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North America's Ducks, Geese and Swans in the 21st Century

A 2010 Supplement to *Waterfowl of North America*

Paul A. Johnsgard

Part I Introduction (pp. 1-30)

Since the 1975 publication of *Waterfowl of North America*, a great deal of ornithological literature has appeared concerning North American ducks, geese & swans. The most significant of these are the species accounts in the American Ornithologists' Union *The Birds of North America (B.O.N.A.)* series, 46 of which were published between 1993 and 2003, and which include all the species known to breed in the United States and Canada (see references). Nine additional species are included in my 1975 summary that have not yet been proven to breed in North America north of Mexico. These have all been discussed in varying degrees of detail by myself (Johnsgard, 1978), and by two major world reviews of the waterfowl family, namely del Hoyo, Eliot, & Sargatel (1992), and Kear (2005). Six of the species not covered by the (*B.O.N.A.*) monographs are native to the temperate Eurasia (the Palaearctic zoogeographic region), and these were monographed by Cramp & Simmons (1977).

Other important books published since 1975 and that covered the entire waterfowl family include an identification guide to the world's waterfowl, illustrated by color paintings (Madge & Burn, 1988), and two books by Frank Todd (1979, 1996) that are especially notable for their excellent color photographic illustrations.

In addition to these geographically-defined reviews, several smaller taxonomic groups of waterfowl including one or more American species have been monographed since 1975. They include the whistling ducks (Bolen & Rylander, 1983), mute swan (Birkhead & Perrins, 1986), snow goose

(Batt, 1996; Cooke, Rockwell & Lane, 1995), Canada goose (Hanson, 1997), Hawaiian goose (Kear & Berger, 1980), wood duck (Shurtleff & Savage, 1996), and stiff-tailed ducks (Johnsgard & Carbonell, 1996).

Population data of wild species are constantly changing, and sometimes of limited accuracy, but long-term averages or trends are often significant. National population surveys such as the annual U.S. Fish & Wildlife Service's Breeding Bird Surveys, and annual hunter-kill ("harvest") surveys by the U.S. Fish & Wildlife Service and Canadian Wildlife Service are thus of both immediate and long-term interest. Nearly all of these data are now easily accessed on-line from their respective sources. Annual U.S. hunter-kill data such as those that were provided in Table 4 (p. 24) can now be extracted for individual species with regard to states, flyways, or nationally, and over time periods extending back to 1960 through the web site of Flyways US (http://flyways.us/regulations-and-harvest/harvest_trends). Some comparable recent average U.S. hunter-kill estimates (for the period 2004–8) and long-term trend-lines are noted in the species accounts below, which may be compared with the 1960's data that I presented in Table 4. Similar country-wide hunter-kill data are available for Canada, but, but these have so far been put on-line for hunting seasons only up through the 1998 season (<http://cws-scf.ec.gc.ca/harvest/>).

Audubon Christmas Bird Count data are no longer published as hard-copy in a way that allows for easy comparison with the decade-long averages that were provided in Table 5 (p. 28). However, raw data for species, sites, or larger geographic entities can now easily be found on the National Audubon Society's web site (<http://audubon2.org/cbchist/>), and some examples of significant recent Christmas Count information are mentioned below. I have mapped these changes for only a few of the most obvious cases. For most species a relatively high count from recent (2002–3 to 2008–9) annual Audubon Christmas Bird Counts is mentioned, to provide examples of current major wintering concentration sites.

Part II Species Accounts (pp. 33–539)

Text updates for the following species accounts are minimal. I have stressed apparent population trends and identified new major literature sources. I have also modified the majority of the range maps to make them more closely conform to our present-day knowledge of breeding and wintering ranges. The breeding ranges of some species are still inadequately

known, such as those of the scoters, which breed in large regions of Canada and Alaska that are still only poorly surveyed. Not only have breeding ranges changed or become clearer, but also many wintering ranges have changed markedly since the 1970s, in conjunction with global warming trends (Johnsgard, 2009; Niven, Butcher & Bancroft, 2009). In updating my range maps I have largely related on the maps produced for *The Birds of North America (B.O.N.A.)* monographs, but have modified my maps only minimally, to avoid making them too confusing.

Pp. 41–60: Whistling Ducks (Tribe Dendrocygnini)

Fulvous Whistling Duck. The North American population of this mostly tropical but widely distributed whistling duck was monographed by Hohman & Lee, 2001 (*B.O.N.A.* No. 562). The average annual hunter-kill estimate in the U.S. during the five years 2004–8 has been about 1,700 birds, and has been relatively stable since the 1960's. The range map's dashed line in Florida indicates a recently expanded breeding region. About 1,100 fulvous whistling ducks were seen during the Clewiston, Florida, Christmas Bird Count in 2007–8. Extra-limital records are numerous and extend north in Canada to British Columbia, Alberta, Quebec, New Brunswick and Prince Edward Island. Most such records are concentrated in California, Arizona, and along the Atlantic Coast from Florida north to Maine.

Black-bellied Whistling Duck. This tropical Western Hemisphere whistling duck was monographed by James & Thompson, 2001 (*B.O.N.A.* No. 578). The average annual hunter-kill estimate in the U.S. during the five years 2004–8 has been about 11,500 birds, and has been increasing since the 1960's. The range map's dashed lines indicate recently expanded breeding regions. Over 8,000 black-bellied whistling ducks were seen during the Waslaco, Texas, Christmas Bird Count in 2004–5. Extra-limital records extend north to Colorado, Minnesota and Pennsylvania.

Cuban Whistling Duck. This West Indian species' range is the smallest of any whistling duck. The most complete recent summary of its biology is by Kear (2005). Its declining population may still be in excess of 10,000 birds, but some island populations are becoming locally extirpated (Kear, 2005). Populations are known to still exist on the Ba-

hamas, Turks & Caicos, Cuba, Cayman, Jamaica, Dominican Republic, Puerto Rico and Antigua islands. The species is considered vulnerable and is listed in Appendix II of CITES.

Pp. 61–160: Swans and True Geese (Tribe Anserini)

Mute Swan. This introduced Eurasian swan was monographed by Ciaranca, Allin & Jones, 1997 (*B.O.N.A.* No. 273). It has become increasingly common and ecologically troublesome in North America since its introduction, both along the Atlantic Coast and the Great Lakes region (see revised range map with dashed lines indicating new or expanded breeding populations). It is no longer protected by federal agencies, but is still protected by most states. By 2002 there were an estimated 13,000 birds in the Atlantic flyway, including about 4,500 centered in the Chesapeake Bay region. At that time the Great Lakes watershed had about 10,000 swans, which were centered in Michigan. During recent Audubon Christmas Bird Counts the greatest number of mute swans seen at any single location has been 2,293, at Rockwood, Michigan, in 2004–5. Breeding or probable breeding has occurred in the majority of Lower Peninsula counties in Michigan, and in a few Upper Peninsula counties (Brewer, McPeck & Adams, 1991). The range map's dashed lines indicate recently expanded residential regions.

Trumpeter Swan. This North American swan was monographed by Mitchell, 1994 (*B.O.N.A.* No. 105). Once considered nationally endangered by the U.S. government, this great swan was never in any real danger, owing to then-undocumented populations in western Canada and southern Alaska. Recent total population estimates there exceed 20,000 birds (see revised range map, with inked areas indicating new or expanding breeding populations as of 2005) (Mitchell, 1994; Kear, 2005; Schmidt *et al.*, 2009). South of Canada there are separate Pacific Coast, Rocky Mountain, and Interior (Great Plains & Great Lakes) populations. The largest is the migratory Pacific Coast group, which in 2005 totaled 25,000 birds, 10,000 of which winter in northwestern Washington. During the 2008–9 Audubon Christmas Bird Counts the greatest number seen at any single location was 2,550, at Skagit Bay, Washington. The highest count for Canada was 2,939 at Comox, British Columbia, in 2003–4. The Rocky Mountain population (estimated at 3,700 birds

in 2000) extends from Canada's Yukon Territory southeast to central Alberta. There is also a resident population in eastern Oregon, and one in the Greater Yellowstone region, including Red Rock Lakes National Wildlife Refuge. The latter population has been in serious decline, and by 2009 fewer than 400 birds were present in the Greater Yellowstone region. There are now possibly as many as 5,000 birds in the expanding Interior population, which is located in widely scattered restoration sites from South Dakota east to Ontario. The Ontario population exceeded 1,000 birds by 2008, and by then Minnesota had over 2,000. Breeding now occurs in at least Nebraska, South Dakota, Minnesota, Manitoba, Iowa, Wisconsin, Ohio, Michigan, and Ontario (and perhaps in Pennsylvania and New York as well). Restoration efforts are being made in Arkansas. This species has not been legally hunted except for allowance for mistaken kills in states where tundra swans also could be legally killed (Montana, Utah and Nevada). The very closely related whooper swan (*C. cygnus*) is an uncommon to local winter visitor to the Aleutians, a very rare to accidental visitor to mainland Alaska, and vagrants have been reported south to British Columbia, Idaho, Oregon and California.

Whistling Swan (Tundra Swan). This circumpolar tundra-nesting swan was monographed by Limpert & Earnst, 1994 (*B.O.N.A.* No. 89). Its breeding behavior has been studied by Hawkins (1986). The whistling swan is now considered to be conspecific with the Eurasian Bewick's swan, *C. c. bewickii*, the two having been merged taxonomically by the American and British Ornithologists' Unions in the 1980's, and given the collective English name tundra swan. The Bewick's swan is probably a regular if rare visitor in the western and central Aleutians, and has appeared on at least two Audubon Christmas Counts (in California and Hawaii) since 2000–2001. A high record of eight birds was obtained during the 2007–8 count at Marysville, California. Apparent hybrids between the two races have also been reported on the West Coast. During the late 1980s the overall North American estimates were of about 87,000 tundra swans in the western population (which has been hunted since 1962) and about 64,000 in the eastern one (hunted since 1984) (Kear, 2005). By 2009 the two populations were estimated to total about 100,000 birds each (U.S.F.W.S., 2009a). The annual kill of the western tundra swan population includes subsistence hunting in Alaska that might account for about 10,000 tundra swans and eggs annually, plus controlled legal hunting in Alaska, Montana,

Utah and Nevada that may account for an additional 1,200–1,500 annually. In the Atlantic flyway Virginia and North Carolina allow limited hunting on a permit-only system. The range map's dotted lines indicate some recently expanded wintering regions. A record 53,366 tundra swans were seen at Pettigrew State Park, North Carolina, during the Audubon Christmas Bird Count in 2008–9.

(Greater) White-fronted Goose. This Holarctic goose was monographed by Elly & Dzubin, 1994 (*B.O.N.A.* No. 131). Fox and Stroud (1988) have described this race's breeding biology. The North American 2009 Pacific Coast winter population was estimated at about 537,000 birds, or 14 percent below the 2000 estimate, and the mid-continent fall population was about 752,000, or well below the 2000 estimate (U.S.F.W.S., 2009a). About 350,000 greater white-fronted geese were seen during the Quivera National Wildlife Refuge, Oklahoma, Audubon Christmas Bird Count in 2004–5. The large, rare and long-billed tule race *elgasi* of this widespread species is relatively vulnerable; its breeding grounds were recently determined to be near Cook Inlet, Alaska, and it winters in central California. The average hunter-kill estimate of white-fronts in the U.S. during the five years 2004–8 has been about 277,000 birds, and has exhibited a progressively increasing trend-line, contrary to apparently downward-trending continental populations. Estimated total annual Canadian kills from 1990–1998 ranged from about 29,000–79,000. The range map's dashed line indicates probable southern breeding limits, and the dotted line indicates recently expanded wintering regions. The population of the west Greenland race *flavirostris* has dropped rapidly during the past ten years, and by 2009 may have declined to less than 30,000. About 350,000 were seen the Quivera National Wildlife Refuge, Kansas, during Audubon Christmas Counts in 2004–5. Three individuals of the closely related bean goose (*Anser fabalis*), a very rare Asian vagrant to Alaska (Kessel & Gibson, 1976), were reported from Shemya Island Alaska, during the 2007–8 Audubon Christmas Bird Count, and there is also a 1982 Quebec specimen record. Another closely related Eurasian goose, the pink-footed goose (*Anser brachyrhynchos*), was reported from Newfoundland in 1980.

Snow Goose. This northeastern Siberian (Wrangel Island) and North American goose was monographed by Mowbray, Cooke, & Ganter, 2000 (*B.O.N.A.* No. 514). Winter or spring 2009 national population estimates include about 1.4 million greater snow geese and nearly four million lesser snow geese (U.S.F.W.S., 2009a). All the popula-

tions of this species were still increasing as of 2009. The estimated average U.S. kill of snow geese during the 2004–8 seasons was 565,000, of which about 27 percent were blue-morph. Estimated total annual Canadian kills from 1990–1998 ranged from about 38,000–106,000 for white morph lessers, and 33,000–66,000 for blue-morph lessers. The annual Canadian kills for greater snow geese during that period ranged from 29,000–102,000. These numbers represent less than ten percent of the estimated continental population of perhaps six million snow geese, and have failed to stop population growth, in spite of a decade of federal efforts to promote almost unlimited recreational hunting. The range map's dashed lines indicate expanded breeding regions (which now include at least two colonies in coastal Alaska), and the dotted lines indicate recently expanded wintering regions. As an indication of large wintering concentrations, about 307,000 snow geese were seen during the Arkabukla Lake, Mississippi, Audubon Christmas Bird Count in 2006–7.

Ross' Goose. This North American goose was monographed by Ryder & Alisauskas, 1995 (*B.O.N.A.* No. 162). The recently much-expanded breeding (stippled) and wintering (dashed line) are indicated on the range map. Because of difficulties in field separation from snow geese, no attempts are made to specifically identify and inventory Ross's geese, but one enormous nesting colony (Karrak Lake, in the tundra lowlands of arctic Canada's Queen Maud Gulf) had 726,000 birds in 2008, and comprised a substantial percentage of this gradually increasing population (U.S.F.W.S., 2009a). National Ross' goose kills have also increased greatly in recent years, with a mean of 78,000 during the five years 2004–8, and an estimated maximum of 106,000 in 2001. Estimated total annual Canadian kills from 1990–1998 ranged from about 2,000–29,000. A few blue-morph individuals have been documented among wild flocks, which are the presumed genetic result of acquiring genes via hybridization with blue-morph snow geese. Early observations (McLandress & McLandress. 1979) suggest an extremely low frequency of the blue morph's occurrence. During the 2006–7 Christmas Bird Counts one blue-morph bird was seen among 6,750 white-morphs at Peace Valley, California. Other blue-morphs were seen g Christmas Bird Counts at Salton Sea, California in 2003–4, and at China Lake, California, in 2008–9. The range map's dashed lines indicate several expanded breeding regions of Ross' geese, and the dotted lines indicate some recently expanded wintering regions. As an indication of large

wintering concentrations, about 33,000 Ross's geese were seen at Merced National Wildlife Refuge, California, during the Audubon Christmas Bird Count in 2008–9.

Emperor Goose. This little-studied Siberian and Alaskan goose was monographed by Petersen, Schmutz, & Rockwell, 1994 (*B.O.N.A.* No. 97). Eisenhauer and Kirkpatrick (1977) have described the species' behavior and ecology. The fledging period has been reported as 45–50 days (Kear, 2005). In 2009 the estimated North American population was 91,200 birds, or 42 percent higher than the 2000 estimate (U.S.F.W.S., 2009a). During the 2008–9 Audubon Christmas Bird Count the greatest number seen at any single location was 1,400, at Unalaska, Alaska, but in the 2004–5 counts about 3,300 were seen at Izembek Bay, Alaska. As of the mid 1990's there were numerous records from coastal southeastern Alaska to southern California, including more than 30 records from Oregon. Some subsistence hunting occurs in Alaska, with about 2,000–3,000 birds taken annually on the Yukon–Kuskokwim Delta.

Canada Goose. This North American goose was monographed by Mowbray *et al.*, 2003 (*B.O.N.A.* No. 682). The dusky race (*occidentalis*) of the Pacific Northwest is probably most vulnerable, and its spring 2009 population was estimated at 6,700. The other large forms of Canada goose have been generally increasing in population size, especially the mostly reintroduced Great Plains race *maxima*, which by 2009 was estimated at 1.9 million birds, and nests locally as far west as Clatsop County, Oregon. The average annual hunter-kill estimate in the U.S. during the five years 2004–8 totaled about 2.65 million birds, and kills have been progressively increasing since the 1960's. Estimated total annual Canadian kills from 1990–1998 for large Canada geese ranged from about 183,000–274,000. All told, there may have been more than five million Canada geese in North America by 2009 (U.S.F.W.S., 2009a), as well as some much smaller introduced populations in Europe and New Zealand. Assuming a total annual kill of nearly three million birds, the fall North American population is more likely to be at least six or seven million birds. The regions indicated on the range map for *maxima* and *moffitti* as consisting of scattered breeding populations in the 1970's are now essentially fully occupied, and wintering ranges have moved appreciably northward.

In 2004 the four small tundra-breeding forms *hutchinsii*, *taverneri*, *leucopareia* and *minima* were designated by the American Ornithologists' Union as specifically distinct from the larger Canada goose races

(*canadensis*, *interior*, *maxima*, *moffitti*, *parvipes*, *occidentalis* and *fulva*). These high-arctic breeding geese now bear the collective English name cackling goose (*B. hutchinsii*) (see Shields & Cotter, 1998, and Scribner *et al.*, 2003). The once critically rare Aleutian cackling goose, (*B. h. leucopareia*) population, listed as nationally endangered in 1967 and then limited to Buldir Island, surged as a result of hunting restrictions, transplants to new breeding islands and effective predator control. By 2009 its population had reached 100,000 birds. The 2009 estimates for the other cackling goose races include 160,000 for nominate *minima*, 220,000 for the Baffin Island or Richardson's cackling goose *hutchinsii*, and about 60,000 for the Alaska cackling goose *taverneri* (U.S.F.W.S., 2009a). All told, the total North American population of cackling geese might therefore be at least 750,000 birds. Estimated total annual Canadian kills of "small Canada geese" from 1990–1998 ranged from about 50,000–107,000. Hunter-kill data for cackling geese in the U.S. are not yet available, as they traditionally have not consistently been distinguished from larger Canada geese during national surveys. During the 2004–5 Audubon Christmas Bird Count the greatest number of cackling geese seen at any single location was 74,800, at Salt Plains National Wildlife Refuge, Oklahoma, in 2004–5, which presumably were mostly or entirely comprised of *hutchinsii*. During the 2003–4 count 24,100 Aleutian cackling geese (*leucopareia*) were seen at Caswell–Westley, California. During the 2008–9 Christmas Bird Count there were 40,463 cackling geese at Corvallis, Oregon. These probably consisted of *taverneri*, since upwards of 51,000 winter in the Willamette Valley, and most of the *minima* flocks move on to wintering sites in California by early December (Gilligan *et al.*, 1994). The heavy inked line on the range map separates the breeding distribution of the populations that have been defined as cackling geese from those now considered Canada geese. Dickson (2000) provided a summary of the Canadian breeding populations of Canada and cackling geese and their distributions.

Barnacle Goose. This rare North Atlantic (Greenland, Iceland and Svalbard) goose has been reported from at least 15 states and two Canadian provinces, mainly along the eastern seaboard, but also to as far west as Texas, Nebraska and Alberta. It was seen at least three times along the Atlantic Coast during the six Audubon Christmas Counts 2002–3 through 2007–8. As many as three barnacle geese have appeared in a single year of recent Audubon Christmas Bird Counts, at locations from New York south to Virginia.

Brant Goose. This Holarctic marine goose was monographed by Reed *et al.*, 1998 (*B.O.N.A.* No. 337). In 2007 the Pacific Flyway winter population of black brant was estimated at 147,300 birds, and the light-bellied brant of Atlantic Flyway at 151,300 in 2009. The intermediate gray-bellied population nesting in the high-arctic Queen Elizabeth Islands and wintering along the northwestern Pacific Coast was estimated at 16,200 in 2009 (U.S.F.W.S., 2009a). The average annual hunter-kill estimate in the U.S. for the Atlantic brant during the five years 2004–8 has been about 23,000, and averages have been relatively stable since the 1960's. Much smaller average kills of about 3,000 were estimated for Pacific flyway black brant during that period. These Pacific Coast estimates also have been fairly stable recently, but have trended much lower than they were during the 1960's. Estimated total annual Canadian kills from 1990–1998 ranged from about 300–1,600 for Atlantic brant, and 300–1,200 for black brant. During the 2007–8 Audubon Christmas Bird Counts about 43,000 Atlantic brant were seen at southern Nassau County, New York, and about 13,000 black brant were found at Centerville Beach–King Salmon, California.

Pp. 161–180: Perching Ducks (Tribe Cairinini)

Muscovy Duck. Donkin (1989) has provided a general description of this long-domesticated but otherwise little-studied Neotropical perching duck. The muscovy duck has become increasingly observed in Texas and the Gulf Coast since the 1970's. Muscovies were introduced into Florida as early as the 1960's, and now are feral around many cities. During the 2008–9 Audubon Christmas Bird Count the greatest number seen at any single location was 440, at Naples, Florida; this semi-urban population been reported in all recent Florida Audubon Christmas Counts. Wild-type muscovies are sometimes also seen along the lower Rio Grande River in southern Texas (especially around Santa Ana National Wildlife Refuge and the Falcon Dam area of Zapata County), fairly close to their native Mexican range. Very little information is yet available on the biology of wild birds, but a world population estimate of 100,000–1,000,000 muscovies has been suggested (Kear, 2005).

Wood Duck. This North American perching duck was monographed by Hepp & Bellrose, 1995 (*B.O.N.A.* No. 169). Population estimates include

2,800,000 birds for eastern North America, 665,000 for central regions, and 66,000 for western regions (Wetlands International, 2002). The average annual hunter-kill estimate in the U.S. during the five years 2004–8 was about 1.11 million birds, and has exhibited a gradually increasing long-term trend-line since the 1960's. Estimated total annual Canadian kills from 1990–1998 ranged from about 100,000–138,000. The range map's dashed lines indicate apparently recently expanded midwestern and western breeding regions (probably mainly highly localized along river systems), and the dotted line indicates the western and northern limits of recently expanded wintering regions in central and eastern North America. Large winter flocks of this inconspicuous species rarely develop, but about 1,600 wood ducks were seen during the southern Hancock County, Mississippi, Audubon Christmas Bird Count in 2003–4.

Pp. 181–300: Surface-feeding Ducks (Tribe Anatini)

European Wigeon. This Eurasian surface-feeding duck has become increasingly reported in North America since the 1970's, and few if any states and provinces now lack records for this species. During the 2008–9 Audubon Christmas Bird Count the greatest number seen at any single U.S. location was 112, at Padilla Bay, Washington, and 113 were seen at Ladner, British Columbia in 2006–7. During recent hunting seasons a maximum of 190 Eurasian wigeons were killed in the Atlantic flyway, and a maximum of 2,120 in the Pacific flyway. Total U.S. hunter-kills have averaged about 1,200 annually since 1994, but Eurasian wigeons were apparently not distinguished from American wigeons during earlier U.S. hunter-kill surveys. Estimated total annual Canadian kills from 1990–1998 ranged from about 50–300. Thus, Eurasian wigeons comprised about 0.003–0.015 of all wigeons identified among the U.S. and Canadian kills. In spite of all these recent occurrences, there is still no evidence of Eurasian wigeons breeding in North America, which might well be occurring in remote parts of Alaska or northwestern Canada.

American Wigeon. This North American surface-feeding duck was monographed by Mowbray, 1999 (*B.O.N.A.* No. 401). North American breeding grounds surveys in 2009 indicated a total population of 2.47 million

birds, five percent below the long-term average (U.S.F.W.S., 2009a). Total U.S. kills have averaged about 796,000 during the five years 2004–8, with no clear long-term directional trend. Estimated total annual Canadian kills from 1990–1998 ranged from about 37,000–51,000. The range map's dashed lines indicate apparently expanded breeding regions, and the dotted lines indicate the northern limits of recent wintering regions. As a result of global warming, most other American waterfowl are also now wintering at more northerly latitudes than was the case during the 1970's, a phenomenon that is especially apparent in the Great Plains (Johnsgard, 2009). As an indication of large wintering concentrations, about 150,000 American wigeons were seen during the Peace Valley, California, Audubon Christmas Bird Count in 2006–7.

Falcated Duck. This Asian visitor is very rare to casual in the western and central Aleutians, As of 2007 there were multiple records for British Columbia, and at least three records for Washington State. It was seen only once during the six Audubon Christmas Counts from 2002–3 through 2007–8. The most complete recent summary of the falcated duck's biology is by Kear (2005).

Gadwall. This Holarctic surface-feeding duck was monographed by Leschack, McKnight, & Hepp, 1997 (*B.O.N.A.* No. 283). North American breeding grounds surveys in 2009 indicated a total population of 3.05 million birds, 71 percent above the long-term average (U.S.F.W.S., 2009a). The average annual hunter-kill estimate in the U.S. during the five years 2004–8 has been about 1.46 million birds, and estimates have exhibited a long-term increase since the 1960's. Estimated total annual Canadian kills from 1990–1998 ranged from about 32,000–50,000. The range map's dashed lines indicate some apparently expanded breeding regions. As an indication of large wintering concentrations, about 100,000 gadwalls were seen during the Peace Valley, California, Audubon Christmas Bird Count in 2006–7.

Baikal Teal. This very rare Asian visitor to the Pacific Coast was seen once (at Eugene, Oregon, in 2007–8) during the Audubon Christmas Counts held between 2002–3 and 2008–9. It is very rare to casual in western Alaska, and as of 2007 there were varying numbers of Pacific Coast records for British Columbia, Washington, Oregon and California. There have also been sightings from at least six other states. The most complete recent summary of its biology is by Kear (2005). The species is considered vulnerable and is listed in Appendix II of CITES.

Green-winged Teal. This Holarctic surface-feeding duck was monographed by Johnson, 1995 (*B.O.N.A.* No. 193). Some recent authors (*e.g.*, Kear, 2005) have recognized the Eurasian form (“Eurasian teal”) as specifically distinct from the American one, in which case the American green-winged teal is classified as *A. carolinensis*. Several hundred birds of the Eurasian form are seen annually during Audubon Christmas Counts at Unalaska Island, Alaska, and some Eurasian green-winged teal have also regularly been reported among the Canadian hunter kill. North American breeding grounds surveys in 2009 indicated a total population of 3.44 million green winged teal, 79 percent above the long-term average (U.S.F.W.S., 2009a). Total U.S. kills have averaged about 1.72 million birds, and have exhibited a gradually increasing long-term trend-line since the 1960’s. Estimated total annual Canadian kills from 1990–1998 ranged from about 93,000–145,000. The range map’s dashed lines indicate some apparently expanded breeding regions. As an indication of large wintering concentrations, about 62,000 green-winged teal were seen during the Mattamukeet National Wildlife Refuge, North Carolina,, Audubon Christmas Bird Count in 2008–9.

Common Mallard. This extremely abundant Holarctic surface-feeding duck was monographed by Drilling, Titman, & McKinney, 2002 (*B.O.N.A.* No. 658). The 2009 North American breeding population was estimated at 8.5 million birds, 13 percent above the long-term average (U.S.F.W.S., 2009a). The average annual hunter-kill estimate in the U.S. during the five years 2004–8 has been about 4.62 million birds, with no clear directional long-term trend. However, in the Atlantic fly-way the mallard kill increased from comprising 43 percent of the combined mallard-black duck kill in 1964–8 to 80 percent in 2004–8. Estimated total annual Canadian kills from 1990–1998 ranged from about 537,000–734,000. As an indication of large wintering concentrations, about 213,000 mallards were seen during the Squaw Creek National Wildlife Refuge, Missouri, Audubon Christmas Bird Count in 2006–7.

Southern Mallards. These southern and largely non-migratory near-relatives of the common mallard include the mottled duck, Florida duck and Mexican duck. The mottled and Florida ducks were monographed by Moorman & Gray, 1994 (*B.O.N.A.* No. 81). Their combined populations might consist of about 56,000 birds in Florida and 500,000–800,000 in Texas and Louisiana (Moorman & Gray, 1994). The average annual hunter-kill estimate in the U.S. of mottled and Florida ducks during the five years 2004–8 has been about 70,000 birds and, although the es-

imates have remained fairly steady recently, have undergone a gradual long-term decline since the 1960s.

The size of the Mexican duck population in the U.S. is impossible to judge, owing to hybridization or confusion with mallards. The Mexican duck's entire (U.S. and Mexican) population has been estimated at 55,000 (Wetlands International, 2002). During the five years 2004–8 the U.S. estimated hunter-kill of "Mexican-like" ducks has averaged about 2,750 birds, but has exhibited great annual fluctuations, with no clear long-term trend-line since the 1960's. A record 205 Mexican ducks were seen during the Balmorhea, Texas, Christmas Bird Count in 2006–7.

Black Duck. This iconic North American surface-feeding duck was monographed by Longcore *et al.*, 2000 (*B.O.N.A.*, No. 481). The 2009 U.S. winter surveys of this species indicated a population of about 210,000 birds, whereas recent breeding surveys suggest that about 500,000 birds might be present (U.S.F.W.S., 2009a). Rose & Scott (1997) suggested recent population of about 210,000 for the Atlantic flyway, and 90,000 for the Mississippi flyway. Even more of the black duck's original range has been impacted by competition from and hybridization with northern mallards than was the case during the 1970's. Most evidence indicates that the species has been in a long-term population decline in eastern North America, especially relative to mallards in the same region. Hunter-kill estimates of black ducks in the Atlantic flyway have recently dropped to about one-third of those occurring in the late 1960's (90,000 in 2008), with an average nationwide estimate of about 125,000 for the years 2004–8. However, kills of black x mallard hybrids have exhibited a slight increase, with a long-term average of about 8,000 hybrids taken in the Atlantic flyway during 2008, or nearly ten percent of total recent average kills for the black duck in that flyway. This estimate of hybrid frequencies is more than three times higher than those I summarized for the 1960's, which included an estimate of 2.7 percent hybrids relative to the Atlantic flyway black duck sample (Johnsgard, 1961, 1967). Nationwide, average kills of hybrids have been about 14,300 annually during the five years 2004–8, which also represent about ten percent of the combined black duck-hybrid sample. Estimated total annual Canadian kills from 1990–1998 ranged from about 153,000–243,000, or about double total recent U.S. kill estimates. As an indication of large wintering concentrations, about 13,600 black ducks were seen during the Halifax–Dartmouth, Nova Scotia, Audubon Christmas Bird Count in 2002–3.

Bahama (White-cheeked) Pintail. This tropical West Indian and South American surface-feeding duck only very rarely strays to southern Florida, and has been reported west along the Gulf Coast as far as Texas. There are no recent records of it appearing on Audubon Christmas Bird Counts. The most complete recent summary of its biology is by Kear (2005).

(Northern) Pintail. This Holarctic surface-feeding duck was monographed by Austin & Miller, 1995 (*B.O.N.A.* No. 163). Derrickson (1977) has described the species' breeding behavior. North American breeding grounds surveys in 2009 indicated a total population of 3.22 million birds, 20 percent below the long-term average (U.S.F.W.S., 2009a). The world population of the northern pintail includes several million in North America, and probably well over two million in Europe and Asia. The average annual hunter-kill estimate in the U.S. during the five years 2004–8 has been about 442,000, but estimates have declined greatly from an annual high of nearly two million in the 1970's. Estimated total annual Canadian kills from 1990–1998 ranged from about 33,000–72,000. As an indication of large wintering concentrations, about 75,000 northern pintails were seen during the Peace Valley, California, Audubon Christmas Bird Count in 2006–7.

Garganey. This Eurasian surface-feeding duck regularly occurs in the western and central Aleutians, and more rarely is seen along both North American coasts, primarily the Pacific Coast. As of 2007 there were several records for British Columbia, and at least two each for Washington, Oregon and Idaho. Garganeys have now been reported from at least 30 states and seven Canadian provinces, and have been seen during at least two recent Audubon Christmas Counts, both in Hawaii.

Blue-winged Teal. This North American surface-feeding duck was monographed by Rohwer, Johnson, & Loos, 2002 (*B.O.N.A.* No. 625). North American breeding grounds surveys in 2009 indicated a total population of 7.4 million birds, 60 percent above the long-term average (U.S.F.W.S., 2009a). The average annual hunter-kill estimate in the U.S. for combined blue-winged and cinnamon teal during the five years 2004–8 has been about 870,000 birds, but annual estimates been quite variable, and may reflect the influence of special teal hunting seasons. Estimated total annual Canadian kills from 1990–1998 ranged from about 22,000–53,000. The range map's dashed lines indicate some apparently expanded breeding regions, and the dotted line indicates re-

cently expanded wintering regions. As an indication of large wintering concentrations, about 5,000 blue-winged teal were seen during the Merritt Island National Wildlife Refuge, Florida, Audubon Christmas Bird Count in 2003–4; peak concentrations of these long-distance migrants occur much earlier in the fall.

Cinnamon Teal. This North American surface-feeding duck was monographed by Gammonley, 1996 (*B.O.N.A.* No. 209). The North American population has been estimated as 260,000 birds (Wetlands International, 2002). The range map's dashed line indicates an apparently expanded breeding region. Hunter-kill figures for this species not available since they are combined with those of blue-winged teal (see above). A record 2,836 cinnamon teal were seen during the Sacramento, California, Audubon Christmas Bird Count in 2008–9. These small winter numbers reflect the early fall migrations of cinnamon and blue-winged teal; most are in Mexico or farther south by the Christmas Count period.

Northern Shoveler. This Holarctic surface-feeding duck was monographed by Dubowy, 1996 (*B.O.N.A.* No. 217). North American breeding grounds surveys in 2009 indicated a total population of 4.38 million birds, 92 percent above the long-term average (U.S.F.W.S., 2009a). The average annual hunter-kill estimate in the U.S. during the five years 2004–8 has been about 613,000 birds, and apparently has been slowly increasing since the 1960's, but the estimates were quite variable from year to year. Estimated total annual Canadian kills from 1990–1998 ranged from about 10,000–27,000. The range map's dashed line indicates an apparently expanded breeding region. As an indication of large wintering concentrations, about 128,000 northern shovelers were seen during the Peace Valley, California, Audubon Christmas Bird Count in 2006–7.

Pp. 301–360: Pochards (Tribe Aythyini)

Canvasback. This North American pochard was monographed by Mowbray, 2002 (*B.O.N.A.* No. 659). North American breeding grounds surveys in 2009 indicated a total population of about 700,000 birds, or 16 percent above the long-term average (U.S.F.W.S., 2009a). The average annual hunter-kill estimate in the U.S. during the five years 2004–8

has been about 68,000 birds, but both the yearly figures and long-term trends since the 1960's have been highly variable, perhaps reflecting varying degrees of protection from hunters. Estimated total annual Canadian kills from 1990–1998 ranged from about 5,000–13,000. The range map's dashed line indicates an apparently recently expanded (or better documented) breeding region. As an indication of large wintering concentrations, about 38,000 canvasbacks were seen during the Anchor Bay, Michigan, Audubon Christmas Bird Count in 2007–8.

Redhead. This North American pochard was monographed by Woodin & Michot, 2003 (*B.O.N.A.* No. 695). North American breeding grounds surveys in 2009 indicated a total population of 1.04 million birds, or 62 percent above the long-term average (U.S.F.W.S., 2009a). The average annual hunter-kill estimate in the U.S. during the five years 2004–8 has been about 148,000 birds, but the yearly estimates have been fairly variable since the 1960's, perhaps reflecting varying degrees of protection from hunters. Estimated total annual Canadian kills from 1990–1998 ranged from about 11,000–22,000. The range map's dashed line indicates an apparently recently expanded breeding region. As an indication of large wintering concentrations, about 24,000 redheads were seen during the Corpus Christi, Texas, Audubon Christmas Bird Count in 2007–8.

Ring-necked Duck. This North American pochard was monographed by Hohman & Eberhardt, 1998 (*B.O.N.A.* No. 329). The species' breeding behavior has been studied by Hohman (1984). Annual adult survival has been estimated at 63–69 percent for males and 48–58 percent for females (Kear, 2005). Eastern North American breeding grounds surveys in 2009 indicated a total population of 551,000 birds (U.S.F.W.S., 2009a). The average annual hunter kills in the U.S. during the five years 2004–8 have been about 513,000 birds, and have exhibited a long-term progressive increase since the 1960's. Estimated total annual Canadian kills from 1990–1998 ranged from about 57,000–110,000. The range map's dashed lines indicate apparently recently expanded breeding regions. As an indication of large wintering concentrations, about 45,000 ring-necked ducks were seen during the Catahoula National Wildlife Refuge, Louisiana, Audubon Christmas Bird Count in 2006–7.

Tufted Duck. This Eurasian pochard has become increasingly commonly reported in North America since the 1970's. Mostly observed along the Atlantic and Pacific coasts during winter, it has been reported from at least 15 states and seven provinces, including all the Atlantic and Pa-

cific coastal states and provinces. It is rare to uncommon in the western and central Aleutians, and rarer elsewhere in Alaska. It is seen nearly every winter in British Columbia (usually around Victoria, Vancouver and Ladner), and as of 2007 there were about 50 records for Washington, at least 18 for Oregon and several for California. It appears regularly on Audubon Christmas Bird Counts; during the 2008–9 count the greatest number seen at a single location was 20, at St Johns, Newfoundland. Annual adult survival of wild birds has been estimated at 46 percent (Kear, 2005).

Greater Scaup. This Holarctic pochard was monographed by Kessel, Rocque, & Barclay, 2002 (*B.O.N.A.* No. 650). The fledging period is now known to be 40–45 days, and annual adult survival has been estimated at about 52 percent (Kear, 2005). A North American population about 400,000 seems possible, based on surveys of both scaup species collectively (see below). The average annual hunter-kill estimate in the U.S. during the five years 2004–8 has been about 59,000 birds, but averages have been in a long-term decline since the 1960's. Estimated total annual Canadian kills from 1990–1998 ranged from about 12,000–27,000. The range map's dashed line indicates an apparently recently expanded (or better documented) breeding region. As an indication of large wintering concentrations, about 53,000 greater scaups were seen during the Queens, Long Island, Audubon Christmas Bird Count in 2008–9.

Lesser Scaup. This North American pochard was monographed by Austin, Custer, & Afton, 1998 (*B.O.N.A.* No. 338). The species' breeding ecology has been studied by Hammell (1973). Breeding grounds surveys in 2009 indicated a total population of 4.2 million scaups of both species, or 18 percent below the long-term average (U.S.F.W.S., 2009a). Nearly 90 percent of the scaups surveyed nationally are probably lessers (Bellrose, 1980). The average annual hunter-kill estimate in the U.S. during the five years 2004–8 has been about 235,000 birds. However, a continent-wide population decline has been occurring since the 1980's, and average kill estimates have exhibited a long-term decline from a peak of about 600,000 during the 1980s. Estimated total annual Canadian kills from 1990–1998 ranged from about 41,000–71,000. The range map's dashed lines indicate previously undetected or undocumented breeding regions. As an indication of large wintering concentrations, about 500,000 lesser scaups were seen during the Cocoa, Florida, Audubon Christmas Bird Count in 2008–9.

Pp. 361–518: Sea Ducks (Tribe Mergini)

Common Eider. This Holarctic sea duck was monographed by Goudie, Robertson, & Reed, 2000 (*B.O.N.A.* No. 546). The average annual hunter-kill estimate in the U.S. during the five years 2004–8 has been about 20,600 birds, but has been declining since the 1990's. Estimated total annual Canadian kills from 1990–1998 ranged from about 11,000–39,000. As an indication of large wintering concentrations, about 52,000 common eiders were seen during the Martha's Vineyard, Massachusetts, Audubon Christmas Bird Count in 2007–8.

King Eider. This Holarctic sea duck was monographed by Suydam, 2000 (*B.O.N.A.* No. 491). The fledging period is now known to be a relatively long 50–60 days, and annual adult female survival has been estimated at 79 percent (Kear, 2005). This species' North American population estimates include about 10,000–35,000 birds in Alaska, 200,000–260,000 breeding in western Canada and 280,000 in eastern Canada. The average annual hunter-kill estimate in the U.S. during the five years 2004–8 has been only about 115 birds, but annual estimates have been quite variable. Estimated total annual Canadian kills from 1990–2008 have ranged up to about 700 birds. As an indication of large wintering concentrations, about 80 king eiders were seen during the Narrow Cape-Kalsin Bay, Alaska, Audubon Christmas Bird Count in 2006–7, but usually very few count locations report this species.

Spectacled Eider. The North American population of this species was monographed in *The Birds of North America* (Petersen, Grand, & Dau, 2000, No. 547). Dau & Kischinski (1977) have tracked the species' distribution and seasonal movements. Its breeding biology and productivity in Alaska have been studied by Bart & Earnst (2004) and by Grand & Flint (1997). Annual adult female survival has been estimated at 44–78 percent (Kear, 2005). This species' previously unknown pelagic wintering grounds in the Bering Sea near St. Lawrence Island were finally discovered near St. Lawrence Island in the late 1990's (see stippled area of map). The world population, based on counts of wintering flock concentrations, may have been over 330,000 during the 1990's (Peterson, Leonard, & Douglas, 1999). Because of its pelagic wintering, it does not normally appear on Audubon Christmas Bird Counts. It is classified as nationally threatened under the U.S. Endangered Species Act.

Steller's Eider. This northeast Asian and Alaskan sea duck was monographed by Frederickson, 2001 (*B.O.N.A.* No. 571). Its world population declined about 50 percent during the last four decades of the past century, from about 400,000–500,000 birds to 220,000 during the late 1990s. In southeastern Alaska the population estimates dropped from 137,900 to 69,000 between 1992 and 2000 (Kear, 2005). The inked area on the range map is the only known currently known breeding region in North America. It is a casual visitor to British Columbia, and has been reported south at least to Oregon. It is classified as nationally threatened under the U.S. Endangered Species Act. Over 2,000 were seen during the Izembek Bay, Alaska, Audubon Christmas Bird Count in 2003–4, which is very few North American sites reporting Steller's eiders during these counts.

Labrador Duck. This long-extinct sea duck was monographed by Chilton, 1997 (*B.O.N.A.* No. 307).

Harlequin Duck. This northeast Asian, North American and Icelandic sea duck was monographed by Robertson & Goudie, 1999 (*B.O.N.A.* No. 466). The incubation period is now known to be 27–29 days, and the fledging period is a relatively long 42–60 or more days (Kear, 2005). There are about 165,000 breeding in western North America (Kear, 2005), plus unknown but relatively small numbers nesting in eastern Canada. The eastern population is classified as threatened under the U.S. Endangered Species Act. The average annual hunter-kill estimate in the U.S. during the five years 2004–8 has been about 1,100 birds, but the annual estimates since the 1960's have been fairly variable. Estimated total annual Canadian kills from 1990–1998 have ranged up to about 400 birds. The Pacific Northwest breeding range evidently no longer extends south to California, but it is still fairly widespread as far south as in the central Cascade Mts. of Oregon (Gilligan *et al.*, 1994). Gowans, Robertson & Cooke (1997), and Dzinbal (1982) have described the species' breeding behavior. Over 1,000 harlequins were seen during the Unalaska Island, Alaska, Audubon Christmas Bird Count in 2007–8, which is the few North American sites reporting large number of harlequin ducks during these counts.

Oldsquaw. This circumpolar sea duck, now renamed the long-tailed duck, was monographed by Robertson & Savard, 2002 (*B.O.N.A.* No. 651). Average adult mortality has been estimated at 28 percent (Cramp & Simmons, 1977). The world population may include

about 2.7 million birds in North America (Rose & Scott, 1997), making it by far the most abundant of our sea ducks. The average annual hunter-kill estimate in the U.S. during the five years 2004–8 has been about 28,200, and estimates have exhibited a long-term progressive increase since the 1960's. Estimated total annual Canadian kills from 1990–1998 ranged from about 5,000–10,000. The very small estimated hunter-kill relative to its huge continental population is probably a reflection of this species' mostly marine, high-latitude distribution and its relatively low attractiveness to hunters. As an indication of large wintering concentrations, about 525,000 long-tailed ducks were seen during the Nantucket, Maryland, Audubon Christmas Bird Count in 2002–3.

Black Scoter. This Holarctic sea duck was monographed by Bordage & Savard, 1995 (*B.O.N.A.* No. 177). The average annual hunter-kill estimate in the U.S. during the five years 2004–8 has been about 12,000 birds, but yearly estimates have been rather variable. Estimated total annual Canadian kills for seven years between 1969 and 1993 ranged from about 4,000–8,000. The range map's dashed line indicates a potential breeding region in Quebec and Labrador; the stippled area marks the most likely breeding region. Other Canadian breeding areas of this surprisingly elusive species remain speculative. As an indication of large wintering concentrations, about 43,000 black scoters were seen during the Martha's Vineyard, Maryland, Audubon Christmas Bird Count in 2002–3.

Surf Scoter. This North American sea duck was monographed by Savard, Bordage & Reed, 1998 (*B.O.N.A.* No. 363). The incubation period is now known to be 27.5–28 days, and the fledging period is a relatively long 50–55 days (Kear, 2005). Its population is still only very poorly documented, but Rose & Scott (1997) suggested a stable population of 765,000 birds. The average annual hunter-kill estimate in the U.S. during the five years 2004–8 has been about 33,400 birds, and estimates have exhibited a gradually increasing long-term trend since the 1960's. Estimated total annual Canadian kills from 1990–1998 ranged from about 5,000–19,000. The range map's dashed lines indicate currently known or probable breeding regions in Alaska and Quebec. As an indication of large wintering concentrations, about 5,000 surf scoters were seen during the San Diego, California, Audubon Christmas Bird Count in 2003–4.

White-winged Scoter. This Holarctic sea duck was monographed by Brown & Fredrickson, 1997 (*B.O.N.A.* No. 274). Brown & Brown (1981) have described its nesting biology. The North American population (*deglandi*) may consist of about 1,000,000 birds (Rose & Scott, 1997; Kear, 2005). The average annual hunter-kill estimate in the U.S. during the five years 2004–8 has been about 8,500 birds, but estimates have exhibited a gradually declining long-term trend-line since the 1960's. Estimated total annual Canadian kills from 1990–1998 ranged from about 4,000–10,000. The range map's dashed lines indicate possible breeding expansions in Alaska and British Columbia; breeding no longer extends south in Manitoba to the U.S. border. As an indication of large wintering concentrations, about 64,000 white-winged scoters were seen during the Montauk, Long Island, Audubon Christmas Bird Count in 2004–5.

Bufflehead. This North American sea duck was monographed by Gauthier, 1993 (*B.O.N.A.* No. 67). There is a population estimate of one million birds for all of North America (Wetlands International, 2002). The average annual hunter-kill estimate in the U.S. during the five years 2004–8 has been about 189,000 birds, and kill estimates have been gradually increasing since the 1960's. Estimated total annual Canadian kills from 1990–1998 ranged from about 18,000–37,000. The range map's dashed line indicates a poorly documented breeding region in Ontario and Quebec. As an indication of large wintering concentrations, about 13,500 buffleheads were seen during the Point Reyes, California, Audubon Christmas Bird Count in 2006–7.

Barrow's Goldeneye. This North American and North Atlantic sea duck was monographed by Eadie, Savard, & Mallory, 2000 (*B.O.N.A.* No. 548). Minimum estimated totals exist for Alaska (45,000), British Columbia (70,000–126,000) and the Pacific Coast states (under 8,000) (Kear, 2005); small numbers also occur along the Rocky Mountain range south locally to Wyoming and northern Colorado. The average annual hunter-kill estimate in the U.S. during the five years 2004–8 has been about 5,200 birds, and estimates have remained fairly stable since the 1960's. Estimated total annual Canadian kills from 1990–1998 ranged from about 500–3,700. The range map's dashed line indicates a presumptive breeding region in Quebec. As an indication of large wintering concentrations, about 4,000 Barrow's goldeneyes were seen during the Lewiston–Clarkston, Idaho, Audubon Christmas Bird Count in 2006–7.

Common Goldeneye. This Holarctic sea duck was monographed by Eadie, Mallory, & Lumsden, 1995 (*B.O.N.A.* No. 170). Afton & Sayler (1982) have described this species' breeding behavior. Eastern North American breeding grounds surveys in 2009 indicated a total population of 369,000 goldeneyes, nearly all of which would be commons (U.S.F.W.S., 2009a). The entire North American population might total about 1.5 million birds (Kear, 2005). The average annual hunter-kill estimate in the U.S. during the five years 2004–8 has been about 75,400 birds, and estimates have been quite stable since the 1960's. Estimated total annual Canadian kills from 1990–1998 ranged from about 25,000–77,000. The range map's dashed line indicates a presumptive breeding region in Alaska and northwestern Canada. As an indication of large wintering concentrations, about 10,000 common goldeneyes were seen during the Rend Lake, Illinois, Audubon Christmas Bird Count in 2008–9.

Hooded Merganser. This North American sea duck was monographed by Dugger, Dugger, & Fredrickson, 1994 (*B.O.N.A.* No. 98). The average annual hunter-kill estimate in the U.S. during the five years 2004–8 has been about 84,800 birds, and estimates have exhibited an increasing trend-line since the 1960's. Estimated total annual Canadian kills from 1990–1998 ranged from about 14,000–29,000. The range map's dashed line indicates the western limits of regular breeding in eastern North America; much of the unshaded area to the east of the line is now part of the regular breeding range. As an indication of large wintering concentrations, about 2,200 hooded mergansers were seen during the Noxubee National Wildlife Refuge, Mississippi, Audubon Christmas Bird Count in 2006–7.

Smew. This Eurasian sea duck regularly if rarely occurs in the western and central Aleutians Aleutians and very rarely along the western coast of Alaska. As of 2007 there were at least five records for British Columbia, at least two for Washington and California, and one for Oregon. The most complete recent summary of its biology is by Kear (2005).

Red-breasted Merganser. This Holarctic sea duck was monographed by Titman, 1999 (*B.O.N.A.* No. 443). World population estimates of this Holarctic species include 237,000 birds in North America (Rose & Scott, 1997; Kear, 2005). The average annual hunter-kill estimate in the U.S. during the five years 2004–8 has been about 15,000 birds, and estimates appear to have remained fairly stable since the 1960's. Estimated total

annual Canadian kills from 1990–1998 ranged from about 7,000–16,000. As an indication of large wintering concentrations, about 14,000 red-breasted mergansers were seen during the 2006–7 Audubon Christmas Bird Count at Cleveland, Ohio, and about 16,000 were seen at Point Pelee, Ontario, the same year.

Common Merganser. This Holarctic sea duck was monographed by Mallory & Metz, 1999 (*B.O.N.A.* No. 442). World population estimates of this Holarctic species include 640,000 birds in North America (Kear, 2005). The average annual hunter-kill estimate in the U.S. during the five years 2004–8 has been about 18,600 birds, and estimates have been progressively increasing since the 1960's. Estimated total annual Canadian kills from 1990–1998 ranged from about 12,000–20,000. As an indication of large wintering concentrations, about 70,000 common mergansers were seen during the Wakonda Lake, Kansas, Audubon Christmas Bird Count in 2002–3.

Pp. 519–542: Stiff-tailed Ducks (Tribe Oxyurini)

Masked Duck. This western hemisphere and tropically oriented stiff-tailed duck was monographed by Eitniear, 1999 (*B.O.N.A.* No. 393). Its U.S. occurrences (mostly occurring in Texas, less often in Florida and Louisiana) seem to be of periodically irruptive, the birds often appearing after tropical storms. One of very few documented U.S. breedings occurred in Live Oak County, west of Corpus Christi, in southeastern Texas, in 2007. The fledging period has been reported as 45 days (Kear, 2005), but these birds rarely fly. Very few if any of these ducks are killed by hunters north of Mexico, as they are likely to dive or hide under floating vegetation, rather than to fly when disturbed. The range map's dashed lines indicates additional known or probable breeding regions in Mexico and Texas. Owing to its secretive behavior, no reliable estimates of the U.S. population are possible. One Texas waterfowl survey in 1992–93 suggested that the state's masked duck population might be as large as 3,800 birds, which seems unrealistically high. During the 2008–9 Audubon Christmas Bird Count the greatest number seen at a single location was five, at La Sal Vieja, Texas. At least one more was seen during the previous five counts (at Kingsville, Texas).

Ruddy Duck. This New World stiff-tailed duck was monographed by

Brua, 2003 (*B.O.N.A.* No. 696). The North American population has been estimated at about 500,000 birds (Kear, 2005). The average annual hunter-kill estimate in the U.S. during the five years 2004–8 has been about 28,200 birds, and estimates have exhibited a long-term decline since the 1960's. Estimated total annual Canadian kills from 1990–1998 ranged from about 700–4,000. The range map's dashed lines indicate new or previously unidentified low-density breeding regions in the western U.S., Canada and Mexico. As an indication of large wintering concentrations, about 28,000 ruddy ducks were seen during the Los Baños, California, Audubon Christmas Bird Count in 2002–3.

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