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Lontra canadensis.

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Lontra Gray, 1843*a*

Lontra Gray, 1843*a*:118. Type species *Mustela lutra canadensis* Schreber.
Latax Gray, 1843*a*:119. Type species *Lutra lataxina* F. Cuvier. Name preoccupied by *Latax* Gloger (the sea otter).
Lataxina Gray, 1843*b*:70. Type species *Lataxina mollis* Gray [=*Lutra lataxina* F. Cuvier].
Lataxia Gervais, 1855:118. Renaming of *Latax* Gray.
Nutria Gray, 1865:128. Type species *Lutra felina* Molina.

CONTEXT AND CONTENT. Order Carnivora, Family Mustelidae, Subfamily Lutrinae. River otters from North and South America were recognized as distinct from their European counterparts by van Zyll de Jong (1987). However, the name *Lontra* is rarely used in the present literature, and numerous authors still use *Lutra* (Kellnhauser, 1983). Herein, *Lontra* is used in concordance with van Zyll de Jong (1972, 1987) and Wozencraft (1993). The genus *Lontra* includes four species: *L. canadensis, L. felina, L. longicaudis,* and *L. provocax* (Wozencraft, 1993). All species except *L. provocax* and *L. felina* are allopatric, and all except *L. felina,* a littoral marine species, are probably ecological equivalents (van Zyll de Jong, 1972). The genus *Lontra* is a monophyletic group phylogenetically linked to the African and Asian clawless otters (*Aonyx* and *Amblonyx,* respectively—van Zyll de Jong, 1987). A key to species modified from van Zyll de Jong (1972) follows:

1 Size small (total length usually <100 cm); rhinarium bare with straight dorsal border; skull small (basal length usually <90 mm); postorbital constriction short, dorsal outline of its lateral borders arciform; P4 with parastyle projecting in occlusal view; m1 long and narrow, buccal cingulum of talonid not well developed; P1 usually absent ..... *L. felina*
Size large (total length usually >110 cm); rhinarium bare or partially furred; skull larger (basal length usually >90 mm); dorsal outline of lateral borders of postorbital constriction usually straight; P4 with parastyle not prominent, usually lying on a line with anterior edge of talon; m1 broad, usually with well developed buccal cingulum of the talonid; P1 usually present 2
2 Ventral surface of feet webbing furred; rhinarium with obtuse triangular dorsal projection ..... *L. canadensis*
Ventral surface of feet webbing naked or nearly so; rhinarium without obtuse triangular projection 3
3 Anterior dorsal profile of skull straight; premaxillae in profile precipitous; talon of P4 with anterior hemispheric depression surrounded by rounded rim; rhinarium bare ..... *L. provocax*
Anterior dorsal profile of skull convex; premaxillae in profile not precipitous; talon of P4 without anterior hemispheric depression; rhinarium partially furred ..... *L. longicaudis*

Lontra canadensis (Schreber, 1776)

North American River Otter

Mustela lutra canadensis Schreber, 1776:(3)18(126). Type locality "Eastern Canada" [=Quebec].
Mustela hudsonica Desmarest, 1803:384. Type locality, presumably Hudson Bay.
Lutra lataxina Cuvier, 1823:242. Type locality "South Carolina."
Lataxina mollis Gray, 1843*b*:70. Renaming of *Lutra lataxina* Cuvier.
Lutra destructor Barnston, 1863:152. Type locality "Michipicoten Island, Lake Superior, Ontario," Canada.
Lutra rhoadsi Cope, 1897:391. Type locality "Port Kennedy Bone Deposits, Pennsylvania."
Lutra degener Bangs, 1898:35. Type locality "Bay St-Georges, Newfoundland," Canada.
Lutra periclyzomae Elliot, 1905:80. Type locality "Gawi, west coast of Moresby Island, Queen Charlotte Islands, British Columbia," Canada.
Lutra mira Goldman, 1935:185. Type locality "Kasaan Bay, Prince of Wales Island, Alaska."
Lutra vancouverensis Goldman, 1935:186. Type locality "Quatsino, northwestern Vancouver Island, British Columbia," Canada.

CONTEXT AND CONTENT. Context noted in generic summary above. Hall and Kelson (1959) originally recognized 19 subspecies, which were later increased to 20 subspecies by Harris (1968). More recently, Hall (1981) reorganized the classification to seven subspecies:

L. c. canadensis Schreber, 1776:126, see above (*chimo* Anderson, *degener* Bangs, *destructor* Barnston, and *hudsonius* Desmarest are synonyms).
L. c. kodiacensis Goldman, 1935:180. Type locality "Uyak Bay, Kodiak Island, Alaska."
L. c. lataxina Cuvier, 1823:242, see above (*interior* Swenk, *mollis* Gray, *rhoadsi* Cope, *texensis* Goldman, and *vaga* Bangs are synonyms).
L. c. mira Goldman, 1935:185, see above (*vancouverensis* Goldman is a synonym).
L. c. pacifica Rhoads, 1898:429. Type locality "Lake Keechelus, altitude 3,000 feet [1,000 m], Kittitas County, Washington." (*atterima* Elliot, *brevipilosus* Grinnell, *californica* Baird, *evexa* Goldman, *extera* Goldman, *nexa* Goldman, *optiva* Goldman, *paranensis* Elliot, *preblei* Goldman, and *yukonensis* Goldman are synonyms).
L. c. periclyzomae Elliot, 1905:80, see above.
L. c. sonora Rhoads, 1898:431. Type locality "Montezuma Well, Beaver Creek, Yavapai County, Arizona."

DIAGNOSIS. *Lontra canadensis* can be differentiated from other North American mustelids by the fully webbed feet, long tapered tail, and short, dark, glossy fur. In coastal areas, river otters co-occur with sea otters (*Enhydra lutris*). Sea otters, however, are much larger (>15 kg), possess thick vibrissae, large flipper-like hind feet, and a short tail that is not markedly tapered (Foster-Turley et al., 1990).

GENERAL CHARACTERS. The North American river otter (Fig. 1) is a stocky mammal of 5–14 kg with short legs, muscular neck no smaller than the head, and an elongate body that is broadest at the hips (Jackson, 1961). Tail is long, tapered, and about one-third the length of the animal. Head is flat with a broad muzzle, and ears are round and inconspicuous. Rhinarium is bare with an obtuse triangular projection. Eyes are small and placed anteriorly. Fur is short (guard hairs average 23.8 mm) and very dense; fur density is ca. 57,833 hairs/cm^2 in the midback section (Tarasoff et al., 1972). Pelage has a high luster and varies from light brown to black. Throat, chin, and lips are grayer than the remainder of the body (Jackson, 1961; Smith, 1993). Fur of senescent North American river otters may become white-tipped, and rare albinos may occur (Jackson, 1961).

Sexual dimorphism exists; males average 5% larger than females (Jackson, 1961). In Idaho, juvenile, yearling, and adult males averaged 8, 11, and 17% heavier, respectively, than females of the same age (Melquist and Hornocker, 1983). Averages and ranges of external measurements (in mm) of *L. canadensis* in Louisiana (Lowery, 1974) for three males and three females, respectively, are as follows: total length, 1,129 (1,118–1,150), 978 (900–1,113); length

FIG. 1. Adult *Lontra canadensis* from Yellowstone National Park, Montana. (Photograph courtesy of B. Landis, Bob Landis Wildlife Films, MT.)

of tail, 444 (420–470), 358 (317–400); length of hind foot, 129 (115–140), 112 (101–126); length of ear, 24 (23–25), 23 (22–23). Average body mass (in kg) of adult males and females, respectively, are as follows: 7.7 (n = 20), 7.3 (n = 20) in Alberta, Canada (Smith, 1993); 9.2 (n = 4), 7.9 (n = 6) in Idaho (Melquist and Hornocker, 1983); 9.4 (n = 2), 8.4 (n = 6) in Alaska (Duffy et al., 1994*a*). A clinal decrease in size may exist from north to south along the Pacific coast (Toweill and Tabor, 1982), but not from east to west (van Zyll de Jong, 1972).

The skull is relatively flat with a short, broad rostrum and a long, broad braincase (Fig. 2). Average cranial measurements (in mm; range in parentheses) for four males and three females from Louisiana (Lowery, 1974), respectively, are as follows: greatest length of cranium, 111.8 (108.9–115.1), 108.6 (106.9–110.4); mastoid breadth, 68.6 (65.3–74.2), 65.2 (63.8–66.7); zygomatic breadth, 72.3 (68.9–78.1), 67.6 (63.7–72.8); postorbital length, 21.7 (20.7–22.4), 19.6 (17.5–22.5); interorbital length, 25.1 (22.9–26.3), 23.0 (22.5–23.5); length of maxillary toothrow, 39.0 (37.9–40.0), 36.4 (33.5–38.7); cranial height, 39.6 (37.4–41.5), 38.0 (37.7–38.2).

DISTRIBUTION. Historically, the North American river otter was present throughout most of Canada and the United States (Polechla, 1990). Pollution and urbanization, however, greatly reduced its range by the early 1900s. *L. canadensis* currently occurs in New England, the states bordering the Great Lakes, Atlantic ocean and Gulf of Mexico, and in the forested regions of the Pacific coast in North America (Fig. 3). These mustelids also are present throughout Alaska, including the Aleutian Islands and the north slope of the Brooks Range (Magoun and Valkenburg, 1977). In mainland United States, the distribution of *Lontra canadensis* is dynamic, as the species formerly disappeared from several states following urbanization but was subsequently reintroduced in several areas (Melquist and Dronkert, 1987). Currently, *L. canadensis* is absent or rare in Arizona, Hawaii, Indiana, Iowa, Kansas, Kentucky, Nebraska, New Mexico, North Dakota, Ohio, Oklahoma, South Dakota, Tennessee, and West Virginia (Melquist and Dronkert, 1987; Park, 1971; Polechla, 1990). Reintroductions have expanded the distribution of this species in recent years, especially in the midwestern United States (Melquist and Dronkert, 1987). In Canada, North American river otters occupy all provinces and territories, except for Prince Edward Island (Melquist and Dronkert, 1987).

FOSSIL RECORD. Lutrinae first appeared in North America in the Lower and Upper Pliocene (van Zyll de Jong, 1972), likely from Eurasian origin. The invasion of North America probably occurred during the Kansan glaciation and was facilitated by the existence of the Bering land bridge (van Zyll de Jong, 1972). The genus *Lontra* is present in South American remains from the Lujanian (late Pleistocene—Savage and Russell, 1983). Oldest fossils of North American river otters are from Irvingtonian (Middle Pleistocene) deposits at Port Kennedy, Cumberland caves, and Leisey Shell pits (Anderson, 1984; Berta, 1995; Eshelman and Hager, 1984; Kurtén and Anderson, 1980; Savage and Russell, 1983). *Lontra canadensis* can be traced back to *Lutra licenti* Teilhard and Piveteau, from the Pontian of China (Anderson, 1984; Kurtén and Anderson, 1980). Remains from *L. canadensis* were recovered from late Rancholabrean deposits in Arkansas, Florida, Georgia, Iowa, Missouri, Nebraska, Ohio, Pennsylvania, South Carolina, Tennessee, and West Virginia (Anderson, 1984; Bentley et al., 1994; Corner, 1977; Grady, 1984; Kurtén and Anderson, 1980; McDonald, 1994).

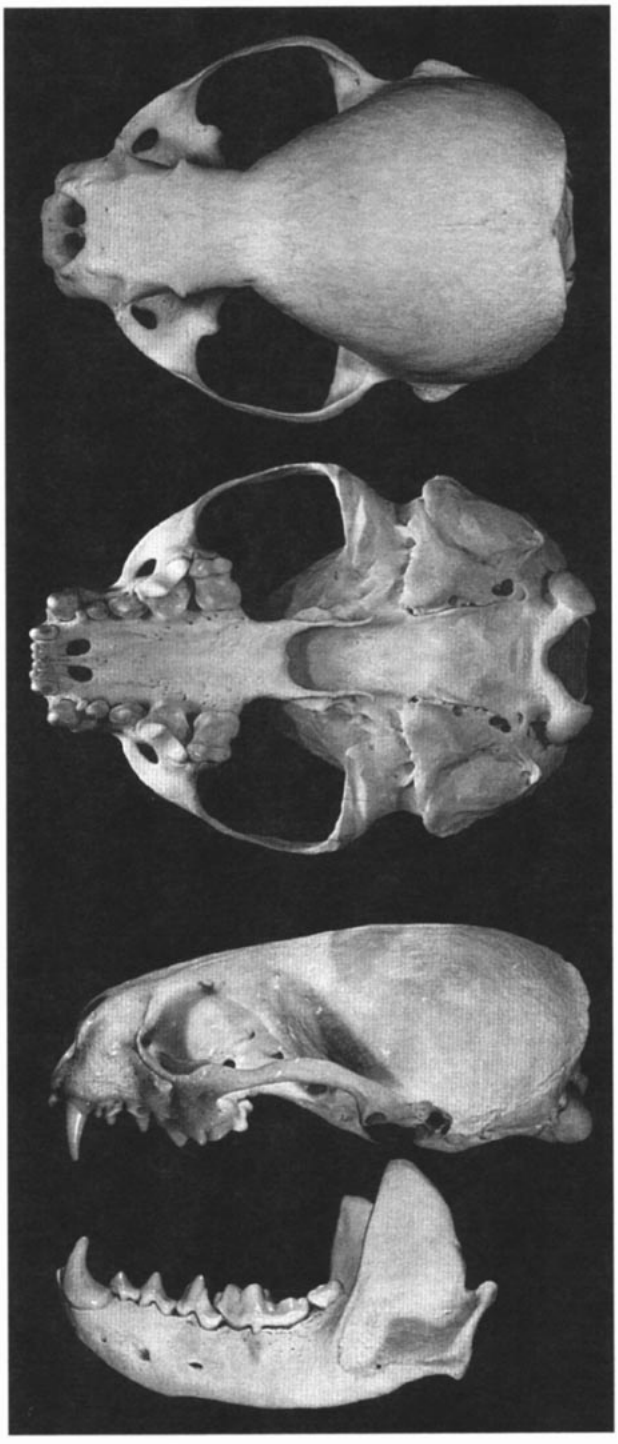

FIG. 2. Dorsal, ventral, and lateral views of cranium and lateral view of mandible of *Lontra canadensis* from Ontario, Canada (sex unknown, personal collection of Q. and S. H. Ferguson, Department of Biology, University of Saskatchewan). Greatest length of cranium is 107 mm.

FORM AND FUNCTION. The river otter is highly modified for aquatic life. Ears are short, neck is the same diameter as the head, legs are short and powerful, toes are fully webbed, and tail

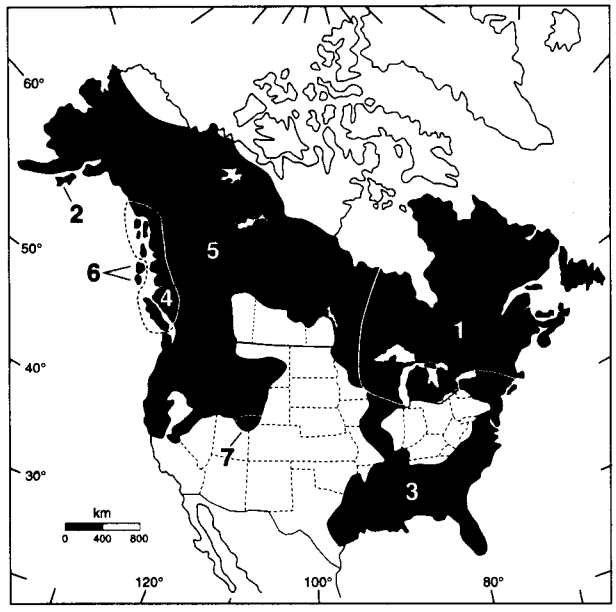

FIG. 3. Distribution of *Lontra canadensis* in North America (Hall and Kelson, 1959; Magoun and Valkenburg, 1977; Melquist and Dronkert, 1987; Peterson, 1966; Toweill and Tabor, 1982): 1, *L. c. canadensis*; 2, *L. c. kodiacensis*; 3, *L. c. lataxina*; 4, *L. c. mira*; 5, *L. c. pacifica*; 6, *L. c. periclyzomae*; 7, *L. c. sonora*.

is long (one third of body length) and tapered. These characteristics give the river otter a streamlined profile in water but reduce agility on land (Tarasoff et al., 1972). Smell and hearing are acute (Chanin, 1985; Jackson, 1961; Park, 1971). *L. canadensis* has a delicate sense of touch in the paws as well as great dexterity (Park, 1971).

Lungs of *L. canadensis* are triangular in outline, with the apex directed cranially. Right lung is 19.3% larger than the left and has four lobes compared with two for the left. Reduced lobulation of the lungs may be an adaptation to aquatic life (Tarasoff and Kooyman, 1973*a*). Similarly, length of the trachea of *L. canadensis* is intermediate between that of terrestrial carnivores and marine mammals. Mean tracheal length is 15.3 cm, or 23.2% of body length. A shorter trachea may facilitate air exchange and increase lung ventilation in diving mammals (Tarasoff and Kooyman, 1973*b*).

The baculum of *L. canadensis* is S-shaped, and in adults averages 94.92 mm in length (SD = 4.46, n = 55) and 6.24 g (SD = 0.80) in weight (Friley, 1949). The os clitoridis of two females trapped in Washington measured 17.5 mm and 3.2 mm in length (Scheffer, 1939). River otters have four inguinal mammae (Jackson, 1961). Milk is rich and contains 62% water, 24% fat, 11% protein, 0.1% carbohydrates, and 0.75% ash (Miller-Ben-Shaul, 1962). Dental formula is i 3/3, c 1/1, p 4/3, m 1/2, total 36 (Peterson, 1966). Extra premolars may occur (Dearden, 1954).

ONTOGENY AND REPRODUCTION. North American river otters are polygynous (Melquist and Hornocker, 1983). Females usually do not reproduce until 2 years of age, although yearlings occasionally produce young (Docktor et al., 1987; Hamilton and Eadie, 1964). Males are sexually mature at 2 years of age (Hamilton and Eadie, 1964). The number of corpora lutea increases with age (Docktor et al., 1987).

North American river otters usually breed from December to April (Hamilton and Eadie, 1964; Liers, 1951). Females are in heat for 42–46 days (Hamilton and Eadie, 1964; Liers, 1951), and true gestation lasts 61–63 days. Because otters delay implantation for ≥8 months, the interval between copulation and parturition may reach 10–12 months (Hamilton and Eadie, 1964; Liers, 1951). Young are born between February and April (Hamilton and Eadie, 1964; Melquist and Hornocker, 1983), and parturition lasts 3–8 h (Liers, 1951).

Litter size may reach five (Park, 1971) but usually ranges from one to three (Docktor et al., 1987; Hamilton and Eadie, 1964; Tabor and Wight, 1977). In Oregon, recruitment was estimated at 1.14 female young per adult female at the beginning of the autumn trapping season (Tabor and Wight, 1977).

At birth, North American river otters are fully furred, blind, and toothless. One full-term fetus, recovered in April from a 3-year-old female, measured 275 mm, 64 mm, and 28 mm for total length, length of tail, and length of hind foot, respectively, and it weighed 132 g (Hamilton and Eadie, 1964). At birth, claws are well-formed and facial vibrissae (ca. 5 mm long) are present (Hamilton and Eadie, 1964). Eyes open at 30–38 days (Liers, 1951). Kits start playing at 5–6 weeks and begin taking solid food at 9–10 weeks. Weaning occurs at 12 weeks, and females will provide solid food for their progeny until 37–38 weeks (Shannon, 1991). Maximum weight and length of both sexes are reached at 3–4 years of age (Melquist and Hornocker, 1983).

ECOLOGY. Aquatic life ties North American river otters almost exclusively to permanent watersheds. In northern areas of Canada, presence of *L. canadensis* is strongly associated with riparian habitats and negatively correlated with latitude (St-Georges et al., 1995). In Alberta, selection of water bodies during winter by *L. canadensis* is governed by the suitability of shoreline substrate and morphology for dens providing access to both air and water under ice (Reid et al., 1994*b*). North American river otters prefer bog lakes with banked shores containing semi-aquatic mammal burrows and lakes with beaver (*Castor canadensis*) lodges, and they avoid water bodies with gradually sloping shorelines of sand or gravel (Reid et al., 1994*b*). In Maine, use of watersheds by river otters is negatively associated with the proportion of mixed hardwood-softwood stands in forested areas adjacent to waterways and positively associated with the number of beaver flowages, watershed length, and average shoreline diversity (Dubuc et al., 1990). In Idaho, river otters prefer valley over mountain habitats, and they select valley streams over valley lakes, reservoirs, and ponds (Melquist and Hornocker, 1983). Logjams are used intensively where present (Melquist and Hornocker, 1983). In Florida, abundance of North American river otters is lowest in freshwater marshes, intermediate in salt marshes, and highest in swamp forest. During the dry season, *L. canadensis* will retreat from marshland and move to permanent ponds where water is available and food is more concentrated (Humphrey and Zinn, 1982). In Idaho and Massachusetts, habitat features preferred for latrine sites include large conifers, points of land, beaver bank dens and lodges, isthmuses, mouths of permanent streams, or any object that protrudes from the water (Melquist and Hornocker, 1983; Newman and Griffin, 1994).

The diet of the North American river otter is comprised mostly of fish (Knudsen and Hale, 1968; Reid et al., 1994*a*). Typically, fish species are captured in inverse proportion of their swimming abilities (Serfass et al., 1990; Stenson et al., 1984). In marine habitats, *L. canadensis* feeds upon fish that are abundant, midsized, and close to shore (Larsen, 1984; Stenson et al., 1984). In addition to fish, amphibians (mostly frogs) and crustaceans (mainly crayfish) may constitute an important part of the diet of *L. canadensis* (Knudsen and Hale, 1968; Reid et al., 1994*a*; Sheldon and Toll, 1964). Small mammals, molluscs, reptiles, birds, and fruits are consumed opportunistically (Gilbert and Nancekivell, 1982; Greer, 1955; Hamilton, 1961; Morejohn, 1969; Verbeek and Morgan, 1978; Wilson, 1954).

Relative abundance of North American river otters is obtained using track counts in the snow (Reid et al., 1987; St-Georges et al., 1995), radioactive isotopes (Knaus et al., 1983; Testa et al., 1994), catch/unit effort (Chilelli et al., 1996), or scent-station surveys (Humphrey and Zinn, 1982). Density estimates of river otters range from 1 otter/1.25–3.60 km of coastline in Alaska (Testa et al., 1994) to 1 otter/3.9 km of waterway in Idaho (Melquist and Hornocker, 1983). Sex ratios (male:female) of free-ranging *L. canadensis* as determined from trapping in 10 northeastern states vary from 0.64:1 to 3.31:1 (Chilelli et al., 1996). In New York and Idaho, sex ratios were 1.26:1 and 1.09:1, respectively (Hamilton and Eadie, 1964; Melquist and Hornocker, 1983). Annual survival rates of otters in Oregon, was 68, 46, and 73% for age classes 0, 1, and 2–11, respectively (Tabor and Wight, 1977).

North American river otters often inhabit beaver ponds, but encounters between otters and beavers may not be agonistic (Green, 1932; Hamilton, 1961; Melquist and Hornocker, 1983). In Idaho, otters and beavers were recorded in the same beaver lodge simultaneously on three occasions (Melquist and Hornocker, 1983). River otters may compete for resources with the American mink (*Mustela vison*). In Alaska, *L. canadensis* and *M. vison* living in marine environments show niche separation through resource partitioning

probably related to the swimming abilitites of these mustelids (Ben-David et al., 1996).

North American river otters have few natural predators in the water: alligators (*Alligator mississippiensis*), American crocodiles (*Crocodylus acutus*), and killer whales (*Orcinus orca*). They are considerably more vulnerable on land or ice where bobcats (*Lynx rufus*), cougars (*Felis concolor*), coyotes (*Canis latrans*), dogs (*Canis familiaris*) and wolves (*Canis lupus*) can kill adults (Melquist and Dronkert, 1987; Melquist and Hornocker, 1983; Route and Peterson, 1991; Toweill and Tabor, 1982). Most mortality, however, is human-related and includes trapping, illegal shooting, roadkills, and accidental captures in fish nets or set lines (Jackson, 1961; Melquist and Hornocker, 1983). Accidental deaths may occur due to ice flows (Serfass and Rymon, 1985) or shifting rocks (Melquist and Hornocker, 1983). Starvation may occur following excessive tooth damage (Serfass and Rymon, 1985). North American river otters can reach 13 years of age in the wild, and up to 25 years of age in captivity (Melquist and Dronkert, 1987; Stephenson, 1977).

North American river otters host numerous endoparasites such as nematodes (Hoberg et al., 1997), cestodes (Greer, 1955), trematodes (Hoover et al., 1984), the sporozoan *Isopora* (Hoover et al., 1984), and acanthocephalans (Hoberg et al., 1997; Hoover et al., 1984). Ectoparasites include ticks (Eley, 1977; Serfass et al., 1992), sucking lice *Latagophthirus rauschi* (Kim and Emerson, 1974), and the flea *Oropsylla arctomys* (Serfass et al., 1992).

Lontra canadensis may be victim of canine distemper (Harris, 1968; Park, 1971), rabies (Serfass et al., 1995), respiratory tract disease, and urinary infection (Hoover et al., 1984; Route and Peterson, 1991). In addition, North American river otters can contract jaundice, hepatitis, feline panleucopenia, and pneumonia (Harris, 1968).

Similar numbers of river otters are harvested in Canada and the United States yearly (Obbard, 1987). In the late 1970s, annual harvest in North America reached ca. 50,000 pelts, for a value of U.S. $3 million (Melquist and Dronkert, 1987). Otter harvests are positively correlated with beaver harvests and with the average beaver pelt price from the previous year (Chilelli et al., 1996). Otters are incidentally harvested by traps set for beavers (Toweill and Tabor, 1982), and all management plans should consider both species simultaneously (Polechla, 1990).

Fur of the North American river otter is thick and lustrous and is the most durable of native American furs (Hamilton, 1943). River otter pelts are used as the standard for rating the durability of other pelts (Obbard, 1987). River otter fur is widely used in the garment industry (Toweill and Tabor, 1982).

Lontra canadensis can be captured alive using Hancock traps (Melquist and Hornocker, 1979; Northcott and Slade, 1976) or foothold traps with padded jaws (Serfass et al., 1996), and immobilized using ketamine, ketamine/midazolam, ketamine/xylazine/acepromazine maleate, or isoflurane (Hoover, 1984; Hoover et al., 1985*a*; Hoover and Jones, 1986; Spelman et al., 1993). Radiotransmitting implants have been used without apparent effects on reproduction (Reid et al., 1986).

Age can be determined through annular layering or radiographs of canine teeth (Stephenson, 1977), or by morphology and conformation of the baculum (Friley, 1949). Juvenile otters can be recognized by size and morphology of body, skull, baculum, and skull (Chilelli et al., 1996; Kuehn and Berg, 1983; Stephenson, 1977).

BEHAVIOR. *Lontra canadensis* is active year-round and is most active at night and during crepuscular hours. North American river otters become significantly more nocturnal in spring, summer, and fall and more diurnal in winter (Melquist and Hornocker, 1983). North American river otters may emigrate because of food shortages or environmental conditions, but they do not migrate annually (Jackson, 1961).

Aquatic locomotion is performed by quadrupedal paddling, forelimb paddling, alternate hind-limb paddling, simultaneous hind-limb paddling, or body and tail dorsoventral undulation (Fish, 1994; Tarasoff et al., 1972). The tail, which is stout and larger in surface area than the limbs, is used for stability while swimming and for short bursts of rapid locomotion (Tarasoff et al., 1972). While swimming at the surface, the dorsal portion of the head including nostrils, ears, and eyes is exposed above water. *L. canadensis* must remain in motion to maintain its position at the surface (Tarasoff et al., 1972).

On land *L. canadensis* can walk, run, bound, or slide. Foot falls during walking and running follow the sequence left limb, right limb, right limb, left limb. During walking, limbs are moved in a plane parallel to the long axis of the body (Tarasoff et al., 1972). Bounding is the result of simultaneous lifting of the limbs off the ground. As the front feet touch the ground, the back feet are lifted and land where the front paws first touched, yielding a pattern of tracks in pairs typical of most mustelids (Tarasoff et al., 1972). Sliding occurs mostly on level surfaces of snow or ice, but also on grassy slopes and muddy banks (Liers, 1951; Melquist and Hornocker, 1983). Sliding across snow and ice is a rapid and efficient means of travel, and otters traveling over mountain passes, between drainages, or descending from mountain lakes often slide continuously for several hundred meters (Melquist and Hornocker, 1983). In winter, North American river otters make heavy use of openings in the ice, and may excavate passages in beaver dams for accessing open water (Green, 1932; Hamilton, 1943; Reid et al., 1994*b*).

Lontra canadensis is not territorial, but individuals of different groups exhibit mutual avoidance (Melquist and Hornocker, 1983; Shannon, 1991). Home ranges of males are larger than those of females, and both sexes exhibit intra- and intersexual overlap of their ranges (Bowyer et al., 1995; Melquist and Hornocker, 1983; Reid et al., 1994*b*). Annual home ranges (mean ± *SD*) for North American river otters in Alberta, Canada, were 231 ± 44 km^2 and 70 ± 65 km^2 for six males and three females, respectively (Reid et al., 1994*b*). For both sexes, winter home ranges averaged 9.0% of annual home range value and showed less overlap (Reid et al., 1994*b*). In Idaho, home range length ranged from 8 to 78 km of stream and/or lake shoreline (Melquist and Hornocker, 1983).

North American river otters are highly mobile and can move up to 42 km in one day (Melquist and Hornocker, 1983). Daily movements of yearling males and females in Idaho, averaged, respectively, 4.7 and 2.4 km in spring, 5.1 and 4.0 km in summer, and 5.0 and 3.3 km in autumn. Daily movements of family groups averaged 4.7, 4.4, and 2.4 km in spring, summer, and winter, respectively (Melquist and Hornocker, 1983). Males and family groups move significantly less during winter (Melquist and Hornocker, 1983; Reid at al., 1994*b*).

In Idaho, juveniles disperse in April and May at 12–13 months of age (Melquist and Hornocker, 1983). The dispersal route may reach ca. 200 km, at a rate of 3.5–3.8 km/day (Melquist and Hornocker, 1983). In Pennsylvania, reintroduced river otters moved up to 80 km from the release site (Serfass and Rymon, 1985).

Prey are captured with a quick lunge from ambush or, more rarely, after a prolonged chase (Park, 1971). River otters can remain underwater for nearly 4 minutes, swim at speeds of up to 11 km/h, dive to depths approaching 20 m, and travel up to 400 m under water (Hamilton, 1943; Jackson, 1961; Park, 1971). Several individuals may cooperate while fishing (Serfass, 1995). Small fish are eaten at the surface but larger ones are taken to shore to be consumed (Chanin, 1985; Park, 1971). Live fish are normally eaten from the head (Chanin, 1985). River otters can be trained to catch and retrieve fish and to hunt and retrieve ducks (Anatidae) and pheasants (*Phasianus colchicus*) from land or water (Gudger, 1927). River otters dry themselves and maintain the insulative quality of their fur by frequent rubbing and rolling on grass, bare ground, and logs (Chanin, 1985; Melquist and Hornocker, 1983).

Lontra canadensis is more social than most mustelids (Melquist and Hornocker, 1983). Throughout most freshwater systems, the basic social group in North American river otters is the family, consisting of an adult female and her offspring (Melquist and Hornocker, 1983). Although uncommon, adult males may form groups ranging in size from ≤10 to 17 individuals (Reid at al., 1994*b*; Shannon, 1989, 1991). In coastal areas males may remain gregarious even during the estrous period of females (Shannon, 1989). Family groups may include helpers, which may consist of unrelated adults, yearlings, or juveniles (Melquist and Hornocker, 1983; Rock et al., 1994). Occasionally, groups of unrelated juveniles are observed (Melquist and Hornocker, 1983; Shannon, 1989). North American river otters in groups hunt and travel together and also use the same dens, resting sites, latrines, and perform allogrooming (Beckel, 1990; Reid et al., 1994*b*; Shannon, 1989). In freshwater systems, groups occur most often in autumn and early winter, and from mid-winter through the breeding season, North American river otters move and den alone (Reid et al., 1994*b*).

Copulation lasts 16–73 minutes, and may take place in water or on land (Liers, 1951; Shannon, 1991). During copulation, the

male grabs the female by the neck with his teeth (Park, 1971; Shannon, 1991). Copulation is vigorous, and is interrupted by periods of rest (Liers, 1951; Shannon, 1991). Females may caterwaul during, or shortly after mating (Liers, 1951; Park, 1971; Shannon, 1991). Adult males do not provide parental care (Shannon, 1989).

Den sites include burrows dug by woodchucks (*Marmota monax*—Liers, 1951), red foxes (*Vulpes vulpes*—Reid et al., 1994*b*), nutrias (*Myocastor coypus*—Lowery, 1974), beavers (Liers, 1951), or beaver and muskrat (*Ondatra zibethicus*) lodges (Melquist and Hornocker, 1983; Reid et al., 1994*b*). *L. canadensis* also may use hollow trees or logs, undercut banks, rock formations, backwater sloughs, and flood debris (Serfass and Rymon, 1985). Use of den and resting sites is mostly opportunistic, although sites that provide protection and seclusion are preferred (Melquist and Hornocker, 1983).

Play behavior is well-developed in North American river otters. Play consists of sliding, chasing the tail, swimming, juggling sticks or pebbles, rolling around in the grass or snow, wrestling, and playing with captured prey or with conspecifics (Jackson, 1961; Melquist and Hornocker, 1983; Park, 1971). Play behavior occurred during only 6% of 294 observations in a study in Idaho, and was confined primarily to immature otters (Melquist and Hornocker, 1983).

Communication among North American river otters is achieved primarily by olfactory and auditory signals. Scent marking is important for intergroup communication. *L. canadensis* scentmarks with feces, urine, and probably anal sac secretions (Melquist and Hornocker, 1983). Musk from the scent glands may also be released when otters are frightened or angry (Liers, 1951; Melquist and Hornocker, 1983).

North American river otters can emit a snarling growl or hissing bark when disturbed and a shrill whistle when in pain (Liers, 1951). When at play or traveling, they sometimes emit a low purring grunt (Jackson, 1961; Liers, 1951). The alarm call, given by an otter when surprised or startled by potential danger, is an explosive snort, made by expelling air through the nostrils (Park, 1971). North American river otters also may use a birdlike chirp for communication over longer distances, but the most common sound heard among a group of otters is low-frequency chuckling (Park, 1971).

GENETICS. *Lontra canadensis*, like all other *Lontra* and *Lutra* species, has a diploid number of 38 chromosomes (van Zyll de Jong, 1987). Thirteen pairs of autosomes are metacentric or submetacentric, whereas six pairs are acrocentric or subacrocentric (Wurster and Benirschke, 1968). Both sex chromosomes are metacentric (van Zyll de Jong, 1987). Hybridization is possible between male *L. canadensis* and female *L. longicaudis* (Davis, 1978).

CONSERVATION STATUS. Currently, *L. canadensis* is listed in Appendix II of CITES (Wozencraft, 1993); only the subspecies *L. c. sonora* may be of concern (Polechla, 1990). The major threat is habitat degradation and pollution (Macdonald and Mason, 1990). North American river otters are highly sensitive to pollution and readily accumulate high levels of mercury, organochlorine compounds, and other chemical elements (Francis and Bennett, 1994; Halbrook et al., 1994, 1996). Because of their position at the top of the food chain in aquatic ecosystems, the species is often used as a bioindicator. Environmental disasters such as oil spills may elevate levels of blood haptoglobin, interleukin-6 immunoreactive protein, as well as decrease body mass (Duffy et al., 1993, 1994*a*, 1994*b*). Home ranges of river otters increase in size on oiled areas compared to nonoiled areas, and individuals also change their habitat use (Bowyer et al., 1995). Declines in the richness and diversity of prey species may explain these (Bowyer et al., 1994; Testa et al., 1994).

Otters have been successfully reintroduced in numerous areas (Polechla, 1990; Reading and Clark, 1996; Serfass et al., 1993*a*). Prerelease care and clinical evaluation guidelines are available (Hoover, 1984; Hoover et al., 1984, 1985*b*; Serfass and Rymon, 1985; Serfass et al., 1993*b*, 1996).

REMARKS. The generic taxonomy of the North American river otter has been widely debated. Van Zyll de Jong (1972) proposed the use of *Lontra* over two decades ago, and although a recent taxonomy supports classification of New World otters under *Lontra* (Wozencraft, 1993), the genus *Lutra* is still widely used in scientific publications (e.g., Fish, 1994; Hoberg et al., 1997; Serfass et al., 1995). Apparently, some authors have opposed *Lontra* following the work of Sokolov (1973), a misinterpretation that is not justified (Kellnhauser, 1983).

The word otter is of Old World origin. The animal was originally called 'otor' and eventually 'oter' in English (Lowery, 1974). *Otter* (German), *odder* (Danish), and *utter* (Swedish) are all cognates. *Loutre* (French) was used by early French explorers and was named after some of the waterways in which otters were present. *Rivière* was added to it to differentiate this otter from the sea otter (*Enhydra lutris*; Lowery, 1974). The generic name *Lutra* is the Latin word for otter, and the specific name *canadensis* refers to the country from which the species was first described (Lowery, 1974). Other common vernacular names include American otter, Canadian otter, fish otter, land otter, loutre de rivière (French), loutre du Canada (French), northern river otter, nutria del Canada (Spanish), nutria norteamericana (Spanish), and waterdog (Jackson, 1961; Peterson, 1966; Toweill and Tabor, 1982).

Q. and S. H. Ferguson provided a skull from their personal skull collection. D. Dyck and M. Mierau helped with the map and skull photographs. J. S. Shannon provided several references. M. Pasitschniak-Arts, T. L. Serfass, and R. T. Bowyer reviewed earlier drafts of this manuscript.

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MAMMALIAN SPECIES No. 587, p. 1, 1 fig.

Lontra canadensis.

By Serge Larivière and Lyle R. Walton

Published 5 May 1999 by the American Society of Mammalogists

ERRATUM

Errors appeared in Mammalian Species account 587. The original map of subspecies distributions for *Lontra canadensis* was incorrectly drawn. A corrected map is provided below and can be glued over the original.

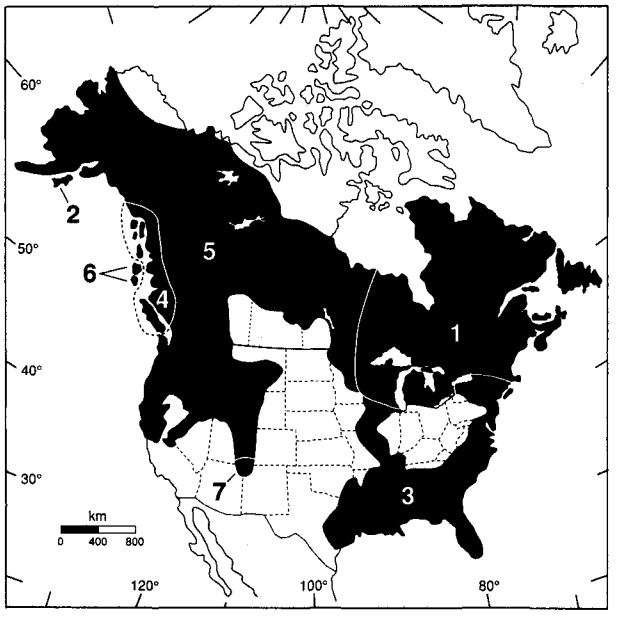

FIG. 3. Distribution of *Lontra canadensis* in North America (Hall and Kelson, 1959; Magoun and Valkenburg, 1977; Melquist and Dronkert, 1987; Peterson, 1966; Toweill and Tabor, 1982): 1, *L. c. canadensis*; 2, *L. c. kodiacensis*; 3, *L. c. lataxina*; 4, *L. c. mira*; 5, *L. c. pacifica*; 6, *L. c. periclyzomae*; 7, *L. c. sonora*.