

years at first reproduction and usually produce only four to seven young annually. These young then grow at the rate of 0.2 to 0.4 cm (0.08 to 0.16 inches) in shell length yearly.

These data may be compared with those of a very successful alien form, the **Giant African Snail**, *Achatina fulica* (family Achatinidae), whose reproductive and growth characteristics are generally similar in many respects to those of several other continental land snails studied. The Giant African Snail typically begins reproduction within its first year and yields about six hundred eggs annually. The hatchlings then increase at least 2.5 cm (1.0 inches) in length each year. The investigated endemic Hawaiian species of *Achatinella* and the closely related genus *Partulina*, however, live to a maximum age of between 10 and 19 years, but the alien species reaches only 4 or 5.

Evolution of the subdued but extended reproductive effort of at least these particular achatinellids quite possibly resulted from a lack of predation by carnivorous snails and essentially all other invertebrates (but see the case of blow flies in chapter 16). Also, there presumably was decreased vertebrate predation in the group's insular environment, compared with that affecting species such as the Giant African Snail in a continental setting. In Hawai'i before human arrival, probably only a small number of endemic birds (chapters 20–22), possibly mostly flightless ones, included land snails in their diet. The fact, however, that a few endemic land snail species without conspicuous color patterns have a sculptured shell surface somewhat matching their typical habitat backgrounds suggests that this vertebrate predator pressure may have been significant in evolution (or retention) of this texture. Certain ground-living Hawaiian species of the family Amastridae retain the ancestral characteristic of secreting quantities of mucus to which enough debris adheres to disguise the animals quite effectively, further suggesting the existence of one or more visually dependent Hawaiian predators.

Size

Almost all native Hawaiian nonmarine snails are relatively small, less than about 1.0–2.0 cm (0.4–0.8 inches) in greatest height and width, but there are a few considerably larger species. The shell height of four in the (now extinct?) amastrid genus *Carelia* of Kaua'i and Ni'ihau reaches almost 8 cm (3.2 inches). That of three other (also probably now extinct) amastrid species, one each on Kaua'i, Moloka'i, and Maui, may equal this. It is possible that this gigantism signifies an ecological niche radically different from that of other Hawaiian land snails. But, if so, it is most surprising that the same possible way of life has not been filled on the remaining main islands by species of Amastridae or other families. Incidentally, it seems that snails of this relatively great size could have furnished a prehistoric dietary item, although there is no evidence regarding this possibility from either archaeological or ethnological sources.

Shape

The shell shapes of endemic Hawaiian land snails represent primarily two types: most species of a majority of families are relatively tall and somewhat narrow, but those of a substantial minority are quite low and broad. A very few remaining species of particular families are roughly globular. These differences in shape are not closely correlated with island of occurrence or, to some extent, taxonomic group. The two primary shapes are each well represented on all of the main islands, and at least the speciose family Amastridae (see discussion later in this chapter) has numerous species of both shell configurations.

Presumably, then, this variation in shell shape is related to ecological niche, although the details of such a putative relationship have yet to be elucidated. Unfortunately, the extinction of up to 75 percent of the endemic Hawaiian nonmarine snail species within the last two millennia (probably mostly during just the last two centuries) has removed the possibility of pertinent ecological studies of most taxa. It has been speculated that shell shape may be determined by usual locomotion or posture. For example, a tall narrow shape might well be advantageous to burrowing species as well as to those that must consistently draw the shell behind them over near-vertical surfaces such as plant trunks or pendant leaves. On the other hand, a low, broad shell could possibly be best suited for life under forest duff and other loose ground litter. All of these possibilities need to be explored through studies on still-extant species of Hawaiian nonmarine snails.

NOTABLE FAMILIES

As indicated in Table 18.1, at least three families have speciated extensively in Hawai'i: the **Achatinellidae** (212 endemic species), **Amastriidae** (326±), and **Endodontidae** (220±). Representatives of all three are found on each main Hawaiian Island, although there are some marked interfamilial differences in numbers of species per island.

Achatinellidae

The center of Hawaiian achatinellid species abundance and taxonomic diversity is O'ahu, which has well over a third of the 212 endemic species, representing eight of the twelve Island genera. From O'ahu, speciosity progressively decreases to both the northwest and southeast in the main island chain, being especially low on Kaua'i.

Shell size is generally greater among species of the endemic Hawaiian subfamily Achatinellinae than in any other world population of the family (suggesting an adaptive shift to larger individuals after Island colonization and evolution of the subfamily). The size and shape of shells among achatinelline species tend to have similar ranges, the height usually being from about 0.5 to 2.0 cm (0.2 to 0.8 inches), and the rather moderate width from approximately 0.1 to 1.0 or 1.1 cm (0.04 to 0.44 inches). As discussed earlier, among species of *Achatinella* and *Partulina* enormous variation has evolved in color and pattern (as well as direction of spiraling in at least *Achatinella* [Figure 18.1]). The varied shell colors of most *Achatinella*, especially the arrangement of these hues in spiral bands, and the shell's polished appearance, has given rise to the alternative common name of little agate shells (which is also the Latin meaning of the scientific name). The occasionally encountered Hawaiian term "*pūpū hinuhinu*" (very shiny shells) is similarly appropriate. Examples of *Achatinella* and *Partulina* are shown in Plate 18.1, and these two groups are by far the Hawaiian land snails best known among collectors and scientific investigators.

A majority of Hawaiian Achatinellidae are arboreal, living in trees and lower vegetation of often moister areas and, apparently like many other arboreal snails worldwide, eating mostly fungi and algae growing on foliage and branches rather than the leaves themselves. Most Hawaiian achatinellid species resorb the eggshell within the body and subsequently give birth to the young, but some are egg layers. The coloration of immatures is similar to that of the apical shell region of the adult, and the young apparently receives no parental care.

Amastridae

Amastrid species numbers are highest on Kaua'i and O'ahu and lowest on Hawai'i. This endemic family may well be the oldest land-snail group in the archipelago, judging primarily from the fact that it is the most diversified morphologically. Evolutionary radiation in shell morphology has involved changes in shape and size rather than variation from the typical dull coloration and general surface smoothness. The original colonist yielding the family may have been a rather small species with a shell of only moderate height and width. This putative "primitive" shell type, averaging possibly a little less than 1.0 cm (0.4 inches) high and 0.5 cm (0.2 inches) wide, is still characteristic of many, although not a majority of, Hawaiian Amastridae.

From this possible original shell type, certain species of the ten amastrid genera have developed some striking evolutionary variations, which include a relatively tall and somewhat narrow shape, as well as a quite low and broad one. Some small O'ahu amastrid species possess the low and broad type of shell, rather like that of the Endodontidae (discussed next), but most on all islands show a tall, narrow shell; a few become almost awl-like. Occasional species undergo a noted increase in size, as in the case of the earlier-mentioned *Carelia*. In contrast to the many tree- and shrub-inhabiting species of Achatinellidae with which they share the same general geographic areas, most Amastridae are either leaf-litter species or denizens of ferns. The members of these two highly speciose families evidently avoid a great deal of potential food competition in this partitioning of primary habitat. One of the two amastrid subfamilies lays eggs; the other produces live young.

Endodontidae

Among the numerous native endodontid taxa, the thirty-three species described thus far are more or less evenly distributed among the main islands. But, because there are probably about 190 yet-unnamed ones, this reputed distribution pattern must be considered tentative. Hawaiian Endodontidae are generally quite small species found on the ground, boulders, or low tree stumps. The shell forms a very flat spiral only 0.1 or 0.2 cm (0.04 or 0.08 inches) high and between 0.4 and 0.8 or 0.9 cm (0.16 and 0.34 inches) wide. The shell is generally dull-colored in most forms but is notable for great species diversity in surface sculpturing. A few species are found in moister upland situations, but the areas more usually occupied are within the drier Coastal Zone (see chapter 14), including grassland. All species of endodontids lay eggs.

ALIEN NONMARINE SNAILS

Of the numerous species of alien land and freshwater snails either inadvertently or intentionally brought to the Hawaiian Islands by humans, at least thirty-four are known to have become established, as enumerated in Tables 18.1 through 18.3. Many of these are small, inconspicuous forms, doubtless arriving unnoticed in vegetable and other material imported mostly during historic times, but certain others are large, conspicuous snails intentionally imported for specific purposes.

Various reasons have been given for the private importation in 1930 of the previously mentioned Giant African Snail. With a shell reaching 15 to 20 cm (6 to 8 inches) in length, it seemed a good potential food animal and/or one of putative value in folk medicine. It has also been stated that the large animal was brought in just as a garden ornamental. Although this species

The nonvenomous **Brahminy Blind Snake** (*Rhamphotyphlops braminus* [Figure 19.1]) was first noted in 1930 on the (then) campus of The Kamehameha School for Boys in the lower Kalihi Valley of Honolulu. It is supposed that this earthworm-sized burrowing snake was inadvertently carried in soil around the roots of plants recently transported from the Philippines to landscape the school grounds. The species, which is often called the “Flowerpot Snake” because of its ease in traveling in this manner, subsequently became established on all other main islands. This originally Southeast Asian species is the only known parthenogenic (see earlier discussion on geckos) snake, which helps explain its historic colonization of most isolated Pacific and Indian Ocean islands, as well as of southern parts of Mexico and Africa. The animal is uniform dark brown to black (but becoming light bluish gray preparatory to shedding the skin), has very small eyes barely visible beneath the overlying head scales, and a short spine at the tail tip apparently used to anchor the body when burrowing.

MAMMALS

Background

Even leaving humans out of consideration, members of the class **Mammalia** are now the dominant animals of the world’s terrestrial habitats—at least in terms of major environmental effects by individuals. Also, in the oceans, marine mammals are often large, and thus play a significant role in near-surface pelagic and coastal ecosystems. Essentially all mammals, like birds, are “warm-blooded” or **endothermic** (generating and regulating their temperature internally). Thus, mammals and birds are the only vertebrates capable of inhabiting polar regions in addition to all lower-latitude ones.

Mammals typically possess hair at some life stage, and the females of almost all species exhibit **vivipary**, giving birth to live young, and nurse them with milk transmitted through nipples. (The spiny “anteaters” [family Tachyglossidae] and Duck-billed Platypus [family Ornithorhynchidae] of the order Monotremata lay eggs, but still nourish the hatched young with milk.) The skin of mammals, like that of their reptilian ancestors, is highly resistant to passage of water, although the unique mammalian sweat glands can release internal moisture, whose evaporation aids in lowering body temperature. Various mammals figure prominently in each possible consumer step of the ecological pyramid, from herbivorous rodents and rabbits through the highest-level carnivores such as lions and tigers, larger bears, and the many toothed whales.

Living mammals are usually divided taxonomically into about twenty orders, with the average large continent containing native species of at least a dozen of these. The native Hawaiian Island land-mammal fauna, however, is noticeably disharmonic. In addition to indigenous humans (order Primates), only two other orders are represented naturally: one terrestrial (bats) and one nearshore marine (seals and allies), each containing a single extant Island species (Table 19.3). The additional two native Hawaiian orders (both whales; discussed further in the next section) are entirely pelagic. Six more orders are represented in the Hawaiian Islands only by alien species.

Order Pinnipedia

The archipelago’s only living mammal endemic at the species level is the **Hawaiian Monk Seal** or *‘ilio holoikauaua* (*Monachus schauinslandi* [Plate 23.1]). The Hawaiian name means “dog running in the toughness [or rough elements],” presumably referring to the animal’s long-

Table 19.3. Terrestrial and nonpelagic marine mammals established in Hawai'i. The time of introduction for alien species is also indicated; the Water Buffalo may no longer exist in the wild on any island. The dagger (†) preceding a name indicates an apparent prehistorically extinct endemic taxon. (Data primarily from Tomich [1986].)

Order Family Species	Time of Initial Introduction
Pouched mammals (Marsupialia)	
Kangaroos and wallabies (Macropodidae)	
Brush-tailed Rock-wallaby (<i>Petrogale penicillata</i>) <i>kanakalū</i>	1916
Bats (Chiroptera)	
Common bats (Vespertilionidae)	
Hoary Bat (<i>Lasiurus cinereus</i>) 'ōpe'ape'a	(Indigenous)
†Undescribed genus and species 'ōpe'ape'a (?)	(Endemic)
Rabbits (Lagomorpha)	
Hares and rabbits (Leporidae)	
European Rabbit (<i>Oryctolagus cuniculus</i>) <i>lāpaki</i>	pre-1825
Rodents (Rodentia)	
Old World rats and mice (Muridae)	
Polynesian Rat (<i>Rattus exulans</i>) 'iole	Polynesian
Norway Rat (<i>Rattus norvegicus</i>) 'iole nui	Pre-1860?
Roof Rat (<i>Rattus rattus</i>) 'iole nui	1870s?
House Mouse (<i>Mus musculus</i>) 'iole li'ili'i	Pre-1825
Carnivores (Carnivora)	
Dogs, wolves, and foxes (Canidae)	
Domestic Dog (<i>Canis familiaris</i>) 'ilio	Polynesian
Mongoose and civets (Viverridae)	
Small Indian Mongoose (<i>Herpestes auropunctatus</i>) <i>manakuke</i>	1883
Cats, lions, and tigers (Felidae)	
House Cat (<i>Felis catus</i>) <i>pōpoki</i>	1800 ±?
Seals, sea lions, and walruses (Pinnipedia)	
Hair seals (Phocidae)	
Hawaiian Monk Seal (<i>Monachus schauinslandi</i>) 'ilio holoikauaua	(Endemic)
Odd-toed hoofed mammals (Perissodactyla)	
Horses, donkeys, and zebras (Equidae)	
Domestic Horse (<i>Equus caballus</i>) <i>lio</i>	1803
Donkey (<i>Equus asinus</i>) <i>kēkake</i>	1825
Mule (<i>Equus caballus</i> x <i>Equus asinus</i>) <i>hoki</i>	Pre-1847
Even-toed hoofed mammals (Artiodactyla)	
Pigs, babirusa, and wart hogs (Suidae)	
Pig (<i>Sus scrofa</i>) <i>pua'a</i>	Polynesian

(Continued on following page)

Table 19.3. (continued) Terrestrial and nonpelagic marine mammals established in Hawai'i. The time of introduction for alien species is also indicated; the Water Buffalo may no longer exist in the wild on any island. The dagger (†) preceding a name indicates an apparent prehistorically extinct endemic taxon. (Data primarily from Tomich [1986].)

Order Family Species	Time of Initial Introduction
Deer, elk, moose, caribou, etc. (Cervidae)	
Axis Deer (<i>Axis axis</i>) <i>kia</i>	1867
Black-tailed Deer (<i>Odocoileus hemionus</i>) <i>kia</i>	1961
American antelope (Antilocapridae)	
Pronghorn (<i>Antilocapra americana</i>) <i>'anekelopa</i>	1959
Cattle, goats, sheep, African antelopes, etc. (Bovidae)	
Domestic Cattle (<i>Bos taurus</i>) <i>pipi</i>	1793
Water Buffalo (<i>Bubalus bubalis</i>) <i>pipi pākē</i>	1881
Domestic Goat (<i>Capra hircus</i>) <i>kao</i>	1778
Domestic Sheep (<i>Ovis aries</i>) <i>hipa</i>	1791
Mouflon (<i>Ovis musimon</i>) <i>hipa</i>	1954

shore swimming activities in the surf. Females attain about 2.4 m (8 feet) in length and 257 kg (570 pounds) in weight; the males reach only 173 kg (385 pounds). The population in 1999 was thought to number about 1,300 to 1,400 individuals.

The Hawaiian Monk Seal currently gives birth almost entirely on the isolated beaches of the Northwestern Hawaiian Islands. Occasional animals are, however, seen along shores of the main islands, especially since the late 1980s, with females pupping on both Kaua'i and O'ahu. Single wandering animals have been seen at various localities up to 3,700 km (2,300 miles) from Hawai'i: at the atolls of Johnston, Palmyra, and Wake, as well as Bikini in the Marshall Islands (Figure 24.1). The absence of skeletal material from both paleontological and archaeological sites on the main Hawaiian Islands suggests that, for obscure reasons, the species may always have been scarce in the vicinity of large young islands of the archipelago, preferring instead the small sandy atolls. The only other members of its subtropical genus are a now-rare insular Mediterranean species and a recently extinct Caribbean one.

Order Chiroptera

The large, strong-flying, fruit- and blossom-eating bats that successfully expanded their range from tropical Southeast Asia to as far east as the Mariana Islands and Samoa never reached Hawai'i. The only bat species now extant in the archipelago is the smaller, insectivorous **Hoary Bat** or *'ōpe'ape'a* (*Lasiurus cinereus*). Bats of this New World genus are accomplished long-distance fliers and at least some species are migratory, characteristics that doubtless aided colonization of the Hawaiian Islands. The species probably occurs on all main islands, although currently quite sparingly on most. The archipelago population has been named as an endemic subspecies although only very slight (if any) average differences in size and coloration separate it from conspecific continental populations. This essential lack of differentiation suggests that the length of Island residency of the Hawaiian animal has been in the range of hundreds of thou-

sands—rather than millions—of years. Unlike many insectivorous bats that roost colonially in caves, the Hoary Bat and its several continental congeners are typically solitary daytime roosters in trees and other vegetation, although remains of individuals are occasionally found in caves.

In the early 1980s, a number of (undated) skeletons of a second, smaller taxon of apparently prehistorically extinct insectivorous bat were discovered on the floors of Hawai‘i, Maui, and Moloka‘i lava tubes (along with a few Hoary Bat skeletons). Lack of bat-excrement deposits (“guano”) in Hawaiian lava tubes, however, indicate that neither of these native chiropterans ever utilized this habitat in substantial numbers. The extinct bat is still awaiting formal naming. It, however, evidently belongs to the same large and cosmopolitan family (Vespertilionidae) as the Hoary Bat and may represent a relatively closely related genus, thus presumably also being derived from the Americas. The time period that the smaller bat existed in the Islands is incompletely known, as is the exact time that the Hoary Bat first arrived. Bones of the two forms have subsequently been recovered from Kaua‘i and O‘ahu paleontological deposits that are much less than 100,000 years old. And at least the smaller bat is represented in an O‘ahu crater-fill deposit substantially more than 130,000 years in age (Ulupa‘u Head; see chapter 22).

Polynesian Mammals

The **Polynesian Rat** or *‘iole* (*Rattus exulans* [Figure 19.2]), **Domestic Dog** or *‘ilio* (*Canis familiaris*), and **Pig** or *pua‘a* (*Sus scrofa*) were the three species of mammals brought to the Hawaiian Islands by ancient Polynesians (see chapter 25). The latter two have extensively interbred with individuals of the same species continually introduced after foreign contact with the Islands, so it is difficult to determine the total range of morphological variation present in the original Polynesian forms. To judge from archaeological skeletal evidence and early historical records, however, both the ancient Domestic Dog and Pig seem to have been significantly smaller and more lightly built than even average-sized, often domestically selected, historic animals. The Polynesian Rat, evidently carried by Polynesians to all Pacific island groups they colonized, perhaps provides an example of founder effect and/or genetic drift in Hawai‘i. The genotype producing the blackish or melanistic dimorphic color phase evident on certain other Pacific archipelagos (at least the Solomons, Marshalls, and Samoa) is not represented in the Hawaiian population.

Historic Mammals

Most of the larger mammals introduced to Hawai‘i in the early historic period were intended either for food or beast-of-burden purposes. Among the smaller alien species, the **House Mouse** or *‘iole li‘ili‘i* (*Mus musculus*) as well as the larger **Norway and Roof Rats** or *‘iole nui* (*Rattus norvegicus* and *R. rattus*) first arrived in the Islands as unintended travelers on early historic sailing ships. One or more **House Cats** or *pōpoki* (*Felis catus*) were usually carried aboard many of these same vessels, primarily to control the rodent infestations. Undoubtedly, some of these felids or members of their ship-born litters were given to Hawaiian residents at Island ports, where the entire native populace was understandably fascinated by this strange and completely new kind of animal. The more recently imported **Small Indian Mongoose** or *manakuke* (*Herpestes auropunctatus*) was intended as a control agent of alien rats in Sugarcane fields.

The incongruous presence of a marsupial in the Islands is due to the chance escape from a private zoo of a single pair of the **Brush-tailed Rock-wallaby** or *kanakalū* (*Petrogale peni-*

cillata) early in the twentieth century. For almost 80 years the population derived from this pair has managed to maintain a small population on the steep, rocky slopes of lower Kalihi Valley on O‘ahu. It is interesting that when specimens taken from this colony in 1979 were compared with various populations in the species’ Australian homeland, they were found to be noticeably smaller, and several of their biochemical characteristics could not be matched in any of the living Australian groups tested. It is a still-unanswered question whether these differences in the Hawaiian form (whose exact ancestral source area within Australia is unknown) resulted from genetic drift, or whether the particular original population from which the colonizing pair came is now extinct.

A novel and sometimes amusing set of Hawaiian names developed as alien historic species were introduced. The early Island term for the cat, *pōpoki*, was apparently the Hawaiian transliteration of “poor pussy.” Certain other names that came to be applied were elaborations of traditional terms for similar animals; for example, *‘iole* was the long-familiar Polynesian Rat, so the smaller alien House Mouse quite naturally became *‘iole li‘ili‘i* or “little rat,” and the two new larger Norway and Roof Rats were each *‘iole nui* or “big rat.” Most other such appellations merely represented Hawaiian pronunciations of English names, as *manakuke* and *kanakalū* for “mongoose” and “kangaroo,” respectively, as well as *kēkake* for “donkey,” *hipa* for “sheep,” and *pipi* for “beef” (= cattle). Occasional curious name transpositions and combinations also appeared: for example, *kao* for the Domestic Goat instead of for “cow,” and *pipi pākē* or “Chinese cattle” for Water Buffalo (*Bubalus bubalis*).

Whales, Dolphins, and Porpoises

The pelagic marine mammals or **cetaceans** are divided into two orders: the Mysticeti or baleen whales; and the Odontoceti or toothed whales, including dolphins and porpoises. All mysticetes feed on “krill” or concentrations of small planktonic crustaceans, straining these (and occasional accompanying schools of small fishes) out of great mouthfuls of water by means of close-set series of internally frayed keratinous plates (baleen or “whalebone”) that line the inside of the upper jaw. Even the largest baleen whales are not “top carnivores” in the food chain because they are preyed upon by certain sharks. All of the cetaceans for which there seem reliable records of Hawaiian occurrence are among those Pacific species listed in Table 19.4.

Of the half dozen or so baleen whales found in the central Pacific, only the **Humpback Whale** or *koholā* (*Megaptera novaeangliae*) is usually seen in nearshore Hawaiian waters. (The term “*koholā*” was quite possibly a generalized one in ancient Hawai‘i, applying to any large cetacean; see further information in the discussion on the Sperm Whale below.) The entire North Pacific Humpback population, currently numbering at least several thousand animals, feeds during the warmer half of the year in Arctic waters. In winter, the animals divide into three discrete units that migrate south to calve along, respectively, the American and Asian coasts as well as among the main Hawaiian Islands. The Hawaiian complement is present among the Islands from about December through May or June, its conspicuous blowing (“spouting”) and leaping activities forming a popular attraction. This Hawaiian population is estimated as between 1,500 and 3,000 individuals, and the number of calves born in the archipelago each season appears to range from about 75 to 150.

The toothed whales are represented by about three dozen species throughout the Pacific as a whole; half of these are relatively small, between about 2 and 5 m (7 and 16 feet) in length, and only one of the remaining species exceeds 9 m (30 feet). Most of the toothed whales occupy

a relatively high trophic level, feeding on fishes, large squid, and occasionally larger benthic invertebrates, and at least the Killer Whale (*Orcinus orca*) takes smaller dolphins and porpoises as well as seals and sea lions. The largest odontocete worldwide is the **Sperm Whale** (*Physeter macrocephalus*), whose males reach 19 m (63 feet) in length, with females about two-thirds that long. The species is almost never seen alive in Hawaiian waters. Dead or dying individuals, however, occasionally wash ashore, although such occurrences were doubtless very infrequent before about 1820, when historic whaling began in the central Pacific.

Table 19.4. Cetaceans in or near Hawaiian waters. Undoubtedly, a few additional species very occasionally visit the archipelago. The approximate maximum lengths attained are listed. An asterisk (*) precedes the names of the species most often seen around the main islands and a question mark (?) those of uncertain occurrence. (Data from various sources.)

Order Family Species	Maximum Length in Meters (Feet)
Baleen whales (Mysticeti)	
Fin-back whales (Balaenopteridae)	
*Humpback Whale (<i>Megaptera novaeangliae</i>)	15 (50)
Fin Whale (<i>Balaenoptera physalus</i>)	18 (60)
Bryde's Whale (<i>Balaenoptera edeni</i>)	14 (45)
Minke Whale (<i>Balaenoptera acutorostrata</i>)	8 (27)
Right whales (Balaenidae)	
Right Whale (<i>Eubalaena glacialis</i>)	18 (60)
Toothed Whales (Odontoceti)	
Sperm whales (Physeteridae)	
Sperm Whale (<i>Physeter macrocephalus</i>)	Male, 19 (63); female, 12 (40)
Pygmy Sperm Whale (<i>Kogia breviceps</i>)	4 (13)
Dwarf Sperm Whale (<i>Kogia simus</i>)	2.7 (9)
Beaked whales (Ziphiidae)	
Cuvier's Beaked Whale (<i>Ziphius cavirostris</i>)	7 (23)
Blainville's Beaked Whale (<i>Mesoplodon densirostris</i>)	4.6 (15)
Dolphins and allies (Delphinidae)	
Killer Whale (<i>Orcinus orca</i>)	8.6 (28)
*Short-finned Pilot Whale (<i>Globicephala macrorhynchus</i>)	7 (23)
False Killer Whale (<i>Pseudorca crassidens</i>)	5.5 (18)
Risso's Dolphin (<i>Grampus griseus</i>)	4 (13)
*Bottlenose Dolphin (<i>Tursiops truncatus</i>)	3 (10)
*Broad-beaked Dolphin (<i>Peponocephala electra</i>)	2.4 (8)
Pygmy Killer Whale (<i>Feresa attenuata</i>)	2.4 (8)
Rough-toothed Dolphin (<i>Steno bredanensis</i>)	2.4 (8)
Striped Dolphin (<i>Stenella coeruleoalba</i>)	2.4 (8)
*Spotted Dolphin (<i>Stenella attenuata</i>)	2 (7)
*Spinner Dolphin (<i>Stenella longirostris</i>)	2 (7)
?White-sided Dolphin (<i>Lagenorhynchus obliquidens</i>)	2 (7)
?Common Dolphin (<i>Delphinus delphis</i>)	2 (7)

There is some question as to the traditional Hawaiian name for the Sperm Whale. A thick necklace of human hair with a suspended tongue-shaped ornament of ivory (mammalian dentine; in prehistoric Hawai'i that of the Sperm Whale, but historically also that of the walrus or possibly even of the elephant), worn only by some members of the chiefly class, was called "*lei niho palaoa*" (or simply "*lei palaoa*"). *Lei*, of course, is "wreath" or "necklace," and *niho* means "tooth." The final word of this term, however, is sometimes translated as "Sperm Whale," but it may equally well be glossed only as "ivory." In the latter case, "*palaoa*" would not be indicated as the traditional Hawaiian name of the Sperm Whale, as such, and the species would probably have been included with the Humpback Whale in "*koholā*."

In regard to names of smaller odontocetes, it might be noted that the term "porpoise" is frequently used in the place of "dolphin" for some species and also that "Dolphin" is an alternative name for a fish: the *mahimahi* (*Coryphaena hippurus*). It appears that the collective Hawaiian terms *nu'ao* or, occasionally, *nai'a* are the only two recorded as referring to odontocetes smaller than the Sperm Whale. This particular lack of differentiation in recorded Hawaiian terminology seems unusual because at least a few dolphin species are of common occurrence along Hawaiian coasts and are generally separable by color pattern and, in a few cases, behavior. It appears almost certain that ancient Hawaiians would have known the differences among at least these more obvious Island species, but, if so, the traditional specific names have unfortunately been lost.

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AUDIOVISUAL AIDS

Hawaii: Strangers in paradise.