente (German); eider de Stellar (French); eidero de Steller (Spanish).

Subspecies and range. No subspecies recognized. Breeds in arctic Siberia from Novaya Zemlya (rarely northern Scandinavia) eastward to the Bering Sea (but only locally common), on St. Lawrence Island, and in North America locally on the Kuskokwim delta and in northern Alaska from Wainwright east at least to Pitt Point, and possibly to Humphrey Point. Winters off northern Finland and Norway, the Kamchatka Peninsula, the Commander, Kurile, and Aleutian islands, and the Kenai Peninsula. See map 110.

Measurements and weights. Folded wing: males, 209–17 mm; females, 208–15 mm. Culmen: males, 36–40 mm; females, 35–40 mm. Weights: both sexes average ca. 860 g, with maximums of 951 and 907 for males and females, respectively (Nelson & Martin, 1953). Additional weight data summarized by Palmer (1976) indicate maximums of 1,000 and 999 g for the two sexes. Eggs: av. 59 x 41 mm, pale olive buff, 58 g.

Identification and field marks. Length 17–19" (43–48 cm). Plate 53. Adult males in breeding plumage have a shiny white head and neck, except for black on the chin and throat, around the eyes, and on the occiput, and a plushlike greenish group of feathers forming an occipital tuft, as well as a less distinct area of green in front of the eyes. The hind neck and sides of the neck are black, and the black extends around the foreneck as a narrow collar and down the middle of the back to the tail. The brown tail is long and pointed, with black under tail coverts; a black rounded spot is also present in front of and below the base of the wings. The longer scapulars are decurved, pointed, and iridescent bluish black striped with white. Most of the upperparts are cinnamon buff, deepening to orange on the chest and underparts. The upper wing coverts are white, except for the primary coverts and the secondaries and outer webs of the tertials are iridescent blue, the secondaries tipped with white and the tertials white on their inner webs. The iris is dark brown, the bill bluish gray, lighter toward the tip, and the legs and feet are dark bluish gray. Females have a dusky brown and brownish buff head and neck, with an indistinct whitish eye-ring and pale cheeks. The body is predominantly dark brown, with paler edges on the feathers, especially the flanks and scapulars, and darker on the breast, shading to blackish on the abdomen. The tail is dark brown, the upper wing coverts are dusky brown with grayish tips, except for the greater secondary coverts, which are dusky with broad white tips. The primaries and their coverts are brown, the secondaries are iridescent blue tipped with white, and the sickle-shaped tertials have grayish blue outer webs and dusky brown inner webs. The iris is brown, the bill dusky blue, and the legs and feet are bluish gray. Males in eclipse closely resemble females, but retain their white upper wing coverts. Subadult males in their second year resemble adults, but may have a few scattered brown feathers. Juveniles resemble the adult female, but are lighter-colored, more reddish, and mottled below. First-year males gradually develop a black neck-ring and dusky throat.

In the field, Steller eiders, particularly the rather Anas-like females, are most likely to be mistaken for...
species other than the larger eiders. Males in nuptial plumage have a distinctive white head and cinnamon body coloration, and in flight the white forewings and distinctive speculum pattern are quite evident. Like the other eiders, this species is not highly vocal, but females do utter a loud *qua-haaa* call during inciting, while the males are almost totally silent during display.

**Natural History**

**Habitat and foods.** No detailed studies of breeding habitat needs have yet been made, but it is clear that the Steller eider nests in lowland tundra near the coast, often in tidewater flats. They also often nest in lacustrine basins on mossy tundra, but in general are probably to be found somewhat closer to the coastline than are spectacled eiders, which have a very similar breeding distribution. Late spring and summer foods of the birds are primarily amphipod crustaceans and bivalve mollusks, which presumably are from salt-water or at least brackish-water environments. Fresh-water animal materials include the larvae of midges and caddis flies. Vegetative materials are taken in small amounts, and include such items as pondweeds and crowberries (*Empetrum*). The winter foods are evidently mainly such rather soft-bodied invertebrates as amphipod and isopod crustaceans, univalve and bivalve mollusks, and barnacles (Johnsgard, 1975; Palmer, 1976).

**Social behavior.** This small eider is perhaps the most sociable of all the eiders, and in some areas such as Nelson Lagoon and Izembek and Bechevin bays at the tip of the Alaskan peninsula the flock sizes are overwhelmingly large. This, however, occurs only during the fall molting period and in early spring, before waters to the north become ice-free and allow for northward migration. Observations at Izembek Bay by McKinney (1965b) indicate that much pair-forming behavior occurs during the spring assembly period of April and is marked by extensive display on the water, aerial flights, and massed diving behavior. Typically several males display around a single female, with frequent chases and fighting among them, and also with short flights toward the females. Inciting is the major female display, and is marked by loud calling and strong chin lifting. Males perform a variety of displays, all of which are evidently done silently and which include several ritualized comfort movements such as body shaking, head rolling, and preening. The most spectacular display, rearing, consists of a rapid raising of the head and body, momen-
Map 110. Breeding (hatched) and wintering (stippling) distributions of the Steller eider.

tarily exposing the chestnut-colored underparts, and is often preceded and followed by rapid lateral head movements as the males first swim toward and then away from a female. All of the displays are performed much more rapidly than their counterparts among the larger eiders, and the overall level of activity is also much greater. Copulation takes a form similar to that of the other eiders, in that the female becomes prone after little if any preliminary posturing. Thereafter the male performs a long series of displays that primarily are a sequence of bathing, bill-dipping, and preening movements in rapid succession. Mounting is apparently always preceded by a single body shake, after which the male quickly steams over the water and begins treading. After copulation, he performs a single rearing display, then steams away in an erect posture, usually while head-turning (Johnsgard, 1964a; McKinney, 1965b).

Reproductive biology. Relatively little is known of the breeding biology of this species, which in Alaska nests in only a few localities. There it arrives later than the other three eiders in the Hooper Bay area, about three weeks before nesting gets underway in late June. The nests are well scattered over lowland tundra, and often are placed a few meters from a tundra pond, either on a slight hummock or in a depression between hummocks, and usually are well concealed in grass cover. Studies on the lower Kashunuk River indicate a very low nesting density there in recent years—only about one nest per 100 acres in the early 1960s. However, the species was apparently at one time more common there, so this may not be an accurate reflection of spacing behavior. The average clutch size is of 7 or 8 eggs, which are presumably laid at daily intervals. Evidently the male remains in the vicinity of the nest and female for a longer period than most other eiders, perhaps until about the time of hatching. The incubation period is still unestablished. Evidently gulls and other predators are serious sources of mortality among eggs and ducklings; and shortly after hatching, the females move their broods to brackish inlets or even salt water, where they form "herds" and forage in the litter of the tidal flats. The fledging period is not definitely established, but studies by Brandt (1943) indicated that hatching began in early July and some birds were on the wing by the end of August, so an approximate 50-day fledging period seems likely. About the time that hatching is underway the males begin to gather in large flocks off the coastline near the nesting grounds, but the species has an unusually late wing-molt period, allowing a substantial migration to molting areas that may be as far as 3,000 kilometers from the nesting grounds. There are marked yearly differences in the timing and degree of this migration to the tip of the Alaska Peninsula; sometimes it occurs as early as August, while in other years the birds have not arrived until early November, after having completed their molt in some other area (Jones, 1965).

Status. The winter population of Steller eider in the vicinity of the Alaska Peninsula has been estimated at about 200,000 birds (Jones, 1965), and in addition there is a second major wintering area from the Kamchatka Peninsula southward to the Kurile Islands. Uspenski (1972) estimated a total world population of about half a million birds. Probably nearly all of these nest on the Siberian mainland; there are now virtually none nesting along the lower Yukon and Kuskokwim deltas; and although a nesting population is now known to occur in the Prudhoe Bay area (Lubbock, 1976), it is not likely to be extremely large.

Relationships. Behavioral studies (Johnsgard, 1964b) and anatomical analyses (Woolfenden, 1961) both indicate not only that Polysticta should be recognized as distinct, but also that it has affinities with such sea duck genera as Clangula and Polysticta. However, Brush (1976) found that electrophoretic patterns of the feather proteins of Somateria and Polysticta were alike, and differed from those of the other sea ducks, thus favoring tribal separation of the eiders.

Labrador Duck

*Camptorhynchus labradorius* (Gmelin) 1789

**Other vernacular names.** Pied duck; Labradorente (German); canard du Labrador (French); pato del Labrador (Spanish).

**Subspecies and range.** No subspecies recognized. Extinct since about 1875. Originally occurred along the Atlantic coast of North America, possibly breeding in Labrador or farther north, but the nesting grounds were never definitely established. Wintered south to Chesapeake Bay, but mainly along Long Island.

**Measurements and weights.** Folded wing: males, 210 mm; females, 206–9 mm. Culmen: males, 43–45 mm; females, 40–42 mm. Weights: males, 864 g; females, 482 g. Eggs: some probable Labrador duck eggs are pale olive to yellowish brown and average 62.7 x 42.5 mm, weight unknown.

**Identification and field marks.** Length about 20–23” (51–56 cm). Adult males have a head, neck, and scapulars that are white except for a black stripe extending from the crown to the nape, a black collar around the base of the neck, and a yellowish area of stiffened feathers on the cheeks. The back, rump, upper tail coverts, tail, primaries, and entire underparts are black, and the scapulars and tertials are edged with black. The upper wing surface is white, except for the primaries, which are black. The iris color was probably yellow or reddish hazel, and the legs and feet were probably grayish blue, but there is disagreement on this. The unusually soft-edged bill was black for most of its length, but the basal portion behind the nostrils was probably pale grayish blue and was separated from the black portion by a yellow, orange, or flesh-colored band. The eclipse plumage of males, if it existed, is unknown. Females are generally uniformly brownish gray, grading toward bluish slate dorsally, to sandy brown on the rump and tail coverts, and to light grayish brown on the underparts. The tail is very dark brown, the wing coverts are the same bluish-slate as the mantle, except for the greater secondary coverts, which, with the secondaries, form a white speculum. The primaries and their coverts are blackish brown, as in the male. The soft-part colors are probably similar to those of the male. Juveniles apparently resembled adult females for most of their first year, with young males probably beginning to get white feathers on the head, throat, and upper breast by the end of their first winter of life.

**Natural History**

**Habitat and foods.** Evidently this little sea duck had a highly specialized diet, to judge from its unusual bill structure, that may have involved both dabbling at the surface in a shovelerlike manner and also diving for its food. Since the birds were sometimes caught by fishermen on trotlines that had been baited with blue mussels (*Mytilus*), it may be imagined that mollusks were a part of their diet, and the birds apparently often fed close to shore along sandy bays or in estuaries where mussels might be abundant. It is quite possible that the Labrador duck occupied much the same habitat and consumed the same type of foods as the Steller eider, which also has a soft-edged bill and is of very similar bodily proportions.

**Social behavior.** Nothing specific was ever recorded on this subject.

**Reproductive biology.** Nothing is known of this. It has been suggested (Phillips, 1922–26) that the birds may have nested on a few islands in the Gulf of St. Lawrence or in southern or eastern Labrador, in which case it would have been highly susceptible to nest robbing by fisherman or “eggers.”

**Status.** Extinct since the 1870s, with the last known specimen taken in the fall of 1875, probably along Long Island. A less likely final record is for 1878, when a bird was reputedly shot near Elmira, New York, but the inland location makes this record suspect, and the specimen no longer exists. No convincing reasons for the bird’s disappearance have ever
been advanced; it was not an important sport species, nor was it sought after by market hunters. It seems most likely that a breeding-grounds disturbance, such as perhaps the arrival of effective mammalian predators in a previously isolated nesting area, may have left the species defenseless.


Harlequin Duck

Histrionicus histrionicus (Linnaeus) 1758

Other vernacular names. None in general English use. Kragenente (German); canard harlequin (French); pato arliquin (Spanish).

Subspecies and range. No subspecies currently recognized. Breeds in northern and eastern Asia, on the islands of the Bering Sea, in Greenland and Iceland, and in continental North America from Alaska and the Yukon south through the western mountains to central California and Wyoming (originally to Colorado), and from Baffin Island and Labrador to the Gaspé Peninsula and perhaps Newfoundland. Winters in or near its breeding grounds of the arctic islands, south to California and Long Island. See map 111.

Measurements and weights. Folded wing: males, 200–10 mm; females, 190–97 mm. Culmen: males, 25–28 mm; females, 24–26 mm. Weights: males average ca. 680 g and females ca. 540 g, with the respective reported maximums being 750 and 562 g (Johnsgard, 1976). Eggs: 54 x 38 mm, creamy, 53 g.

Identification and field marks. Length 15–21" (38–51 cm). Plate 55. Males in breeding plumage have a dark slate blue head and neck with a purplish sheen, a black crown and throat, and a white cheek patch extending above the eye, where it becomes dull chestnut and passes back to the nape. There is a second rounded spot behind the eye, and a third white vertical stripe along the back of the head, with all of these narrowly margined with black. The back, breast, and underparts are generally slate blue, shading to dusky on the abdomen and to bluish black or black on the rump and tail coverts. The black tail is long and pointed, and white is present only as a small rounded spot on each side of the rump. There is a black-bordered white stripe around the base of the neck, and a similar vertical stripe from the base of the wing down the side of the breast; the scapulars are also tipped with black and white. The sides and flanks are chestnut brown, and the primaries and their coverts are dark brown. The secondaries from an iridescent blue to purplish speculum and the tertials are white, margined with black on the outer webs, while the other upper coverts are dark slate with a purplish gloss, except for rows of white spots on the outer middle coverts and inner greater coverts. The iris is brown, the bill bluish gray with a yellowish nail, and the legs and feet are grayish blue, with dusky webs. Females have an olive brown head and neck, with a darker crown and a lighter chin and throat. There is a small rounded whitish area above the eye and a larger one behind the eye, and the cheek area below the eye is also whitish, with darker spotting increasing toward the chin and throat. The upperparts are dark olive brown to brownish black, the tail is dark purplish brown, the under tail coverts are olive brown, and the sides and flanks are medium brown, becoming paler on the abdomen and mottled with grayish white. The upper wing surface is dark grayish brown to brown, the secondaries being glossed with a purplish sheen. The iris is dark brown, the bill is dusky, and the legs and feet are dull grayish blue. Males in eclipse resemble females, but have darker brown underparts and the brighter upper wing coloration typical of males. Immature males have the white head markings bordered with grayish brown, but the cinnamon stripe is absent or poorly developed, and the lateral neck and breast markings are smaller than in adults. Juveniles resemble adult females but have paler upperparts and more spotted underparts.

In the field, the habitat of rocky shores or rushing mountain streams tends to eliminate most other species of ducks, and the unique spotted plumage of the male is also distinctive. Females have a close resemblance to female or juvenile scoters, but are smaller and have a much smaller bill. In flight the birds appear swift, and closely follow the course of mountain streams. They appear quite dark-bodied when in flight, and only the white spotting of the male may help to identify them as harlequins. The male’s bluish coloration is surprisingly inconspicuous in the water, and the white spotting may even be a concealing adaptation in a white-water environment. Neither sex is very vocal, and the calls that have been described are mostly high-pitched piping notes or stac-
Natural History

Habitat and foods. The presence of cold, rapidly flowing waters that are rich in aquatic insect life is central to the habitat needs of harlequin ducks, and additionally the birds seem to favor forested over nonwooded environments when they are available. In the summertime the birds forage in rapid streams for the larvae and pupae of midges (Chironomida) and black flies (Simulium) and for caddis fly larvae (Trichoptera). They feed much in the manner of torrent ducks, and are equally well adapted to swimming in torrential currents as that species. During winter, many harlequin ducks move to coastal waters, where they congregate along rocky headlands and dive in the surf for such foods as crustaceans, mollusks, and echinoderms. They are well adapted to prying such mollusks as chitons from submerged rocks, and also obtain a variety of univalve mollusks in much the same manner. During foraging dives, the birds tend to remain under water longer than most other diving ducks, but in general they probably do not dive to such great depths as many of the others which feed in still or less rapidly flowing waters (Bengtson, 1966b).

Social behavior. Perhaps because the species is adapted to foraging in a specialized manner on a very restricted food supply, harlequins usually are not found in large flocks, nor are they highly gregarious. Birds raised in captivity acquire adult plumage and begin sexual display activity in their second winter of life, and presumably two-year-old females attempt to nest under natural conditions. Little is known of the timing or mechanism of pair formation in this species, but Bengtson (1966b) observed a very low incidence of mated birds among flocks in December, when some display activity was seen. A few displays
Breeding (hatched) and wintering (stippling) distributions of the harlequin duck.

have also been seen on the nesting grounds involving presumably paired birds. The most commonly seen display is a head nodding rather like the elliptical head movements of goldeneyes, and likewise performed by both sexes. It is seemingly silent, and also evidently of hostile derivation, as in goldeneyes. Bill dipping, lateral bill shaking, wing flapping, and various preening movements often occur during apparent courtship and some or all of these may represent actual displays. Females perform what seems to be a typical inciting movement with an associated harsh call, but descriptions are still meager for both male and female displays. Some observers have described a definite head-throw display by males, while others who have observed the birds at considerable length have not reported anything more elaborate than vigorous head-nodding displays. Various trilled, squeaking, or whistling notes have been attributed by various observers to displaying males as well, but again there is little agreement on this point. Copulatory behavior apparently consists of head-nodding behavior by the male and often by both sexes, with lateral bill shaking and bill dipping frequent between head nods. The male also performs a series of short rushes toward the female, which end with him nibbling the side of her face. Mounting is done deliberately and is followed by male aggressive behavior (Kuchel, 1977).

Reproductive biology. In Iceland, the birds move from coastal wintering areas to territories located along stretches of interior rivers during May and become well dispersed and spaced in such areas. In that area, Bengtson (1966b) found that the density was about two pairs per mile of river, being highest near lake outlets, and territorial boundaries were either indistinct or even lacking, although males exhibited possessive behavior toward their mates. Probably females tend to use the same nesting site year after year; such sites are usually extremely well hidden locations under dense bushes, in rock crevices, or on islands. Surface-nesting is apparently more typical than hole-nesting, but surface nests are always well concealed from above by dense vegetation. Eggs are evidently laid at the rather slow rate of one every two days, and clutch sizes are relatively small, probably averaging about 6 and ranging from 4 to 8. Males desert their mates as soon as incubation begins, and within a few days they leave for coastal habitats. The incubation period is not yet fully established, but probably is 28 to 29 days, rather than the earlier estimates of up to 34 days. Likewise, the fledging period is rather uncertain, but may be about 40 days, although estimates of as much as 60 to 70 days have also been made. Apparently some females molt in their breeding areas, while others evidently leave their broods and fly elsewhere to undergo their flightless period. Brood mergers have been reported common in Iceland and elsewhere (Bengtson, 1966b, 1972b; Palmer, 1976).

Status. The size of the Icelandic population of harlequin ducks is not known with certainty but probably is not more than 5,000 birds (Gudmundsson, 1971), and likewise, no estimate is available for Greenland's population. The vast majority of the North American population is associated with the Aleutian Islands, and Bellrose (1976) reports that during the fall and spring from 600,000 to a million harlequin ducks may be present on the Aleutian Islands National Wildlife Refuge. Additionally, there is an unknown but presumably rather small population in Siberia and the adjoining Asian islands.
Relationships. Although a distinctive genus and one that has clearly evolved in conjunction with strong selective pressures associated with specialized foraging behavior, *Histrionicus* appears in many ways to be a typical sea duck. Woolfenden (1961) believes that this genus and *Clangula* come close to the core of this group of birds, with *Histrionicus* having some clear affinities with the scoters as well. What little is known of the species’ displays also suggests typical sea duck affinities. Unfortunately, Brush (1976) was unable to test its feather proteins against those of the other sea duck genera.


Long-tailed Duck
*Clangula hyemalis* (Linnaeus) 1758

Other vernacular names. Oldsquaw; Eisente (German); canard nequelon (French); pato de cola largo (Spanish).

Subspecies and range. No subspecies recognized. Breeds in a circumpolar belt that includes arctic North America, Greenland, Iceland, northern Europe and Asia, and the islands of the Bering Sea. Winters in salt-water and deep fresh-water habitats, including the coastlines and larger lakes of Europe, Asia, and North America, the Caspian Sea, the Great Lakes, and coastal Greenland and Japan. See map 112.

Measurements and weights. Folded wing: males, 219–36 mm; females, 202–10 mm. Culmen: males, 26–29 mm; females, 23–28 mm. Weights: males shot in the fall average ca. 800 g and females ca. 650 g, with maximum weights of 1,042 and 815 g, respectively. Eggs: av. 54 x 38 mm, olive buff, 43 g.

Identification and field marks. Length 15–23" (38–58 cm). Plate 54. *Males in winter plumage* have the forehead and sides of the head a pale brownish gray, with a white eye-ring, the sides of the neck blackish brown shading to buffy brown below, and the rest of the head, neck, and extreme forehead white. The scapulars are gray to white, including several ornately long and pointed ones. The breast, rest of the upperparts, and the upper wing surface are brown to brownish black, the primaries lighter brown and the secondaries dark chestnut brown. The underparts are white, shading to pearly gray on the upper sides and flanks; the outer tail feathers are white to dusky, edged with white; and the central pair is black and greatly elongated. The iris is yellow to reddish brown, the bill is dusky at the base and pink toward the tip, with a black nail, and the legs and feet are bluish gray, with darker webs. *Males in summer* have a brownish black head, neck, and breast, except for a large white eye-ring that extends backward as a postocular stripe, and an ashy gray area between this white patch and the bill, which gradually diminishes in size as the white area enlarges. The back and scapulars are blackish brown, the feathers broadly edged with reddish brown to buffy coloration, and the longest scapulars shorter than in the winter plumage. The rest of the plumage is as in the winter plumage, but is generally faded and worn. *Males in late summer and autumn* lose the brown and ashy gray head feathers from the summer plumage and replace them with white, so that the head is entirely white except for a dusky patch in the region of the ears. The scapulars are again molted and replaced with still shorter buff-edged feathers. *Adult females in winter* have the forehead, crown, and a patch at the side of the neck brownish black, while the rest of the head is white except for a dusky chin and throat. The upper breast and foreback are blackish brown, the feathers, especially the scapulars, having broad reddish brown edges and markings. The hind back, wings, and tail are blackish brown, except for the outer tail feathers, which are ashy brown; the secondaries are dull chestnut brown; and the middle coverts, which are mostly buff. The iris is brown, the bill is blackish to lead-color, and the legs and feet are grayish. *Adult females in summer* are generally more brownish, with the brown crown and ear-patch increasing in size and grayish brown
feathers appearing over most of the face, except immedi­ately around the eyes, and on the sides of the neck. The black becomes more brownish, with the buff-tipped scapulars replaced by less contrastingly patterned ones, and the sides and flanks become consider­ably browner or grayer. There is a late-summer molt of the scapulars, which are replaced by ones that are more uniformly olive brown. Immature males lack the fully elongated central tail feathers and ornamental scapulars during their first winter of life. Juveniles resemble females in summer, but lack the russet edges on the scapulars and are light brownish gray on the head and neck.

In the field, the open-water habitat, fairly small size, and elongated tail of the males help identify these ducks, which are seasonally so variable in plumage as to make any single field mark almost useless. In the winter both sexes exhibit more white than almost any of the other sea ducks, and the loud calls of the males are very conspicuous at this time.

They include several "yodeling" calls, often sounding like ugh, ugh, ah-oo-gah, or a-oo, a-oo, a-oo'-gah. The calls of the female are soft and infrequent by comparison. In flight, the birds exhibit white abdo­men coloration that contrasts with their generally brownish black wing surfaces, and both sexes also have relatively dark breasts in winter.

**NATURAL HISTORY**

**Habitat and foods.** The breeding habitat of this most northerly ranging duck species consists of arctic tundra in the vicinity of lakes, ponds, or coastlines. Wooded country is avoided, but shrubby areas are preferred to sedges or grassy cover for nesting. The species nests virtually throughout the high arctic of the Northern Hemisphere, often at considerable dis­tances from the coastline, but even during the sum­mer the birds seem to prefer marine foods to fresh­water ones. During the summer, larval insects and crustaceans are important sources of food for adults, while juveniles concentrate to a large extent on crustaceans such as cladocerans. Mollusks are also an important food for long-tailed ducks, but not to the extent that crustaceans are. In the winter the birds are found both on the open sea and on deep fresh-water lakes such as the Great Lakes; in the Chesapeake Bay area they also regularly extend into salt and brackish estuarine bays and sometimes into fresh-water estuaries. They then forage in waters that are deeper than those used by nearly all other diving ducks, having been caught by fishermen at depths of up to about 200 feet below the surface of Lake Michigan, and regularly foraging at depths of 50 feet or more (Ellarson, 1956).

**Social behavior.** Long-tailed ducks are highly social and gregarious birds, and spend a great deal of time during winter, spring, and early summer in pair­forming or territorial activities. They become sexually mature and usually form initial pair bonds in their second year of life; and although pair bonds are renewed annually, they tend to be quite strong, with females often remating with their mate of the pre­vious year. Social displays are marked by a great deal of vocal activity, towering flights followed by a zigzag descent to the water, and short display flights by the drake toward the female. Females utter gut­teral calls during a chin-lifting display that seems to represent inciting behavior. Males produce two dis­tinctive courtship calls, the ah-har-lik call, uttered...
with or without a bill-toss, and a quite different call associated with the rear-end display, in which the head and neck are lowered over the water, the tail is raised vertically, and both feet are kicked slightly. Males also turn the back of the head toward females, and in addition perform a neck-stretching display. Various other postures that may represent displays have also been described (Alison, 1970; Myres, 1959). Copulation is evidently preceded by such male displays as bill tossing and lateral head shaking, and sometimes bill dipping, neck stretching, and porpoising. Many of these same displays have been observed in the postcopulatory situation as well (Alison, 1970).

Reproductive biology. Long-tailed ducks arrive on their high arctic breeding grounds already paired, and soon begin to establish territories that are strongly defended from incursions by other pairs, resulting in a high degree of dispersion. There is also a high degree of homing by females to ponds used in the past year. Although males establish and defend territories of varying sizes, females apparently rarely nest within the territorial limits, and instead often nest near other females, in a colonial manner. They particularly seek out islands in tundra ponds or lakes, and are thus usually quite close to the water's edge, but at times may place their nests several hundred feet from water. In Iceland, low shrubs provide the most frequent nest cover, followed by high shrubs, sedges, perennial herbs, and meadow cover (Bengtson, 1970). In some areas the birds also nest among tern colonies, presumably as an antipredator adaptation. Nesting is initiated rapidly by the female, with eggs being laid on an approximately daily basis and the clutch size averaging about 6 or 7 eggs. The incubation period, during which the male deserts his mate, lasts 24 to 26 days. Perhaps because of the short available breeding season, females seem quite prone to abandon their broods while they are still quite young and begin the postnuptial molt, and the young ducklings typically gather to form large, often parentless groups. They grow very rapidly, and reportedly require only 35 days to attain flight, perhaps the shortest fledging period of any of the arctic ducks (Alison, 1975; Bengtson, 1972a).

Status. The long-tailed duck is perhaps the most abundant of the arctic-nesting ducks, but its numbers are hard to estimate owing to its wide range and dispersal tendencies. Bellrose (1976) estimated an early summer (breeding) population of 3 to 4 million birds in North America. Estimates for Greenland, Iceland, and most of Scandinavia are not available, but the western parts of the U.S.S.R. support about 740,000 breeding pairs, and about 100,000 birds normally winter in the Baltic area (Ogilvie, 1975). In the U.S.S.R. this species is the most abundant duck of tundra areas, especially in northern Siberia (Dementiev & Gladkov, 1967). Presumably its worldwide population might be in the neighborhood of 10 million birds.

Relationships. Although a well-defined genus, Clangula clearly shows structural and behavioral affinities with such other sea ducks as the scoters, the harlequin duck, and even the goldeneyes. Woolfenden (1961) regarded it as a part of the core of the sea duck group, with its closest links to Histrionicus and the scoters, while Brush (1976) found it has feather protein electrophoretic patterns identical to those of Melanitta, Bucephala, and Mergus.


Black Scoter
Melanitta nigra (Linnaeus) 1758

Other vernacular names. American scoter; Trauerente (German); macreuse noire (French); anade negro marino común (Spanish).

Subspecies and ranges. (See map 113.)
M. n. nigra: European black scoter. Breeds in Iceland, Scotland, Spitsbergen, and northern Europe and Asia east at least to the Khatanga River. Winters mainly off the coast of western Europe, and on the Mediterranean, Black, and Caspian seas.
M. n. americana: Pacific black scoter. Breeds in northern Asia from the Lena-Yana watershed to the Anadyr Basin and the Kamchatka Peninsula, on the Kurile Islands, and in North America from Bristol Bay north to about Kotzebue Sound and Mt. McKinley. Breeding records in Canada few and scattered. Winters on the Asian and North American coastlines of the Pacific Ocean, on the Great Lakes, and on the Atlantic coast of North America.
Measurements and weights. Folded wing: males, 228–42 mm; females, 220–29 mm. Culmen: males, 45–49 mm; females, 42–46 mm. Weights: adult males in fall and winter average ca. 1,100 g and females ca. 950 g, with respective maximums of 1,268 g and 1,087 g. Eggs: av. 66 x 45 mm, creamy to buff, 72 g.

Identification and field marks. Length 17–21" (43–51 cm). Adult males have a head, neck, and body that is entirely black, glossy above and less glossy below; a black and rather pointed tail; under wing coverts that are brownish black and silvery gray; and a glossy black upper wing surface. The bill is blackish, with a yellow-orange basal enlargement (larger in americana than in nigra) that terminates at the nostrils. The iris is brown, and the legs and feet brownish black, with darker webs. Females have the top of the head down to the level of the eyes and back of the neck dark brown, while the rest of the head and neck is whitish spotted with dusky coloration. The tail and upper wing surface are dusky brown. The iris is brown, the bill blackish, and the legs and feet are dark greenish brown. Immature males gradually become black except on the breast and wings during their first winter, and the bill begins to assume the adult shape and color. Maximal bill enlargement may not occur until the third year. Juveniles resemble adult females, but are paler, especially on the underparts and lower half of the head.

In the field, the totally black color of male black scoters is the best field mark, with the conspicuous yellow bill marking (smaller in the European form) the only contrasting color present. Females are best identified on the basis of their two-toned head coloration that is reminiscent of some pochards. In flight, the birds also appear very dark, and often fly low but swiftly over the surf, with their wings producing a strong whistling noise. The male utters a clear, mellow whistle during courtship, and the female's voice is quite grating and similar to the sound of a door swinging on rusty hinges.

Natural History

Habitat and foods. The breeding habitat of the black scoter consists of fresh-water ponds, lakes, and rivers in tundra or wooded country, especially where shrubs are present for nesting cover. Yet, in spite of this seemingly generalized requirement, fitting much of northernmost North America, the species is relatively rare nearly everywhere, and is apparently
Breeding requirements, except that lakes or ponds with islets seem to be preferred, and presumably those providing a source of summer foods such as crustaceans, mollusks, insects such as midges and caddis flies, and edible aquatic plants, including pondweeds. During fall and winter the birds occupy primarily salt-water habitats; in the Chesapeake Bay region they concentrate in the littoral zone of the ocean, usually just outside the zone of breakers, and forage in mussel-rich areas less than 25 feet in depth. In addition, they also feed on other mollusks such as periwinkles, crustaceans such as barnacles and shrimp, and to a very limited extent on echinoderms and fish. Although they are the smallest of the scoters, they are not particularly deep divers, and their dives probably rarely exceed 40 feet (Cottam, 1939).

Social behavior. Black scoters, like other sea ducks, do not reach adult plumage or sexual maturity until their second winter, and at that time presumably form initial pair bonds. However, during the winter the birds are usually well away from shore and hard to study, so that the intensity of pair-forming behavior at that time is uncertain. Most observations are for the spring migration period April through June, at or near the breeding grounds. Courtship occurs in small flocks which usually consist of a single female and five or more males, with the numbers of males increasing as the spring progresses. Displays of the males are diverse and often consist of direct aggressive actions or comfort movements such as head shaking, wing flapping, preening, body shaking, and the like. The most elaborate display sequence involves neck stretching, repeated calling, a vertical tail-snap, and a low rush toward or past the female. No definite inciting behavior has been described, but it almost certainly exists as in the other scoters. Evidently behavior associated with copulation is very simple, and involves preening movements by both sexes. The male mounts after performing a single body shake, and afterwards may swim away from the female while calling or may perform other postcopulatory behavior (Johnsgard, 1965a; Myres, 1959; Bengtson, 1966a).

Reproductive biology. Black scoters are relatively late nesters, arriving on their Alaskan breeding grounds in late May and not nesting until late June, but nesting somewhat earlier in Iceland. In Alaska the birds often nest on grass-covered islands, usually in large grass clumps of the past year's growth, while in Iceland they seem to favor dense stands of willow scrub or birch, where shrubby growth provides concealment for the nest. Island nesting is infrequent. In Iceland, initial nesting efforts average about 9 eggs, while renesting attempts average 6 eggs, but little can be said of average clutches in the North American population. Evidently the drake deserts his mate at about the time that incubation begins, and moves back to the coast or undertakes a molt migration of some distance. Incubation lasts about 27 or 28 days, with a few estimates of periods as long as 33 days. There are rather few observations on brood life, but apparently brood mergers are not typical of this species. The fledging period is still not established, but has been estimated as six to seven weeks. Molt migrations of adults are well developed in this species, and in the North Sea up to 150,000 birds, including adult males, juveniles of both sexes, and some adult females, gather in late summer (Salomonsen, 1968).

Status. The North American population of the black scoter is very difficult to judge with certainty, but it
is thought that the Alaskan breeding population may consist of about 235,000 birds, and a presumably much smaller additional number breed in Canada. Wintering-ground counts suggest that the Aleutian Islands support about 250,000 birds, and another 155,000 winter south of Alaska (Bellrose, 1976). Late-summer and winter counts in western Europe suggest a total of about 150,000 birds (Ogilvie, 1976), and additionally there is a substantial wintering area off the east coast of Asia. Dementiev and Gladkov (1967) state that this species is second only to the long-tailed duck in abundance during spring migration along the Gulf of Penzhina (west coast of Kamchatka), but specific estimates of numbers were not provided.

**Relationships.** I concluded (1965a) that this is the most isolated of the three scoter species, but that it should not be generically separated from the other two. It may also provide the closest link with *Clangula* of the three scoters.

**Suggested readings.** Bengtson, 1966a, 1970.

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**Surf Scoter**

*Melanitta perspicillata* (Linnaeus) 1758

**Other vernacular names.** Skunk-headed coot; Brillente (German); macreuse à lunettes (French); anade marino de las rompientes (Spanish).

**Subspecies and range.** No subspecies recognized. Breeds in North America from western Alaska east through the Yukon and the Northwest Territories to southern Hudson Bay, and in the interior of Quebec and Labrador. Winters on the Pacific coast south to the Gulf of California, on the Atlantic coast south to Florida, and to some extent in the interior, especially on the Great Lakes. See map 114.

**Measurements and weights.** Folded wing: males, 240–56 mm; females, 223–35 mm. Culmen: males, 34–38 mm; females, 33–37 mm. Weights: males average ca. 1,000 g and females ca. 900 g, with maximum weights of about 1,130 g reported for both sexes. Eggs: av. 67 x 53 mm, creamy to pinkish buff, ca. 80 g.

**Identification and field marks.** Length 18–22" (46–55 cm). Adult males have a black head and neck except for a white forehead patch and a long, triangular patch on the nape, the point extending down the back of the neck. The rest of the body is black, except for the abdomen, which is mottled with lighter brown. The tail is short and black, and the upper wing surface is black. The iris is white, and the legs and feet are bright red on the outer side, orange-red on the inner side, with blackish webs. The bill has a pale yellow tip, and is otherwise white on the sides and red at the base above a swollen black oval area, shading to yellowish toward the tip. The lower mandible is yellow toward the base and flesh-colored elsewhere. Females have a dusky brown head and neck, with a darker crown and sometimes with a whitish patch on the back of the head comparable to that of the male, as well as two indistinct whitish patches on the face, one between the eye and the bill and the other in the ear region. The body is blackish brown except for a dusky abdomen; the tail and upper wing surface are blackish brown. The iris is dark brown, the bill is blackish with a black oval patch at the base that is surrounded by pale gray and generally less swollen than the male’s. The legs and feet are dull yellowish to brownish, with darker webs. Immature males gradually acquire black feathers and white napes during their first winter, but not the white forehead. Juveniles resemble adult females but have a paler breast and lack the whitish nape patch. The whitish markings on the head are more conspicuous, and the head is dark brown from the eyes upward, resembling the black scoter pattern.

In the field, male scoters may be readily recognized by the white forehead and nape marks and the garishly colored bill. Females closely resemble female white-winged scoters, and may be difficult to recognize unless the white secondaries of that species can be seen. Like black scoters, this species shows no white in the wings when in flight, but its wings produce a humming rather than whistling noise, and the white head markings of males are usually readily apparent.

**Natural History**

**Habitat and foods.** No detailed analysis of breeding habitats of the surf scoter is available, but like the other scoters, it evidently prefers to nest around fresh-water lakes, ponds, or rivers with shrubby or low woodland cover in the vicinity. Wintering habi-
tats include the littoral zone of the ocean and adjoining coastal bays, sometimes extending up into brackish estuaries. Very infrequently stray birds appear on fresh-water lakes or larger rivers in the interior during winter; they are usually females or immature birds. Not much is known of food preferences either, except that mollusks, and particularly mussels, are apparently the major dietary item, with crustaceans, insects, and plant materials being minor components except perhaps among juveniles (Cottam, 1939).

Social behavior. Apparently pair bonds are re-established each winter and spring, following the first year of life. There is a prolonged period of social display among wintering birds, which has been best documented by Myres (1959). Flock sizes in early winter are fairly large, but courting parties frequently consist of a single female and a small number of active males, with much fighting or threatening behavior typical. Females have few obvious displays; chin lifting associated with a crowlike call is the most obvious one and seems to represent a form of inciting behavior. Many of the male displays consist of variably ritualized aggressive postures, such as crouch and threat postures, often interspersed with underwater chases. There is also a stretched-neck posture called the sentinel, and from this posture breast scooping is performed, which seems to be a combination of head-shaking and breast-preening movements, accompanied by a gurgling call. A chest-lifting display that has a strong similarity to the rearing of the Steller eider is likewise performed by males, as well as a short display flight that is terminated by holding the wings in an upraised position as the bird skids to a stop. Copulation takes the same form as in the other sea ducks, with the female assuming a prone position while the male performs an extended series of bill-dipping, preening, and drinking movements. After treading, the male typically performs a single chest-lifting display (Myres, 1959).

Reproductive biology. Very few nests of surf scoters have been described, but it appears that they are often located some distance from water, and are always very well concealed from view. Nests are
reportedly often concealed under low branches of a conifer, under bushes, or in grass. Clutch sizes of from 5 to 7 eggs are apparently typical, and up to 9 eggs have been reported. The incubation period is still unknown, but is likely to be no more than the 27 or 28 days characteristic of the other scoters. Several broods have been seen with two females in attendance, suggesting that brood mergers may be common in this species. Evidently males undertake molt migrations to the coastline before hatching and together with nonbreeding females molt in shallow bays and inlets. The fledging period has not been established, but it is possible that females leave their broods in advance of fledging and also undertake a migration prior to molting (Bellrose, 1976; Johnsgard, 1975).

**Status.** Bellrose (1976) has estimated a wintering population of 765,000 surf scoters and a breeding population of 257,000 birds, but these figures are highly uncertain, inasmuch as little effort is made by federal biologists to distinguish the scoter species during their annual surveys. In any case, the surf scoter is clearly the least common of the three scoter species on a worldwide basis. Like some of the other sea ducks, its major threat to survival is perhaps the possibility of massive losses due to oil spills on areas of concentration, since its breeding areas are diffuse and still fairly undisturbed.

**Relationships.** I have suggested (1965a) that the surf scoter and white-winged scoter are probably fairly closely related but in addition show some similarities to other sea ducks such as the Steller eider and the goldeneyes, emphasizing the central position of the scoters among the sea ducks.

**Suggested readings.** Myres, 1959; Bellrose, 1976; Johnsgard, 1975.

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**White-winged Scoter**

*Melanitta fusca* (Linnaeus) 1758

**Other vernacular names.** Velvet scoter, white-winged sea coot; Samtente (German); macreuse à ailes blanches (French); anade marino de alas blancas (Spanish).

**Subspecies and ranges.** (See map 115.)

- **M. f. fusca:** European white-winged scoter. Breeds across northern Europe and Asia from Scandinavia to at least the Yenisei and perhaps to the mouth of the Khatanga River. Winters in the Atlantic Ocean from Norway to Spain, and on the Caspian Sea.
- **M. f. stejnegeri:** Asiatic white-winged scoter. Breeds in eastern Asia from the Altai to Kamchatka Peninsula, and perhaps on the Commander Islands. Winters on the coast of eastern Asia south to Japan and China.
- **M. f. deglandi:** Pacific white-winged scoter. Breeds in North America from northwestern Alaska east to Hudson Bay and south to southern Manitoba. Winters on both coastlines, south to Baja California and to South Carolina.

**Measurements and weights.** Folded wing: males, 269–93 mm; females, 251–66 mm. Culmen: males, 37–50 mm; females, 38–43 mm. Weights: males (of *fusca* and *deglandi*) in fall and winter average from 1,500 to 1,700 g and females from 1,200 to 1,600 g.
with considerable age and seasonal variation. Eggs: av. 72 x 48 mm, creamy to buff, 92 g.

Identification and field marks. Length 19–24" (48–61 cm). Adult males have a black head and neck except for a small crescent-shaped white spot around and behind the eye; otherwise the entire plumage is black, except for white secondaries and their greater coverts and a brownish tinge on the sides and flanks. The iris is white; the legs and feet are orange vermillion on the inner sides and purplish pink on the outer sides, with dusky webs. The bill is enlarged at the base with a black knob (largest in stejneri, smallest in fusca), a yellow to whitish tip and nail, and reddish to yellow or orange striping on the sides of the bill, varying with the subspecies. Females have a brownish black head and neck, with paler spots between the eye and bill and in the region of the ear. Otherwise the body is entirely blackish brown, except for whitish edging on some of the body feathers and white secondaries. The iris is brown, the bill is dull black, mixed with whitish and sometimes also pink on the upper mandible, and the legs and feet are light brownish red, with darker webs. Immature males lose their femalelike facial markings the first winter and begin to assume the first black feathers of their adult plumage. The iris becomes white by the second autumn of life. Juveniles resemble adult females but are paler on the breast, and sometimes are even whitish there. The pale head markings are also much larger and more whitish than in adult females.

In the field, white-winged scoters are the bulkiest of all the scoter species, and at any distance males appear nearly black, since the white eye markings are easily overlooked and the white wing speculum is often hidden in swimming birds. Females lack the white nape markings sometimes shown in female surf scoters, and additionally show less overall contrast in their head markings. The best field mark is the white speculum of both sexes, which is readily visible in flying birds, plus the ponderous flight of this species, which often flies at low altitude in long strings or loose flocks. Females sometimes utter a thin whistling note, and males have a more bell-like call that is apparently associated with courtship display.

Natural History

Habitat and foods. The breeding habitat of this rather widespread species of scoter consists of coastlines and lakes in the northern coniferous forest, especially where there are boulder-covered islets with shrubs and low trees present, but also extensive herbaceous vegetation. The birds often nest well away from coastal areas, even in the interior of continents, and thus access to salt water is not necessary. Summer foods are not well studied, but at least juvenile birds seem to concentrate on crustaceans such as amphipods, while the larvae of stone flies (Perlidae) and caddis flies (Trichoptera) have been found in some adult males. Fall and winter foods are mainly obtained in coastal regions, where the birds concentrate in waters that are usually under 20 feet deep, in the littoral zone just beyond the breakers. They also extend into brackish-water estuaries, and stragglers sometimes winter on larger rivers and reservoirs.
MAP 115. Breeding distributions of the Pacific or American ("Am"), Asian ("A"), and European ("E") white-winged scoters. Wintering distributions indicated by stippling.

Mollusks, primarily bivalves such as mussels, clams, and scallops, predominate in the winter foods, and to a much smaller extent such crustaceans as crabs are consumed. The birds often remain submerged for considerable durations, frequently for a minute or more, when foraging in deep water, and even ducklings only a few days old can remain submerged for up to 30 seconds when being chased (Johnsgard, 1975; Bellrose, 1976).

Social behavior. During most of the year this species is on coastal waters, where flocks of considerable size often gather. The birds are not known to nest before their second year of life, and some may not breed until even later, but probably all second-year females form pair bonds. This probably occurs in late winter and spring, since nearly all birds are paired when they arrive on their nesting grounds. Social displays include several aggressive postures such as the crouch, and a more extreme threat or attack posture with the head and neck stretched forward in the water. There is also a neck-erect-forward posture with the neck outline greatly thickened, which may also serve as a threat display. Males are known to produce a whistling call, but the associated posturing has not been described, and females also utter a thin whistle, apparently in conjunction with inciting behavior. Several other rather simple displays have been described, such as wing flapping, drinking, body shaking or upward-stretch, and preening behind the wing, but at least some of these are probably more directly associated with copulatory behavior. Evidently a combination of display preening and water-twitching, preceded by display drinking, provide the major precopulatory displays of males, but no specific postcopulatory posturing has yet been described (Myres, 1959).

Reproductive biology. These scoters arrive on the nesting grounds relatively late, and furthermore a period of a month or more may elapse before the female begins egg laying. The ecological significance of this adaptation is obscure, but probably restricts the potential for arctic breeding as well as for renesting. In the Gulf of Bothnia, Hilden (1964) found that females usually selected junipers or bushes for nest cover, with broad-leaved herbs, herb-shrub mixtures, or boulders accounting for most of the rest of the sites. Nests were generally placed in woodland areas well away from the shore and almost invariably were well concealed from above, with exposed nests typically found only where the birds nested in association with gulls or terns. The interval between successive eggs has been estimated at about 40 hours, and clutch sizes seem to average 9 to 10 eggs, with later clutches slightly smaller than earlier ones. The incubation period is usually between 26 and 29 days, averaging 27.5 days, and probably males abandon their mates at about the time incubation gets underway. Likewise, females tend to abandon their young at a relatively early stage, probably in order to complete their own molt before bad weather begins; and as a result a good deal of brood merging usually occurs in the first week or two of life. The fledging period has not been established with certainty, but indirect evidence suggests that it may be between 63 and 77 days. In contrast to the males, which often undertake molt migrations of considerable length, breeding females probably normally molt on their breeding grounds (Rawls, 1949; Hilden, 1964; Koskimies & Routamo, 1953).

Status. Using the only available evidence, which is rather questionable, Bellrose (1976) indicated that the
North American population of breeding white-winged scoters might be as high as 675,000 birds, but that this is likely to be an inflated estimate. However, about 250,000 apparently winter in the Aleutian Islands alone. Also, the wintering range on the Pacific coast extends from Alaska to Baja California, and nearly 150,000 birds winter from southern Alaska southward. Since as many as 100,000 white-winged scoters have been reported in a single day off the Massachusetts coast, and as many as 400,000 birds have been estimated in winter flocks of Cape Cod and Nantucket, there may indeed be close to a million white-winged scoters in North America. In Europe, about 30,000 birds winter in the Baltic area, and some winter south to Spain and around the Black and Caspian seas as well (Ogilvie, 1975). The size of the East Asian population of white-winged scoters is totally unknown.

Relationships. Plumage similarities of the downy young and females of the surf and white-winged scoters indicate that they are very close relatives, and in addition, some surprising behavioral similarities occur between *Melanitta* and *Bucephala* (Johnsgard, 1965a; Myres, 1959).


**Bufflehead**

*Bucephala albeola* (Linnaeus) 1758

Other vernacular names. Butterball; Büffelkopfente (German); garrot albéole (French); pato cabeza clara (Spanish).

Subspecies and range. No subspecies recognized. Breeds in North America from southern Alaska and northern Mackenzie District through the forested portions of Canada east to James Bay and south into the western United States to northern California and northwestern Wyoming. Winters along the Pacific coast from the Aleutian Islands to central Mexico, along the Gulf and Atlantic coasts from southern Canada to Texas, and in the interior where open water occurs. See map 116.

**Measurements and weights.** Folded wing: males, 163–80 mm; females, 150–63 mm. Culmen: males, 25–29 mm; females, 23–26 mm.Weights: males average ca. 450 g and females ca. 330 g, with maximum weights of about 590 g in both sexes occurring during fall. Eggs: av. 52 x 37 mm, creamy to pale olive buff, 37 g.

Identification and field marks. Length 13–16” (33–40 cm). Plate 56. **Adult males** in breeding plumage have a large white patch extending across the back of the head from cheek to cheek, forming a bushy crest, with the rest of the head iridescent with shades of purple blue, bronze, and green. The neck, scapulars, breast, underparts, and sides are white; the abdomen is slightly grayish; and the flank feathers are white, narrowly edged with black, as are the outer tail coverts. The tail is dark gray, the upper wing surface is blackish, except for a white speculum that extends from the inner and middle secondaries diagonally forward across the greater and middle coverts to the outer lesser and marginal coverts, which are grayish to dusky. The iris is dark brown, the bill is dusky, with a darker tip, and the legs and feet are flesh pink. **Females** have a brownish head and neck except for an oval white patch that extends from below the eye back toward the nape. The back is dull blackish; the sides, flanks, breast, and rear underparts are dark sooty gray; the abdomen is whitish; and the tail is grayish brown. The upper wing surface is blackish brown, except for the inner and middle secondaries and inner greater coverts, which are white, tipped with blackish. The iris is dark brown, the bill is lead-color, and the legs and feet are bluish gray to pinkish. **Males in eclipse** resemble females, but have more white on the sides of the head and on the upper wing coverts. **Immature males** begin to acquire a large white nape patch in their first winter, but the rest of the head remains largely brownish. Males at this age have darker heads than females, and their upper tail coverts are paler grayish brown. **Juveniles** resemble adult females, but are more brownish and generally duller, with smaller white patches on the sides of the head.

In the field, the predominance of white in the body plumage of males makes them highly conspicuous and distinctive; only the smew has as much or more white. The large white crest marking of the male is also distinctive; unlike that of the hooded merganser, it is not tipped with black. The female is an extremely small duck that might be mistaken for a small grebe; its small teardrop-shaped white head marking pro-
vides the best field mark. In flight, the birds flash their white speculum pattern and are smaller than other North American diving ducks except ruddy ducks. Both sexes are unusually silent, even during courtship display.

**NATURAL HISTORY**

**Habitat and foods.** Favored breeding habitats of this North American hole-nesting duck consist of lakes and ponds in or near open temperate woodland, particularly those lakes that are moderately fertile, with large areas of open water and maximum depths of at least three meters. Trees that are located either in water or very close to it, and which have cavities such as those formed by flickers (Colaptes) are obviously an important breeding habitat component. Lakes that have an abundance of such summer foods as nymphs, water boatmen, aquatic beetles and their larvae, and other aquatic invertebrates are also favored. Snails are also eaten in quantity when the birds are on fresh-water areas, but in winter they are as likely to be found in brackish-water habitats such as estuarine bays, where they feed on crustaceans and mollusks to a much larger degree. Even fish are consumed to some extent by wintering birds, and in some areas aquatic vegetation is also consumed in considerable quantities during that time of year. Buffleheads are evidently opportunistic foragers, and probably can utilize considerably smaller items as major foods, as can goldeneyes, which might account for the importance of snails and small bivalve mollusks present in most food samples (Erskine, 1972b; Wienmeyer, 1967).

**Social behavior.** Buffleheads become sexually mature during their second winter of life, and as early as late January may begin the social displays that result in pair bonding. The flock sizes of adult wintering birds tend to be rather small, a fact which is perhaps related to the surprisingly high level of aggressiveness typical of courting birds. Most of the male displays are clearly aggressive in nature, and are sometimes alternated with actual male-to-male attacks, often by underwater approach. Probably the most common male display is oblique-pumping, which is directed both to other males and toward females. Crest erection is also common, but no calling is performed by males during display activity. Short flights, followed by a complex and rapid sequence of wing flapping, head bobbing, and lifting of the folded wings over the back, are frequent. Females regularly swim behind displaying males in a following display, and also raise their crests in a head display, both of which are important stimuli to male display activity. Copulation is preceded by a very short prone posture on the part of the female, while the male typically performs preening and bill-dipping movements combined with lateral head movements. Postcopulatory behavior is evidently quite variable, but often consists of vigorous bathing or diving by the male (Myres, 1959).

**Reproductive biology.** On their return to the breeding grounds, females often seek out areas where they were raised, and often return to nest sites that they used in a previous year. Often many pairs will share a lake; Erskine (1972b) found a few cases of single trees having two simultaneously occupied nests. If females do not use the nest site of a previous year, they usually nest nearby, and will accept tree holes from as low as a meter above the water to more than 15 meters, and with openings as small as six centimeters in diameter. Eggs are laid at rather variable intervals, but average about 38 hours apart, and clutch sizes for initial nesting attempts are 8 or 9 eggs. Dump-nesting tendencies may inflate observed clutch
Breeding (hatched) distribution of the bufflehead, including areas of major concentrations (cross-hatched). Wintering distribution indicated by stippling.

sizes, and renesting efforts tend to produce smaller-than-average clutches. Apparently most males leave their territories as soon as the female begins incubation, and at least in some areas probably undergo a migration to favored molting areas. The incubation period averages about 30 days under natural conditions; and shortly after hatching, the young jump out of their nesting holes and are led to water. Although brood territories are established by the females, transfers of young from one brood to another are not uncommon, and at times single broods have been seen with two females in attendance. It is estimated that fledging requires from 50 to 55 days, and probably the mother abandons the ducklings before this time so that she can undergo her own flightless period, but relatively little is known of this phase of the reproductive cycle (Erskine, 1972b).

Status. Erskine (1972b) estimated a breeding-ground population of 500,000 buffleheads in the early 1960s, and Bellrose (1976) produced more recent evidence suggesting spring populations approaching 750,000 birds. Evidently the species has increased somewhat in the midwestern and eastern states in recent years, but has declined in the far western states, for reasons that are not now apparent.

Relationships. Most taxonomists now support the view that this species should be included with the goldeneyes in the single genus *Bucephala*. Erskine (1972b) believes that *Mergus* represents the nearest generic relative of *Bucephala*, but it is significant that a number of the behavioral traits of *Bucephala* also occur in *Melanitta*, and the scoters must also be considered closely related to the goldeneyes (Johnsgard, 1960c).

Suggested readings. Myers, 1959; Erskine, 1972b.

**Barrow Goldeneye**

*Bucephala islandica* (Gmelin) 1789

Other vernacular names. None in general English use. Spatelente (German); garrot d’islande (French); pato ojos dorados de Barrow (Spanish).

Subspecies and range. No subspecies recognized. Breeds in Iceland, southwestern Greenland, northern Labrador, and from southern Alaska and Mackenzie District southward through the western states and provinces to California and Wyoming. Winters primarily along the Pacific coast south to central California, also along the Atlantic coast to the mid-Atlantic states, and around Greenland and Iceland. See map 117.

Measurements and weights. Folded wing: males, 232–48 mm; females, 205–24 mm. Culmen: males, 31–36 mm; females, 28–31 mm. Weights: males in fall average ca. 1,100 g and females ca. 800 g, with respective maximums of 1,314 and 907 g. Eggs: av. 62 x 45 mm, bluish green, 70 g.

Identification and field marks. Length 16–20" (40–51 cm). Plate 57. Adult males in breeding plumage are similar to those of the common goldeneye, differing in the following major ways: the white patch on the head is crescent-shaped, and the iridescence is glossy purple. The head has a flatter crown profile and longer nape feathers, and the nail of the bill is distinctly raised above the culmen profile. The body is more extensively black, especially on the flanks, which are more heavily margined with black, and on
the scapulars, which are margined with black in such a way as to produce a pattern of oval white spots in linear series. The upper wing surface is also more extensively black, especially on the lesser and middle coverts. The soft-part colors are the same. Females likewise resemble female common goldeneyes, but have a slightly darker brown head with a more flattened crown profile, a broader and more pronounced ashy brown breast band, and more black on the middle and lesser wing coverts. The soft-part colors are the same, except that the bill is more extensively yellowish, and often is entirely bright yellow in breeding females. Males in eclipse resemble females, but have darker heads and often retain a trace of the white cheek pattern. The middle wing coverts are also more extensively white. Immature males are like those of the common goldeneye, with the white face markings appearing late in the first winter or spring, and the head remaining brownish. Juveniles resemble adult females, but initially have a brownish iris.

In the field, this species is most likely to be confused with the common goldeneye, but the differences in head shape and in the white cheek markings on the male provide for fairly ready identification. Lone females are much more difficult to identify. If the bill is entirely yellow, the bird can confidently be regarded as a Barrow goldeneye; and when the two species are side by side, the differences in head shape and overall darkness of head and breast are evident. In flight, males show less white in the forewing than do common goldeneyes, and the white speculum of the secondaries is separated from the forewing white.
patch by a narrow black line that is lacking in the common goldeneye. Males lack the loud whistling notes of courting common goldeneyes, and instead utter a variety of grunting and clicking sounds. Calls of the female are soft, and even during courtship females are relatively silent birds.

**Natural History**

**Habitat and foods.** The breeding habitat of this species is rather more flexible than that of the common goldeneye or bufflehead, inasmuch as it is not dependent upon tree cavities for nest sites, and instead can utilize rock crevices or even surface nest sites in treeless habitats. Thus, its distribution may be more closely related to the availability of food, mostly in the form of amphipods and other aquatic invertebrates associated with fresh-water or alkaline lakes. In Iceland, where large trees are lacking, the birds seem to prefer to breed near running water rather than lakes, and in most areas deep lakes with little aquatic vegetation present are apparently avoided. Summer foods include not only amphipods, but also many aquatic insects, especially the nymphs of dragonflies and damsel flies. After the breeding season the birds typically move to brackish water in estuaries or to coastal lakes, with salt-water environments seemingly avoided. At that time of the year mollusks, especially mussels, become important foods, and are supplemented by crustaceans, fish, and marine algae. Many birds also winter in the interior, on fresh-water lakes and rivers that remain unfrozen, and at such times may even resort to feeding on grain provided by humans when it is available (Cottam, 1939; Johnsgard, 1975).

**Social behavior.** Like the other sea ducks, Barrow goldeneyes become sexually mature during their second winter of life, and at that time begin an extended period of social display that persists for several months through the spring migration. Yearling birds are often present in the flocks of wintering adults but do not participate in social display, and during such display the courting groups typically consist of several adult males and one or two females. There is a great deal of overt and ritualized aggression among the males and a considerable degree of aggression by females toward males. The major female display is a strong side-to-side movement of the head, performed silently but certainly equivalent to inciting behavior, as well as rotary pumping movements of the head, also silently performed. The major displays of the males consist of a head-throw associated with a kick and splash of water, an aggressive crouch posture, a neck-withdrawing movement often performed in response to female inciting, and rotary pumping movements generally given in conjunction with the same display by females. Precopulatory behavior consists of the female's assuming a prone posture on the water, usually after mutual drinking by both birds, and remaining in that posture while the male performs a long series of displays that are largely derived from comfort movements. Treading is always preceded by a stereotyped sequence of rapid movements and a quick rush to the female. After copulation the male swims rapidly away from the female with his neck extended and the crest fluffed, while uttering grunting sounds and performing lateral head-turning movements (Johnsgard, 1965a; Myres, 1959).

**Reproductive biology.** One of the few studies of the nesting biology of this species is that of Bengtson (1971b), who found that among ten species that he studied, this one was unique in its establishment of a...
true territory before egg laying, as well as its formation of defended brood territories after hatching. In Iceland, where tree-cavity nesting is not possible, the birds nested primarily in other kinds of cavities or even under dense shrubs, with the density of the nesting birds ranging from 30 to 600 pairs per square kilometer. Most of the nests were located within ten meters of water, and studies of tree nesting in British Columbia indicated that the birds usually selected holes with entrances between 7 and 10 centimeters in diameter, and apparently preferred cavities with vertical rather than horizontal openings (Erskine, 1960). Clutch sizes of initial nesting efforts are usually between 9 and 11 eggs, while renesting attempts have appreciably smaller clutch sizes. Males apparently desert their mates shortly after incubation gets underway, and the incubation period under natural conditions is fairly long, averaging about 32 days. Females establish strongly defended brood territories for their young, and not only attack the young of other species but also strange young of their own species, which in densely inhabited areas may be a serious cause of duckling mortality. The fledging period is approximately eight weeks, but the adult females usually abandon their young before fledging and either fly up to 25 miles to a molting area, or undergo their flightless period in the same vicinity (Bellrose, 1976; Munro, 1939).

Status. The two major populations of this species occur in Iceland and in western North America. The Icelandic population is believed to number only about 1,000 pairs, mostly concentrated in the Lake Mývatn area (Hudson, 1975). Bellrose (1976) has made a "crude" estimation of the prebreeding population in western North America as between 125,000 and 150,000 birds. Beyond these populations, the Labrador and Greenland birds add a small additional component to the total, which is perhaps no more than 200,000 breeding birds.

Relationships. It is interesting that in spite of the remarkable similarities between the females of common and of Barrow goldeneyes, natural hybrids between the species have been reported only a few times. This might be largely related to the substantial differences in male display behavior and vocalizations, although the behavior associated with copulation is nearly the same in both forms (Johnsgard, 1965a). Another curious feature of the Barrow goldeneye is its failure to colonize any part of Asia, in spite of its rather more flexible nesting requirements than those characteristic of the far more cosmopolitan common goldeneye. Perhaps competition with that species has restricted its opportunities for range expansion.

Suggested readings. Munro, 1939; Myres, 1959.

Goldeneye
(Common Goldeneye)

Bucephala clangula (Linnaeus) 1758

Other vernacular names. Whistler; Schellente (German); garrot ordinaire (French); pato ojos común (Spanish).

Subspecies and ranges. (See map 118.)

B. c. clangula: European goldeneye. Breeds in Iceland, northern Europe, and Asia from Norway to Kamchatka and Sakhalin. Winters from the British Isles, southern Scandinavia, and the southern limits of its breeding range south to the Mediterranean, the Persian Gulf, northern India, Burma, southern China, and Japan.

B. c. americana: American goldeneye. Breeds from Alaska to southern Labrador and Newfoundland, and south through the forested portions of Canada plus northern and northeastern parts of the United States. Winters from the Alaskan coast south to California, in the interior wherever open water is present, and on the Atlantic coast from Newfoundland to Florida.

Measurements and weights. Folded wing: males, 215–35 mm; females, 188–220 mm. Culmen: males, 35–43.5 mm; females, 28–35 mm. Weights: males (of both races) average ca. 1,000 g in fall and females ca. 800 g, with maximums of 1,406 and 1,133 g, respectively. Eggs: av. 60 x 42 mm, greenish, 57 g.

Identification and field marks. Length 16–20" (40–51 cm). Adult males in breeding plumage have a white circular to oval patch between the eye and the base of the bill, and the rest of the head blackish with an iridescent greenish gloss. The neck, breast, anterior underparts, sides, flanks, and some scapulars are white, the flanks and longer scapulars having narrow black margins. The shorter scapulars are entirely black. The back, rump, and upper tail coverts are
black; the tail is grayish brown; and the under tail coverts and rear underparts are grayish to dusky. The upper wing surface is blackish to blackish brown, except for a white patch that includes the exposed webs of about six secondaries, eight greater coverts, and the adjoining middle and lesser coverts. The iris is bright yellow, the bill is black, and the legs and feet are bright yellow to orange. Females have a head that is entirely dark chocolate brown, separated from a more grayish body by a white neck band. The upper breast, anterior back, sides, and flanks are gray to brownish gray, the feathers edged with lighter tips, and the back becoming darker toward the rump and upper tail coverts. The tail is grayish brown, the under tail coverts are sooty gray, and the abdomen becomes white anteriorly. The upper wing surface is brownish black to black and darkest on the outer secondaries, tertials, and adjoining secondaries, while the middle five secondaries are white, with their greater coverts also white but tipped with blackish coloration. The middle coverts are mostly grayish white or gray tipped with white. The iris is pale yellow to greenish yellow, the bill is dusky, sometimes tipped with yellow, and the legs and feet are dull orange with darker webs. Males in eclipse resemble females but usually have a darker head color, and a trace of the white cheek spot is often evident. The wing coverts also remain more extensively white at this time. Immature males during the first fall and winter assume a plumage that is darker on the back than are females, and a white spot on the cheeks may be evident by spring. Juveniles resemble adult females, but have a brown iris and are generally darker on their upper wing coverts.

In the field, common goldeneyes are most often confused with Barrow goldeneyes; distinctions are provided in the account of that species. They might also be confused with various mergansers, but no merganser species has such distinctively yellow eyes or a short and stout bill. In flight the birds resemble buffleheads, but are appreciably larger, and might also be confused with goosanders, which have a similar white wing speculum but are much longer in body outline. Males utter loud whistling notes during aquatic courtship, and the wings of birds in flight produce a strong whistling noise (thus the vernacular name “whistler”), but otherwise both sexes are relatively silent.

**Natural History**

**Habitat and foods.** This goldeneye breeds over a very wide area of the Northern Hemisphere, primarily where lakes or deep marshes having abundant invertebrate life are located near forests or stands of hardwood or coniferous trees of moderate size. Rock crevices are apparently not suitable substitutes for nest sites in this species, but a variety of tree species are utilized for nesting. Foods of juveniles during the breeding season probably consist largely of invertebrates.
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Reproductive biology. Goldeneyes are relatively early migrants, and pairs begin to return to their breeding grounds soon after they have thawed. Like most hole-nesting ducks, females exhibit a strong homing tendency and very often nest in the same cavity as they used the previous year. If natural cavities are used, they are generally in trees that are large enough to provide internal cavity diameters of about 20 centimeters, although the height of the opening and its dimensions seemingly are not so important. Cavities with lateral openings are used more often than those with vertical openings, and trees that are in open stands or near the edges of marshes seem to be preferred to those in dense stands, perhaps for ease of entry by flying birds. Females deposit their eggs at the rate of one per 1.3 to 2.0 days and have clutch sizes that average about 10 eggs. In areas where cavities are limited, considerable competition for available nest sites occurs and several females may attempt to use the same site, often resulting in desertion and reduced hatching success. The incubation period averages 30 days, but ranges from 27 to 32 days under natural conditions. Females usually leave the nest the day after the eggs have hatched and quickly lead their broods to water. Females are seemingly rather careless mothers, often losing several of the ducklings in the process of moving them from one area to another. Such abandoned ducklings combine to form rather large groups, especially as they grow older. The fledging period has been variously estimated to require 56 to 66 days, and probably in most cases the female will have abandoned her brood before fledging in order to begin her own flightless period, but she usually remains in the same general area to molt. On the other hand, males typically abandon their mates about the time incubation gets underway, and at least in some areas often move to river mouths or coastal inlets to undergo their molts (Carter, 1958; Johnson, 1967; Johnsgard, 1975).

Social behavior. Goldeneyes are known normally to mature in their second winter of life, and occasionally even yearling females attempt to breed but probably only rarely do so successfully. Pair bonds are renewed annually during a prolonged period of courtship in winter and spring, which normally peaks about March, by which time about 80 percent of the females appear to be paired. Goldeneye courtship is perhaps the most spectacular and complex of that of any North American duck, with males showing a bewildering array of postures and calls that seem to have little predictability or obvious differences in function. Clearly, many are derived from hostile patterns, and direct threats or attacks among the males are not uncommon. Likewise, the inciting behavior of females, although highly ritualized, is clearly of hostile origin. Three different types of head-throw occur, one of which lacks an associated kicking of the feet, while the other two are slow and fast versions of a simultaneous head-throw and backward kicking movement that throws water behind the displaying bird. Several other silent displays are also performed, all of which have been analyzed carefully as to their time and sequential characteristics (Dane & Van der Kloot, 1964). Copulation is likewise preceded by an extended and diverse series of male displays, performed while the female lies prone in the water. Treading is preceded by a rigidly stereotyped sequence that is terminated by a rapid steaming to the female, and afterward the male retreats from her in an equally stereotyped manner (Johnsgard, 1965a; Lind, 1959).

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Status. Bellrose (1976) suggested that a breeding-grounds estimate of 1.25 million birds in Alaska and Canada represents a "crude" index to this species' abundance in North America. Ogilvie (1975) indicated that the summering population in western Europe is about 150,000, with the majority located in the Baltic. However, in the western U.S.S.R. alone there are an estimated 120,000 pairs, plus an additional 50,000 in Finland and unknown but considerable numbers breeding in Scandinavia. Likewise, the population of eastern Asia must be considerable.

Relationships. As noted in the account of the Barrow goldeneye, these species are obviously very close relatives, as are the bufflehead and, perhaps surprisingly, the smew and hooded merganser. Bill shape cannot confidently be used to estimate relationships.
among the members of this group, which show strong similarities in behavior, the patterns of their downy young, skeletal characteristics, and electrophoretic patterns of the feather profiles (Johnsgard, 1965a; Woolfenden, 1961; Brush, 1976).


Hooded Merganser

*Mergus cucullatus* (Linnaeus) 1758

Other vernacular names. Fish duck, sawbill; Kappen­säger (German); harle couronné (French); mergo capuchino (Spanish).

Subspecies and range. No subspecies recognized. Breeds in North America from southeastern Alaska and adjacent Canada east through the southern and middle wooded portions of the border provinces to New Brunswick and Nova Scotia, and south to Oregon, Idaho, and Montana. East of the Great Plains it breeds from Minnesota through the Great Lakes states to the Atlantic coast, with less frequent breeding southward through the Mississippi Valley to the Gulf Coast. Winters along the Pacific coast south to Mexico, along the Gulf Coast, and on the Atlantic coast north to New England. See map 119.

Measurements and weights. Folded wing: males, 195–201 mm; females, 184–98 mm. Culmen: males, 38–41 mm; females, 35–39 mm. Weights: males in fall average ca. 680 g and females ca. 540 g, with respective maximums of ca. 900 and 680 g. Eggs: av. 52 x 47 mm, white, 60 g.

Identification and field marks. Length 16–19” (40–48 cm). Plate 58. Adult males in breeding plumage have a blackish brown forehead and the rest of the head and neck glossy black, except for a large, erectile white patch extending from behind the eyes in a triangular fashion to the tip of a rounded crest, which is margined with black. The back is blackish brown, shading to grayish brown on the rump and upper tail coverts, and the tail is dark sooty brown. The scapulars are black, with black also extending down the sides of the breast in two vertical bands; the rest of the underparts are white, except for reddish brown sides and flanks, which are vermiculated with black. The lesser and middle wing coverts are ashy gray; the greater coverts are blackish, some of them being tipped with white; while the primaries, their coverts, and outer secondaries are grayish brown to blackish. The inner secondaries are black, with white outer margins, and the black tertials are pointed and elongated, with white central stripes. The iris is yellow, the bill is blackish, and the legs and feet are dull brown, with darker webs. Females have a head and neck that are grayish brown except for the crest, which is lighter and brighter, and a whitish chin and throat. The upperparts are generally dark brown, with the tips of the scapulars and upper tail coverts lighter, and the tail is dark sooty brown. The breast is ashy brown, shading to whitish on the abdomen and darker brownish on the sides and flanks. The upper wing surface is similar to the male’s but the lesser and middle wing coverts are not lighter than the other coverts, the secondaries and greater coverts have less white present, and the tertials are less pointed and are brownish with white stripes. The iris is yellow-brown, the bill is blackish, with dull orange on the lower mandible and basal half of the upper mandible, and the legs and feet are dull yellow to brown, with darker webs. Males in eclipse resemble females, but the head and neck are more mottled, the flanks are plain grayish brown, and more white is present on the upper wing surface. Immature males are femalelike most of their first year, with a white head patch developing in winter or spring. Juveniles resemble adult females but have no crest, and the entire plumage is more brownish.
Breeding (hatched) distribution of the hooded merganser, including areas of major concentrations (cross-hatched). Wintering distribution indicated by stippling.

In the field, the merganserlike bill and strongly crested head will serve to separate both sexes from other species, although the male's crest can be strongly depressed and fairly inconspicuous. The white tertial stripes on the lower back of both sexes are usually quite evident, and in flight a limited amount of white is visible on the secondaries. Neither sex is highly vocal, but during courtship males utter a strange, froglike croooooo note that carries some distance.

NATURAL HISTORY

Habitat and foods. During the breeding period, hooded mergansers are usually found in wooded habitats that contain clear-water streams or equally clear lakes. Such waters provide foraging for small fish and invertebrates, and tree cavities for nesting sites. Streams that have sandy or cobble bottoms are preferred to mud-bottom streams, and fairly shallow, fast-moving waters are preferred to slower or deeper rivers. Besides fish, frogs, tadpoles, crayfish, other crustaceans, snails, and some other mollusks are consumed, but little plant material is ingested. Probably much the same foods are taken during winter, when the birds concentrate on fresh or brackish waters of rivers, estuaries, and interior lakes, generally avoiding salt-water habitats (Johnsgard, 1975; Stewart, 1962).

Social behavior. Perhaps because of the problems associated with competition for limited food resources, flock sizes of hooded mergansers tend to be fairly small during the fall and winter, usually consisting of no more than 15 birds. Courtship begins in midwinter among birds more than one year old, and such displaying groups often consist of from 3 to about 10 birds, with up to 3 females present. The major display activity of the female consists of a rather vigorous inciting behavior, marked by head-bobbing movements and repeated uttering of a hoarse gak sound. Females also perform an elliptical head-pumping movement almost exactly like that of the males, and usually perform it simultaneously with that display. Most of the male displays are associated with crest raising, which may occur independently of other displays or in conjunction with them. Silent elliptical head pumping, similar to that of goldeneyes and likewise apparently hostile in function, is common. The only display that has a moderately loud call is a head-throw that is preceded by several increasingly strong head-shaking movements. Swimming ahead of an inciting female with the depressed crest directed toward her is another common male display. Copulation is preceded by the female's assuming a prone position in the water, often after both birds have performed drinking movements. The male then begins a series of body-shaking and drinking movements, interspersed with jerky back-and-forth head movements, and terminates his precopulatory behavior with a stereotyped display sequence that includes a ritualized approach to her. After treading he swims away from the female with a fully erected crest, and finally dives or bathes (Johnsgard, 1961, 1965a).

Reproductive biology. Pair formation is probably completed by the time the birds arrive on their breeding grounds, and there is a strong tendency for females to return to their natal homes or to where they nested the previous year. Females frequently reoccupy the nest site of the previous year if it is still available, but otherwise look for suitable sites in the near vicinity. Cavities adjacent to water are preferred to those some distance from it, and there is probably some competition with goldeneyes and other hole-nesting species for suitable sites. Females lay eggs in
such sites at a rate of about one egg every two days, and initial nesting efforts have average clutch sizes of about 10 eggs, with experienced breeders averaging slightly larger clutches than hens nesting for the first time. Males usually desert their females at the time that incubation gets underway, and a relatively long incubation period of 32 to 33 days is typical. As in many hole-nesting species, dump nesting is a frequent cause of desertion of clutches, but otherwise fairly high nesting success seems to be characteristic. Females move their newly hatched ducklings out of the nest within a day of hatching, and usually go to shallow waters quite close to timber. Rivers with high levels of food resources are preferred for brood rearing, but sometimes beaver ponds or other standing-water habitats are used. The fledging period of the ducklings is about 70 days, but it is still uncertain how long females remain with their broods before leaving them to begin their own flightless period, and there is little available information on the activities of adults during the postbreeding period (Morse et al., 1969).

Status. Although the method of calculation was indirect, Bellrose (1976) estimated that the prebreeding population of hooded mergansers may average about 76,000 birds. The dependence of these birds on clear and unpolluted streams, and on nesting sites in fairly large trees, places them at a substantial disadvantage relative to many other North American ducks in terms of survival probabilities. Artificial nesting boxes may be used by the birds, but inasmuch as they are not significant sporting birds they have not received the attention that the wood duck has in this regard, and most hunters tend to regard all mergansers as "trash ducks," or, even worse, as destroyers of fish that should be shot on sight.

Relationships. As indicated by a study of its sexual patterns (Johnsgard, 1961c), as well as its postcranial skeletal structure (Woolfenden, 1961), the hooded merganser has strong evolutionary affinities with the genus Bucephala, and Woolfenden has argued for a retention of the genus Lophodytes on this basis. However, Brush (1976) found no obvious differences in the electrophoretic patterns of the feather proteins among all of the mergansers, the goldeneyes, scoters, and the long-tailed duck, which further suggests that they are a fairly close-knit group, and that very few genera should be recognized.


Smew

Mergus albellus Linnaeus 1758

Other vernacular names. None in general English use. Zwergsäger (German); harle piette (French); bech de serra petit (Spanish).

Subspecies and range. No subspecies recognized. Breeds in forested areas from northern Scandinavia across northern Russia to eastern Siberia, south to the lower Volga, Turkestan, and the Amur. Winters on the coasts and lakes of Europe south to the Mediterranean, the Caspian, Iran, northern India, southern China, and Japan. See map 120.

Measurements and weights. Folded wing: males, 192–205 mm; females, 178–86 mm. Culmen: males, 28–30 mm; females, 25–28 mm. Weights: males (fall), 540–935 g; females, 515–650 g (Dementiev & Gladkov, 1967). Eggs: av. 52 x 38 mm, creamy buff, 39 g.

Identification and field marks. Length 14–16" (35–40 cm). Males in breeding plumage have a white head and neck except for a greenish black patch extending from the bill to around the eyes, and another blackish V-shaped mark around the nape, forming a short crest. The breast and foreback are white, with two black bands extending down the sides of the breast in front of the wings. The tail is gray, the outer scapulars white, some with black margins, and the underparts are white, except for the sides and flanks, which are vermiculated with gray. The middle and lesser wing coverts are white, while the marginal and greater coverts are mostly black, and the secondaries are dark brown to black, tipped with white. The primaries are dark brown, and the tertials are silvery gray. The iris is dark gray, the bill bluish to blue-gray, with a darker nail, and the feet and legs are bluish gray. Males in eclipse are very similar to
females, but have whiter upper wing coverts and darker upperparts. Females have cinnamon brown on the upper head extending from the base of the bill to the nape, which is more grayish, and the rest of the head and neck is white. The breast, sides, flanks, and upperparts are gray, the scapulars being mostly light gray; while the rump, tail coverts, and tail are brownish to silvery gray. The underparts are mostly pure white, and the upper wing surface is like that of the male, but has less white on the coverts and the tertials are shorter and browner. The iris is dark brown, the bill dark gray, and the legs and feet bluish gray. Juveniles resemble adult females, but the central wing coverts have brownish edges.

In the field, the predominantly white pattern of the male is highly conspicuous and distinctive; no other European duck exhibits so much white on the head and body. The female's sharply two-toned head pattern, with bright cinnamon above and white below, is also apparent from great distances. The slim, typical merganser body form is evident in flight; the head, neck, and body are held in a straight line. Calling by both sexes is largely limited to display; females utter a harsh, rattling krrrr, krrrr sound during incubating, and males produce a very soft rattling call that sounds much like the noise made when winding a timepiece.

Natural History

Habitat and foods. This is a forest-nesting species which is similar in its ecological needs to the hooded merganser and bufflehead. It apparently avoids rapidly flowing streams, and instead favors the bottomlands of larger rivers, flooded riverside woods, and lakes that are associated with river bottomlands. During the nonbreeding period the birds are usually found on larger
lakes and impoundments, and at the mouths of rivers, but in general they prefer fresh-water to marine habitats. Besides the usual merganser fare of small fishes, they also eat mollusks and crustaceans and substantial quantities of insects such as beetles, dragonflies, and caddis fly larvae. The fish that are taken are generally roach (Rutilus), minnows, small carp (Cyprinus), and other nongame species, but the birds have also been known to consume trout and salmon. They typically feed in rather shallow water, and remain under water for rather short periods of 15 to 20 seconds. Pairs often dive synchronously, and at times flocks forage in a cooperative manner (Nilsson, 1974). Their bill shape is merganserlike in its serrated edges, but is shorter and stouter than those of the other mergansers, and presumably is better adapted for crushing than are the others (Dementiev & Gladkov, 1967; Ogilvie, 1975).

Social behavior. There is evidently some separation of the sexes during the winter, with females and immature birds wintering farther south than adult males, and tending to use inland rather than coastal habitats to a greater degree than adult males. In southern Sweden the birds spend about half of the daylight hours foraging, interspersed with resting and preening activities. Social display was not observed by Nilsson (1974) until late January, and by March about a third of the birds seemed to have become paired. The courting groups usually consisted of one or two females and up to eight males, with a good deal of shifting of numbers typical. Females have a conspicuous and energetic inciting movement and associated call, to which males often respond by swimming rapidly ahead and orienting their V-shaped markings toward her. Males also erect the front part of their crown into a rather shaggy crest and while swimming in this posture perform pouting, a bridlinglike movement of the head backward along the back while uttering a soft mechanical rattling sound. Males also perform a silent neck fling, tossing the head upward and backward and uttering the same call as that produced during pouting, suggesting that this is a more elaborate version of that display. Copulation has been observed in wild birds as early as January, and probably is usually initiated by mutual drinking movements. The female then assumes a distinctive prone posture, with her bill on the water but her tail well elevated above it. The male then performs an extended series of drinking and preening displays in no obvious sequence.

There is evidently no ritualized approach to the females as in the hooded merganser or goldeneyes; but after treading is completed, the male performs a single head-fling display and then swims rapidly away from the female while turning the back of the head toward her (Johnsgard, 1965a; Nilsson, 1974).

Reproductive biology. Apparently female smew breed in their second year of life, judging from what is known of related species. There is not a great deal known of the nesting biology of smews, but they evidently prefer to nest in hollow broad-leaved trees, including oaks, willows, and aspens, often in cavities so low that they can readily be looked into by humans, and at times the birds also accept nesting boxes. The cavity is lined with abundant whitish down, and from 6 to 9 eggs are laid, with up to 14 reported, presumably from multiple nesting efforts. Additionally, the birds often have mixed clutches with goldeneyes, and wild hybrids between these two species have been reported. The incubation period is 28 days, during which time the male deserts his mate and moves to a molting area. Females are reportedly very "tight" sitters, and near the end of the incubation period sometimes can be picked up. There is no specific information on sources of mortality among eggs and ducklings, and the fledging period under wild conditions is not known, but some young raised in captivity were reportedly fully fledged by ten weeks of age (Dementiev & Gladkov, 1967; Bauer & Glutz, 1969).

Status. Although no estimates of breeding populations are available, Ogilvie (1975) reports that about 10,000 smews winter in northwestern Europe, and another 30,000 occur in the Mediterranean and Black sea vicinity. The Netherlands supports the largest numbers of wintering smews in northwestern Europe. Most smews presumably nest in the U.S.S.R., where they are most common in western Siberia and in the open areas among the lowland coniferous forests of European U.S.S.R., but numerical estimates for the U.S.S.R. and China are not available. The birds are uncommon in Japan during winter (Austin, 1948).

Relationships. Similarities in female plumages and those of downy young, and the occurrence of wild hybrids, all suggest a close relationship between smews and goldeneyes. Additionally, smews and hooded mergansers seem to be close relatives, but this in part is a reflection of the fact that they are
ecological counterparts. The inciting behavior of female smews is more Mergus-like than Bucephala-like, further indicating the intermediate status of this species between these two seemingly distinctive genera (Johnsgard, 1965a).


Brazilian Merganser

*Mergus octosetaceus* Vieillot 1817

Other vernacular names. None in general English use. Dunkelsäger (German); harle du Brésil (French); mergansar pico serrucho (Spanish).

Subspecies and range. No subspecies recognized. Resident in southern Brazil in the states of Goiás, São Paulo, Santa Catarina, and Paraná, and also in the Paraná River drainage of eastern Paraguay and northeastern Argentina. See map 121.


Identification and field marks. Length: ca. 20” (50 cm). Adults have a black head and upper neck, with some green iridescence, and generally dark greenish brown upperparts. The lower neck, breast, and flanks are gray, finely vermiculated with hoary white, while the abdomen is barred irregularly with brown and white. The upper wing surface is generally blackish, except for the secondaries and their coverts, which form a white speculum bordered anteriorly with black and white bars. The legs and feet are rosy red, the iris is brown, and the bill is black. Females differ from males in their smaller size, shorter bill, and more poorly developed crest. Juveniles closely resemble females.

In the field, the slim, merganserlike shape separates this species from all other South American waterfowl. The birds fly swiftly, following the river courses closely, and hold their necks stiffly outstretched in line with the body, in the usual merganser fashion. The major calls so far described are a simple queek uttered in flight, and various sounds made while defending the young.

NATURAL HISTORY

Habitat and foods. The contribution by Partridge (1956) constitutes nearly the sum total of our knowledge of this rare species, which for some time was believed to be extinct. The species is now largely or entirely limited to the tributaries of the Paraná River, which are wild and torrential streams that flow through tropical forests. Evidently the upper reaches of these streams are inaccessible to the predatory dorado fish (*Salmimius*), regarded as a major enemy of the downy young. The streams do support other fish, and the remains of 11 stomachs indicate that the merganser’s primary food consists of fish (cichlids, characinids, etc.) from 6 to 19 cm long, supplemented by the larvae of do bson flies (*Corydalis*) and a few snails. The birds feed during the daytime, often perching on rocks among rapids and diving for food. Like torrent ducks, they often feed in areas of rapids where a large stone emerges, and feed near such rocks, remaining submerged for periods of about 15 or 20 seconds.

Social behavior. Evidently these mergansers are almost always found in pairs; Partridge noted only a single exception to this in his observations, where two pairs occupied the same stretch of rapids. During August he observed some apparent mating displays among these two pairs of birds, which included the male chasing a female in circles, paddling with the wings in the water but not leaving the water surface. At times both pairs would engage in this behavior, after which they would leave the water and preen. Judging from the behavior of other waterfowl, it seems unlikely that this was typical display; more
probably it represented the "dashing and diving" behavior of many ducks when bathing energetically. Partridge saw one copulation, which was preceded by the female's becoming prone and motionless in the water. Both birds were completely submerged during treading, and afterward the female uttered a long cry, after which they bathed and perched on a rock.

Reproductive biology. Breeding in this species begins in June, with incubation in July and the young emerging in the first part of August, according to Partridge. This corresponds to the rainy period and presumably to an abundance of available food. Only a single nest has been described, which was found by Partridge in a hollow cavity of a leguminous tree (Peltophorum) adjacent to the river. The cavity was located about 25 meters above the level of the river, and the entrance measured 35 by 15 centimeters. At the bottom of the cavity, which was three meters deep, there was a great deal of fine, rotten wood present but no down or other nesting materials. While the female incubated the male remained near the nest site, resting or foraging. Once a day the female left the nest and joined her mate in foraging, spending an hour to an hour and a half in this activity. After resting for a time in the river, the female would fly directly back to the nest cavity, while the male would fly past the nest entrance and then return to the river. Hatching occurred about a week after the nest was originally discovered, on August 30, and four ducklings were subsequently observed on the river with both parents. No information on the fledging period is yet available.

Status. Partridge (1956) believed that this merganser is not rare where suitable habitat occurs, but that its total range is limited to the tributary streams of the Alto Paraná river system. Because the birds are distributed as pairs along those tributary rivers, the total population must be greatly restricted. Since these rivers are still largely inaccessible, he believed that the species will continue to survive there indefinitely.

Relationships. I have suggested (1965a) that this species is not very closely related to any single one of the Northern Hemisphere mergansers, and must have had an earlier origin. Like the Auckland Island merganser, it seems to be a relatively isolated form.


Red-breasted Merganser

*Mergus serrator* Linnaeus 1758

Other vernacular names. Fish duck, sawbill; Mittelsäger (German); harle huppé (French); mergansár de pecho rojo (Spanish).

Subspecies and ranges. (See map 122.)

*M. s. serrator*: Common red-breasted merganser. Breeds in Iceland, the British Isles, northern Europe and Asia from Scandinavia to Kamchatka, the Aleutian Islands, and from Alaska.
east across nearly all of arctic Canada except for the northern part of Keewatin District and the arctic islands, south to northern British Columbia and Alberta, central Saskatchewan and Manitoba, southern Ontario, the Great Lakes states, New York, New England, and the eastern Canadian provinces to Newfoundland. Winters mostly on salt water from the southern parts of its breeding range southward along the coastlines of Europe, Asia, and North America.

M. s. schiøleri: Greenland red-breasted merganser. Resident in Greenland. (This is a poorly characterized subspecies that might not deserve recognition.)

Measurements and weights. Folded wing: males, 224–60 mm; females, 217–30 mm. Culmen: males, 53–62 mm; females, 48–55 mm. Weights: males in fall and winter average ca. 1,200 g and females ca. 925 g, with respective maximums of 1,314 and 1,268 g. Eggs: av. 63 x 45 mm, deep buff, 72 g.

Identification and field marks. Length 19–26" (48–66 cm). Adult males in breeding plumage have the entire head and neck black, with a green gloss, the feathers on the back of the head elongated to form a long, shaggy, and rather double-pointed crest. The foreback, sides of breast, and inner scapulars are black, shading to vermiculated green on the rump and upper tail coverts. The tail is ashy gray, the underparts are whitish, and the sides and flanks are white, with black vermiculations. The breast is cinnamon brown streaked with black, separated from the blackish neck by a wide white collar that is incomplete behind. The outer scapulars are white, and a group of black-margined white feathers extend down from the base of the wing to separate the brownish breast from the sides. The marginal and tertial coverts are gray, while the others are white or tipped with white, the greater coverts having exposed black bases. The primaries and their coverts are slaty brown. The secondaries have the exposed webs black outwardly and white or white margined with black inwardly. The longer tertials are white margined with black, and the inner ones are blackish. The iris is red, the legs and feet are dull red to orange, and the bill is carmine red, with a more dusky culmen and a black nail. Females have a grayish brown crown and crest, are darker around the eyes, have whitish lores, and whitish coloration on the chin and throat that gradually merges with cinnamon brown on the
cheeks, sides of the head, and the neck. The upperparts are grayish brown, the feathers having lighter edges and darker shaft-lines; the inner scapulars are blackish brown; the breast is whitish to brownish gray, and the sides and flanks are grayish brown, as is the tail. The underparts are white, the primaries and their coverts are dark brown, the outer secondaries are black, and the remainder are white with black exposed basally. The tertials are dark brownish gray, the greater coverts are black or black tipped with white, and the other coverts are brownish gray. The iris is reddish brown, the bill is dull red, and the legs and feet are dull red to orange. Males in eclipse resemble females, but have less white on the chin and have white on the middle and lesser coverts, a darker back, and more reddish eyes. Immature males resemble females but in their first spring begin to develop black feathers on the head, back, and sides of the breast. Juveniles resemble females but have a smaller crest, grayer upperparts, less white on the foreneck, and less blackish coloration around the eyes.

In the field, this species is most likely to be confused with the goosander, although the shaggy crest of males and their brownish breast coloration should easily separate them. Females have a distinctly less contrasting facial pattern, with the whitish areas of the chin and throat not so distinctly contrasting with the darker cheeks and neck feathers; in addition, their brown head and neck coloration gradually merges with the more grayish breast. Females of both species utter harsh calls during courtship display, but male red-breasted mergansers produce a distinctive catlike yeow-yeow call during elaborate posturing. In flight, the long, thin body profile, with the head and neck held in line with the body, marks the birds as mergansers, and the brownish breast of males, bordered in front and behind with white, provides the best field mark for distinction from goosanders and hooded mergansers.

**Natural History**

**Habitat and foods.** During the breeding season, red-breasted mergansers are usually found around inland lakes and streams that are not far removed from the coast. Although they extend into tundra areas, they are more often found around deeper lakes than tundra ponds. However, by their ground-nesting behavior they are not dependent on trees like many mergansers. Nonetheless, habitats having natural cavities such as those provided by boulder fields are favored over more exposed areas. During the summer the adult birds apparently remain fish eaters, but the young feed on insects such as aquatic beetles and the larvae of May flies as well as small fish and shrimp. During the fall and winter the birds tend to move to coastal areas, where they concentrate in such habitats as the open ocean, salt-water and brackish estuarine bays, and to a limited extent on fresh and slightly brackish waters as well. In any case, they prefer clear and shallow waters not affected by heavy wave action, where they can see to forage. Fish make up the majority of the diet at such times, with limited amounts of shrimps, crayfish, and other crustaceans also being consumed. The

![Map 122. Breeding distributions of the Greenland ("G") and common ("C") red-breasted mergansers. Wintering distributions indicated by stippling.](image-url)
Social behavior. Although first-year males have at times been observed in courtship display, full male plumage and presumably full sexual maturity are not attained before the second winter. Likewise, pair bonds are reestablished each winter during a rather prolonged period of display, but apparently they are fairly loose and some divergences from typical monogamy have been reported. By as early as February active display can be seen among coastal wintering birds, and courtship in this species is both conspicuous and rather bizarre in terms of the male posturing. Female inciting with a strong and harsh double note occurs occasionally but does not seem to be the major stimulus for display, which at times seems to be independent of specific female activities. The most obvious and complex male display consists of a series of movements including diagonal neck stretching (the salute), followed by a quick lowering of the neck and part of the head into the water (the curtsy) as a catlike note is simultaneously uttered. Males also sprint over the water, sending up a spray on both sides. Copulatory behavior consists of the female's assuming a prone posture on the water, often after both birds have performed drinking movements. Thereafter the male begins an extended series of drinking, preening, wing-flapping, and shaking movements, without clear sequential connections. After copulation, the male performs a single knicks display (the combination salute and curtsy mentioned above), and then both birds begin to bathe (Johnsgard, 1965a).

Reproductive biology. Red-breasted mergansers are usually paired by the time of their arrival on the nesting grounds, although some display occurs after arrival as well. Little is known of home ranges or possible territoriality in this species, but in general the nests tend to be well scattered, with some tendency for concentration on islands. In Iceland, Bengtson (1970) found that island nesting concentrations were roughly twice as dense as mainland ones, and that the majority of nests were placed in holes or cavities, with shrubs providing cover for most of the rest. Studies on the Gulf of Bothnia by Hilden (1964) indicated a strong tendency for nesting under boulders or amid thick bushes. Where tree cavities or artificial nesting boxes are utilized, the birds favor those with entrances about 10 centimeters in diameter and with internal diameters of about 30 to 40 centimeters. Clutches of this species average about 9 to 10 eggs for initial nesting attempts, but dump nesting resulting from competition for limited nesting sites often produces larger observed clutch sizes. Incubation periods usually average about 32 days but range from 29 to 35 days under natural conditions. Males desert their mates early in incubation; and although they may tend to move to brackish or saline waters, there is no evidence for a major migration in this species to a common molting area. As in some other sea ducks, especially late nesters, brood aggregations are common in this species, and frequently one or more females may be seen in company with several dozen young of various ages. The fledging period probably is about 60 days, which would suggest that females are likely to become flightless before the young are able to fly, and would seemingly also tend to limit the success of northerly-breeding birds in late springs (Curth, 1954; Hilden, 1964; Johnsgard, 1975).

Status. Bellrose (1976), using a combination of data sources, judged that the summer population of the red-breasted merganser in North America might consist of about 237,000 birds. This compares with an estimate of about 40,000 wintering birds in northwestern Europe, including Great Britain, and another 50,000 in the Mediterranean and Black sea region (Ogilvie, 1975). This would exclude the populations wintering off Iceland and Greenland; and in addition, the large population that winters along the coast of China and Siberia cannot be estimated. Although not a game species, the red-breasted merganser has suffered population losses in North America as a result of presumed pesticide poisoning as well as local control efforts by fishing interests.

Relationships. The evolutionary relationships of this species to the goosander and the Chinese merganser are of interest; and although no behavioral information is available on the latter species, it seems on anatomical grounds to occupy an evolutionary position somewhere between those of the red-breasted merganser and goosander. By comparison with the goosander, the red-breasted merganser has a somewhat narrower and longer bill structure, and also has somewhat broader nesting adaptations.

Chinese Merganser

*Mergus squamatus* Gould 1864

**Other vernacular names.** Scaly-sided merganser; Schuppsäger (German); harle écaille (French); mergánsar barreado (Spanish).

**Subspecies and range.** No subspecies recognized. Breeding range uncertain, but includes Ussuriland and perhaps eastern and northern Manchuria. In Ussuriland, breeding known only in the central and southern Sikhote-Alin range, from the Khor River basin to the Iman River basin. Winters mainly in eastern and central China, in the Yangtze River valley west to Szechwan and south to Fukien, Kwangtung, and northern Tonkin (Vaurie, 1965). See map 123.

**Measurements and weights.** Folded wing: males, 250–65 mm; females, 240–45 mm. Culmen: males, 46–54 mm; females, 43–46 mm. Weights: no record. Eggs: no description.

**Identification and field marks.** Length: ca. 22" (55 cm). *Adult males* in breeding plumage closely resemble the red-breasted merganser in the color and shape of the head, which is shaggy-crested and greenish. The lower neck, breast, and abdomen are salmon pink, while the flanks are distinctively scalloped in a scaly pattern. The upper back and inner scapulars are black, bounded by white laterally, and the lower back and rump are gray, edged with black in the same manner as the flanks. The tail is gray, and the upper surface of the wings is patterned as in *serrator*, but the anterior coverts are much greater. The bill is dull red, with a black nail and a...
dusky stripe along the culmen, the legs and feet are orange, and the iris is brown. **Females** are very much like female goosanders but are more whitish on the breast and sides and have a trace of the scalelike markings on the flanks. The soft-part colors are as in the male. **Males in eclipse** closely resemble females but have more white on the wings. **Juveniles** apparently resemble females, but too few have been described to be certain of this.

In the field, the combination of a shaggy head crest, a white to pink breast color, and grayish flanks with crescent-shaped markings are distinctive characteristics of the male. Females cannot safely be separated in the field from the other two species of Asian mergansers.

**Natural History**

**Habitat and foods.** This species breeds in the rapidly flowing mountain streams of the Sikhote-Alin mountains and occupies the middle and upper taiga (coniferous forest) zones. It reportedly avoids extremely narrow creeks where diving may be difficult, and additionally is found only in areas with forested banks. It is largely limited to the area between 35 and 50 kilometers inland. In the winter, however, the birds move downstream and may occur between 9 and 19 kilometers from the sea. Habitats in the wintering areas of southern China must differ considerably from these but presumably are clear rivers or lakes with abundant fishes. Almost nothing is known of the foods other than that they include various fishes (*Salvelinus, Oncorhynchus*).

**Social behavior.** Almost nothing can be said with certainty of this species' social behavior. It evidently is relatively rare everywhere and never is encountered in large flocks. "Large numbers" have been reported only during fall at Lake Chingpo Hu in Kirin province in southern Manchuria, where local residents reported them breeding (Dementiev & Gladkov, 1967). Nothing has been reported yet on the timing of pair formation, the displays, or the strength of the pair bond.

**Reproductive biology.** Although no eggs have been described, two nests were reportedly found in a tributary of the Sitsa River on the eastern slope of the Sikhote-Alin range. Both were in hollow trees, one about 1.5 meters above the water in a broken trunk overhanging the river, the other about 3 to 3.5 meters above the water in a linden tree. In common with the goosander, and in contrast to the red-breasted merganser, females have white-colored down, suggestive of normal tree-cavity nesting. The number of eggs in the clutch is unreported, but observed broods of from 8 to 12 young suggest a normal clutch of 10 or more eggs. Broods have been seen in July, August, and even September.

**Status.** This species' population status is extremely uncertain, but it is apparently quite rare, with an extremely restricted breeding area.

**Relationships.** The Chinese merganser has plumage similarities to both the red-breasted merganser and the goosander, and additionally has a tracheal anatomy very similar to that of the goosander. In the absence of further information, it must be assumed that the species occupies an evolutionary position somewhere between these two species (Johnsgard, 1965a).

**Suggested readings.** Dementiev & Gladkov, 1967; Delacour, 1954–64.

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**Goosander**

*(Common Merganser)*

*Mergus merganser* Linnaeus 1758

**Other vernacular names.** American merganser, fish duck, sawbill; Gänseäger (German); harle bièvre (French); mergansar (Spanish).

**Subspecies and ranges.** (See map 124.)

*M. m. merganser*: Eurasian goosander. Breeds in Iceland, Scotland, Scandinavia, and across Rus-
sia and Siberia to Kamchatka, on the Kurile and Commander islands, and south across Europe and Asia to Switzerland, Poland, Romania, and central Russia, with the southern limits in Asia ill-defined. Winters south to the Mediterranean, Black, and Caspian seas, northern India, Assam, and China.

*M. m. comatus*: Oriental goosander. Breeds in the Pamirs and northeastern Afghanistan, eastward through Ladakh and Tibet to Sikang, Tsinghai, western Kansu, and adjacent Szechwan. Winters in the Himalayan foothills and south to Burma and Yunnan.

*M. m. americanus*: American goosander. Breeds in North America from southern Alaska east across central Canada to James Bay and across the Labrador Peninsula to Newfoundland, south in the western mountains to California, Arizona, and New Mexico, and east to the Great Lakes states and New England. Winters on fresh water and salt water from its breeding grounds to southern California and Florida.

**Measurements and weights.** Folded wing: males, 275–95 mm; females, 244–75 mm. Culmen: males, 55–61 mm; females, 45–50 mm. Weights: males (of *americanus*) average ca. 1,600 g and females ca. 1,200 g during fall, with respective maximums of 1,859 and 1,769 g. Eggs: av. 66 x 46 mm, creamy, 82 g.

**Identification and field marks.** Length 21–27" (51–68 cm). Adult males in breeding plumage have the entire head and neck black, with a green gloss; the feathers of the back of the head are elongated to form a short, bushy crest. The foreback and inner scapulars are black, grading to ashy gray on the hind back, rump, and upper tail coverts. The tail is gray; the neck, outer scapulars, breast, sides, flanks, and underparts are white, often with a salmon pink tint. The flanks are lightly vermiculated with gray. The marginal and lesser wing coverts are black; the primaries and their coverts are dark slate brown; the outer secondaries and their greater coverts are blackish; while the remaining secondaries and tertials are white or white...
Breeding distributions of the American ("A"), European ("E"), and Oriental ("O") goosanders. Wintering distributions indicated by stippling.

Females have a grayish brown crown and crest, with a white throat, lower portion of the cheeks, and a narrow line from the eye to the base of the bill; these areas all contrast rather sharply with the cinnamon red of the rest of the head and neck. The upperparts are ashy, the feathers having darker shaft streaks and lighter edges. The inner scapulars are blackish brown; the foreneck and upper breast are whitish, merging abruptly with the cinnamon of the neck; the sides and flanks are grayish brown; the tail is ashy gray; and the underparts are white, sometimes faintly tinted with salmon. The primaries and their coverts are dark brown, the outer secondaries are black, and the others are white, with little or no black exposed basally. The tertials are dark brownish gray, the greater coverts are black or black tipped with white, and the other coverts are brownish gray. The iris is dull reddish to brown, the bill is purplish red, with a darker nail, and the legs and feet are orange red, with darker webs. Males in eclipse resemble females, but have white upper wing coverts. Immature males begin to acquire black feathers on the head and neck during their first winter and spring, and develop a rather mottled appearance. Juveniles resemble adult females but have a shorter crest, and the white on the throat extends down to the chest.

In the field, its large size and merganserlike bill separate this species from all others except the somewhat smaller red-breasted merganser. Males in breeding plumage appear mostly white (or pinkish), except for a black head and back, and their red bill is also quite widely visible. Females are best separated from red-breasted mergansers by their more grayish body and brownish head, the two color areas sharply separated from each other, and by the more sharply defined white areas on the cheeks and throat. The call of the displaying male is also distinctive, consisting of a guitarlike uig-a note, while the female produces harsh karrr sounds. In flight, the very long-bodied profile and uniformly white underpart coloration of both sexes helps to distinguish this species from other species.

NATURAL HISTORY

Habitat and foods. This widespread and largest species of merganser breeds in temperate forested habitats of the Northern Hemisphere that usually consist of clear fresh-water lakes, rivers, or ponds associated with the upper portions of rivers in forested regions. It is an inland rather than coastal breeder, and is limited almost exclusively to areas with forests nearby, although sometimes cavities in boulders provide alternative nest sites where tree cavities are unavailable. Throughout the year the birds concentrate on fish as their major source of food, although ducklings consume large quantities of insects such as May flies until they become adept at catching fish. During the fall and winter the birds spread out over a variety of habitats, but usually concentrate on clear rivers and ice-free lakes. They also sometimes feed in estuaries at the mouths of rivers or on bay marshes that are slightly brackish. They typically forage in fairly

MAP 124. Breeding distributions of the American ("A"), European ("E"), and Oriental ("O") goosanders. Wintering distributions indicated by stippling.
shallow waters but have been known to dive as deep as 30 feet, and sometimes a flock will forage cooperatively, driving fish into areas where they can be readily captured. In some areas this species is persecuted because of its reputed damage to salmon or trout fisheries, but it tends to feed on what is readily available and can easily be caught, which in most areas is predominantly roughfish (Johnsgard, 1975; Bellrose, 1976).

Social behavior. So far as is known, goosanders mature the second year of life, since no records of year-old birds breeding have yet come to light. Pair bonds are formed during an extended period of display lasting from winter through the spring migration period, until the arrival of the birds at their nesting areas. Display is marked by a great deal of chasing on the water surface, underwater attacks, and some aerial chases. Females incite with a loud, harsh call and quick forward lunges in the water, and the male often attempts to swim ahead of such a female while directing the back of his head toward her and ruffling his crown feathers into a short but distinctive crest. The males produce a distinctive courtship call, a curious twanging note similar to that produced by a guitar, and in addition utter a clear bell-like call during a sudden vertical stretching of the head and neck in a salute posture. They also at times throw out a jet of water far behind them with a backward kicking movement. As in the red-breasted merganser, copulation is often preceded by both birds performing drinking movements, after which the female becomes prone and the male continues an extended series of drinking, preening, shaking, and other movements that seem to have no sequential predictability. No specific postcopulatory posturing has been observed, other than the male swimming away from the female while calling repeatedly and directing the back of his head toward her (Johnsgard, 1965a).

Reproductive biology. Shortly after the spring flocks arrive on their nesting grounds, they break up into pairs that take up home ranges along stretches of river that support populations of fish suitable for them and their ducklings. Pairs occupying such stretches of rivers seem to be well isolated from one another, but in lake or coastal situations with islands that provide suitable nesting sites a more concentrated nesting population may develop. When nest sites are available in trees, the birds seem to prefer cavities with openings about 12 centimeters wide and internal diameters of about 25 centimeters. Artificial nesting boxes are used in some areas, and these are usually 85 to 100 centimeters high, with openings 50 to 60 centimeters from the base. In Iceland and on the Gulf of Bothnia few trees are large enough to provide such sites, and there the birds often nest under boulders, under bushes, or even in buildings. Concealment from above, with an associated darkness of the nesting cavity, seems to be a paramount consideration for nest sites. Eggs are deposited on a nearly daily basis until a clutch averaging 9 to 10 eggs has been completed, and at about this time the male leaves the area, sometimes moving to coastal situations for molting. Incubation requires between 32 and 35 days, a relatively long period, and in addition there is a quite long fledging period of some 60 to 70 days. Not surprisingly, the female often deserts her brood well before fledging to begin her own postnuptial molt, at which time the ducklings often begin to form rather large assemblages. About a month is required for the females to attain the power of flight again, which in the Maritime Provinces means that it may be early October before they are able to fly (Erskine, 1971; White, 1957).

Status. On the basis of rather uncertain assumptions, Bellrose (1976) calculated that the summer population of goosanders in North America may be as high as 641,000 birds, although winter counts average only about 165,000 of these conspicuous birds. Most of these are on large impoundments in the interior, where they can easily be counted, and thus it seems unlikely that the breeding population figure cited above is a reasonable one. In northwestern Europe about 70,000 birds represent the average wintering population, most of which occurs in the Baltic area. There are also about 10,000 that winter in the Mediterranean and Black sea region (Ogilvie, 1975). No estimates of the population of the oriental race are possible, nor is the size of the population of the Eurasian merganser that winters in eastern Asia known.

Relationships. As noted earlier, the goosander is probably a quite close relative of the Chinese merganser and a slightly less close relative of the redbreasted merganser, judging from available data.

Auckland Island Merganser
*Mergus australis* Hombron and Jacquinot 1841

**Other vernacular names.** None in general English use. Aucklandsgär (German); harle austral (French); mergansar de la Isla Auckland (Spanish).

**Subspecies and range.** No subspecies recognized. Extinct; was originally limited to the Auckland Islands and (as subfossil remains) New Zealand.


**Identification and field marks.** Length 23" (58 cm). *Adults* have a very dark brown head, crest, and neck, but with lighter chin and throat. The back, scapulars, upper tail coverts, and tail are very dark bluish black, while the breast is dull gray, with some lighter crescent-shaped markings. The underparts are mottled gray and white, while the flanks are uniformly dark bluish gray. The upper wing surface is slate gray to black, except for the middle secondaries, which are white on the outer vanes, and the greater secondary coverts, which are white on the outer vanes, and the greater secondary coverts, which are tipped with white. The iris is dark brown, the legs and feet orange, with dusky webs and joints, and the bill is yellowish orange, with a black culmen and nail. *Females* have shorter crests and less reddish coloration in the crown, and have one white wing bar instead of two.

*In the field,* the merganserlike shape alone would separate this species from any other bird in the Auckland Islands or New Zealand.

**Natural History**

**Habitat and foods.** The review by Kear and Scarlett (1970) indicates that this bird occupied interior rivers for the most part and occurred along the coast only on estuarine creeks and along sheltered harbors. Most of the specimens, however, appear to have come from coastal locations, and the few substantiated food remains, including a fish (*Galaxias*) and a polychaete (*Nereis?*), are apparently salt-water forms.

**Social behavior.** Nothing specific has been recorded about the behavior of this species. Birds in pairs were taken in October, November, January, and perhaps May, so that the birds were obviously monogamous.

**Reproductive biology.** The review by Kear and Scarlett (1970) suggests that the pair bond may have been a long-term one and that egg laying may have occurred in late November or early December, based on observations of young ducklings that were collected from a brood tended by both parents. This brood evidently consisted of four ducklings, but no more information is available on clutch size or brood size.

**Status.** The review by Kear and Scarlett indicates that the last record of this species was probably in 1902, and that only 26 skins exist in the world's museums. These include 4 ducklings and at least 12 males and 9 females. They suggest that the original population on the Aucklands was probably not great, and perhaps consisted of no more than a few hundred birds. When the species became extinct in New Zealand is uncertain, but it was probably after 1800 (Williams, 1964). Hunting by Polynesian moa hunters was presumably a factor in their extinction there, since skeletal remains of this merganser have been found associated with their refuse heaps. Introduction of various mammals on the Auckland Islands probably contributed to their extinction there.

**Relationships.** As noted in an earlier review (Johnsgard, 1965a), this species is perhaps derived from one of the Northern Hemisphere mergansers such as the Chinese merganser or the common merganser (goosander), although it does possess a number of unique plumage characteristics. There is no good evidence to favor the view that it is closely related to the Brazilian merganser.

**Suggested readings.** Kear & Scarlett, 1970.