

Occurrences of Marine Turtles in Alaska Waters: 1960–1998

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Four species of marine turtles have been observed in Alaska waters (Bane 1992; Hodge 1979, 1981, 1992; Wing and Hodge 1998). Although occurrences of marine turtles in Alaska have been reported geographically, there is no published information on the frequency of occurrence and abundance of turtles in Alaska. In this paper we discuss the frequency and abundance of marine turtle occurrences in Alaska waters since 1960.

Reports of marine turtles were gathered from several sources. The senior author compiled records from museums, correspondence, interviews, and questionnaires distributed to fishermen, biologists, and school teachers in Alaska coastal communities. The junior author compiled records from field notes, correspondence, newspaper articles and reporters, biologists and records in the herpetological collection of the National Marine Fisheries Service Auke Bay Laboratory, Juneau, Alaska. The authority/source references for all occurrences are in the Auke Bay Laboratory herpetological collection records.

Mean August sea surface temperature records from Auke Bay, Alaska (Wing and Pella 1998) were used to characterize environmental conditions for years in which turtles occurred in Alaska. Mean sea surface temperatures within one standard deviation (1 SD) of the long-term mean were considered normal-water years. Years with mean sea surface temperatures 1 SD or higher above the long-term average were considered warm-water

years; years with mean sea surface temperatures 1 SD or lower below the long-term mean were considered cool-water years. All Alaska marine turtle records were plotted in relation to warm-water year, normal-water year and cool-water year occurrences.

Alaska marine turtle occurrences since 1960 include 19 leatherbacks, *Dermochelys coriacea* (including one sighting of two turtles), 9 greens, *Chelonia mydas*, 2 Pacific Ridleys, *Lepidochelys olivacea*, 2 loggerheads, *Caretta caretta*, and 2 unidentified hard shell turtles (Table 1, Fig. 1). Marine turtles have been observed in Alaska waters 14 of the past 39 years (Fig. 2) during all months except February and April (Fig. 3). Stinson (1984) and Starbird et al. (1993) identify a 'turtle season' in the northeast Pacific Ocean as July, August and September. Our data identify a similar Alaska 'turtle season' as July through October with 75% of occurrences during this four-month period.

Historically, marine turtle occurrences in the high latitudes of the North Pacific Ocean have been associated with warm-water years (Eckert 1993). However, in Alaska *Dermochelys* occurrences do not reflect a warm-water year connection, with only 53% of occurrences in warm-water years. *Dermochelys* has occurred in 3 warm-water years (10 occurrences), in four normal-water years (9 occurrences) and none in cool-water years (Fig. 2). Likewise, hard shell turtle (*Chelonia*, *Caretta*, *Lepidochelys*) occurrences in Alaska do not reflect a warm-water year connection, with only 47% of occurrences in warm-water years. Hard shell turtles were recorded in two warm-water years (7 occurrences), in five normal-water years (8 occurrences) and none in cool-water years (Fig. 2).

The State of Alaska is 3840 km east (Hyder, 55°54.7'N, 130°01.3'W) to west (Attu Island, 52°55'N, 172°57'E) (Fig. 1). Hyder is in the northeastern Pacific Ocean; Attu Island is in the northwestern Pacific Ocean, west of the international date line. Amatignak Island (51°17'N, 179°08'W) in the Aleutian Islands is the southernmost point in Alaska. Alaska has 10,624 km of coastline and 54,246 km of shoreline (including islands). Because of low human population throughout most of the coastal area, chances for human-turtle contact are minimal. Much of the coastline, especially Southeast Alaska (south of 59°N and east of

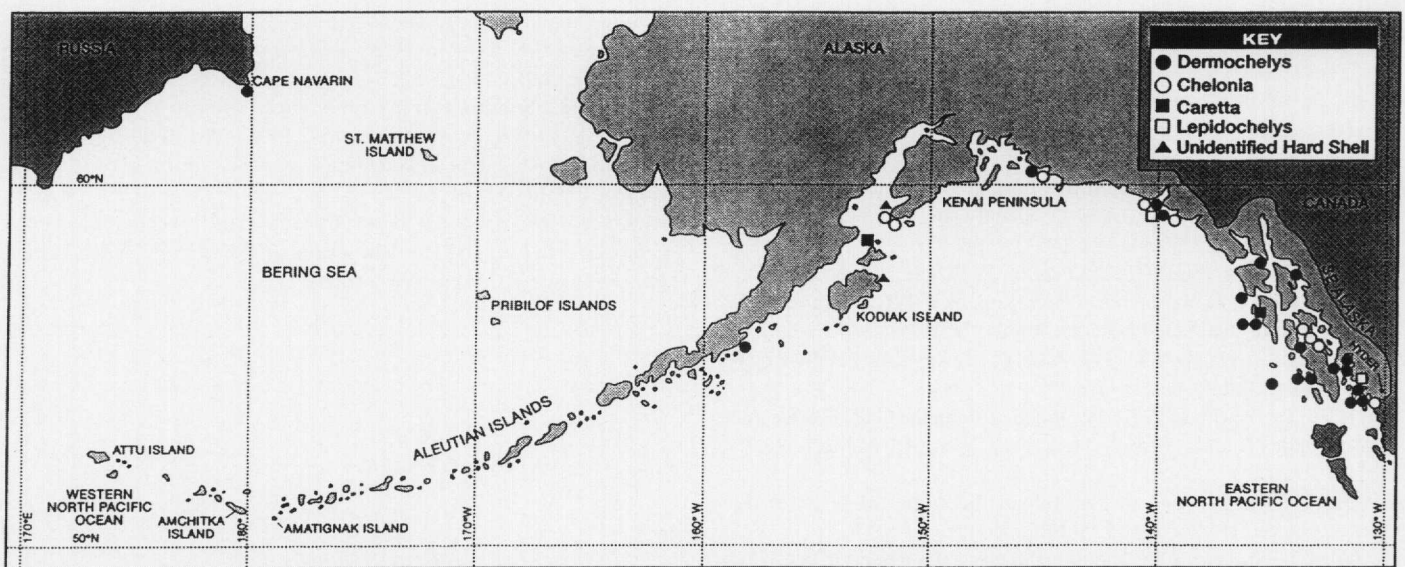


FIG. 1. Marine turtle occurrences in Alaska waters.

137°W) and the Aleutian Islands, is not readily accessible to beach combing. We suspect most cold-killed, grounded turtles are probably destroyed by wave action (pounding on rocks) and scavengers before anyone finds the evidence. Consequently, all reported Alaska marine turtle occurrences are in clusters near centers of human population; 21 in Southeast Alaska, 5 near Yakutat, 2 near Cordova, 3 near Homer on the lower Kenai Peninsula, 2 in the Kodiak Island group and 1 at Perryville on the Alaska Peninsula (Fig. 1).

Dermochelys was first recorded from British Columbia in August 1931 (MacAskie and Forrester 1962) but not recorded from Alaska until 1963. MacAskie and Forrester (1962) reported 10 observations of *Dermochelys* from British Columbia over a 31-year period (1931–1961) and were impressed the turtles were active at sea surface temperatures near 11.7°C. We have 19 Alaska *Dermochelys* occurrences for a 39-year period (1960–1998) and similarly low sea surface temperatures in September, which average 10.9°C, and range from 9.95°C to 12.28°C (Wing and Pella 1998). *Dermochelys* regularly occurs in cold temperate waters of high latitudes (Bleakney 1965; Pritchard 1980; Eckert et al. 1989). North of 60°N latitude in the northeastern Pacific Ocean, *Dermochelys* has been recorded from the Copper River flats (60°25'N, 145°00'W) near Cordova, Alaska (Hodge 1979). North of 60°N latitude in the Bering Sea *Dermochelys* has been recorded at Cape Navarin, Russia (62°17'N, 179°13'E) (Bannikov et al. 1971). Cape Navarin is 450 km northwest of Saint Matthew Island, Alaska and 1200 km due north of Amchitka Island (Aleutian Islands), Alaska. *Dermochelys* is a cold-tolerant turtle with recorded body temperatures well above ambient water temperatures, heat retention capabilities, and demonstrated endothermy (Ernst and Barbour 1989; Ernst et al. 1994). It is not surprising *Dermochelys* represents 58% of Alaska marine turtle occurrences.

The cold-tolerant *Dermochelys* may respond favorably to the Alaska environment. Late summer sea temperatures are frequently within or above the 15–16°C (Wing and Pella 1998) associated with *Dermochelys* off the California coast (Starbird et al. 1993). Atlantic Ocean *Dermochelys* maintain elevated body temperature (25.5°C) in much colder water (7.5°C) (Frair et al. 1972; Paladino et al. 1990). Estimated mean selected body temperature of *Dermochelys* ranges from 25.5–33°C (Mrosovsky 1980; Spotila and Standora 1985), easily attainable in late summer and early fall Alaska waters. Known or

presumed foods of *Dermochelys* are often abundant in the Gulf of Alaska during late summer and fall and are concentrated in the deep scattering layer (e.g., siphonophores) and along thermal fronts (e.g., salps, scyphozan and hydrozoan medusae).

The hard shell turtles that occur in Alaska waters (*Chelonia*, *Caretta*, *Lepidochelys*) are considered tropical, subtropical, and warm temperate species that rarely stray into cold waters (Eckert 1993). Most hard shell turtles seek optimal sea water temperature near 18°C and are cold-stressed at sea water temperatures below 10°C (Mrosovsky 1980; Schwartz 1978). North of 60°N latitude in the northeastern Pacific Ocean, *Chelonia mydas* has been recorded from the Copper River flats near Cordova, Alaska (Table 1). This is the northernmost Pacific Ocean record to date. Although four *Chelonia* have been observed alive in Alaska as late as October, they probably could not survive to return to warmer waters. Two occurrences of live *Chelonia* (October–November 1976 and

TABLE 1. Marine turtle occurrences in Alaska waters, 1960–1998.

Date	Location	Lat. (N)	Long. (W)	Comments
<i>Lepidochelys olivacea</i>				
Jan-86	Cannon Beach	59.50	139.75	Carcass
Jun-91	S. of Ketchikan	55.33	131.63	Carcass
<i>Caretta caretta</i>				
Dec-91	Shuyak Island	58.52	152.50	Carcass
Jul-93	Cape Georgena	57.33	135.87	Sighting
<i>Chelonia mydas</i>				
Oct-76	Point Macartney	57.00	134.05	Sighting
Nov-76	Eliza Harbor	57.20	134.28	Carcass
Sep-81	Dundas Island, B.C.*	54.50	130.67	Repeated sightings
Oct-93	Seldovia	59.50	151.72	Sighting
Oct-93	Homer (Bishop Beach)	59.67	151.67	Carcass
Oct-96	Rocky Pass	56.65	133.72	Sighting
Oct-96	Copper River Flats	60.42	145.00	Live-sent to San Diego
May-98	Blacksand Spit	59.38	139.43	Carcass
Oct-98	Ocean Cape	59.53	139.85	Carcass
Unidentified Hard Shell				
Aug-74	Kachemak Bay	59.67	151.62	Sighting
Aug-79	Marmot Bay	58.00	152.10	Sighting
<i>Dermochelys coriacea</i>				
Aug-63	Stephens Passage	58.07	134.02	Sighting
Sep-63	Copper River Flats	60.42	145.00	Netted & killed
Jul-78	Eaton Point	55.93	132.07	Netted & released
Aug-78	Craig	55.47	133.05	Netted & killed
Aug-78	Craig	55.47	133.05	Netted & released
Aug-78	Gravina Island	55.45	131.85	Sighting
Aug-78	Myer's Chuck	55.72	132.27	Sighting
Aug-79	Union Bay	55.82	132.22	Netted & released
Aug-79	Metlakatla	55.13	131.58	Netted & killed
Mar-83	Perryville	55.97	159.47	Carcass
Jul-83	Yakutat	59.00	139.00	Sighting
Aug-83	Noyes Island vicinity	55.00	134.00	Sighting
Aug-83	Cape Cross	57.92	136.57	Sighting
Aug-83	Deer Hbr., Yakobi Is.	57.95	136.58	Sighting, 2 individuals
Aug-83	Glacier Bay entrance	58.33	136.00	Sighting
Aug-84	Cape Addington	56.43	133.83	Sighting
Jan-90	Yakutat	59.50	139.65	Carcass
Jul-93	Vitskari Straight	57.00	135.80	Sighting
Aug-93	Vitskari Rocks	57.00	135.55	Sighting

*Dundas Island, British Columbia is 11 km south of the international boundary.

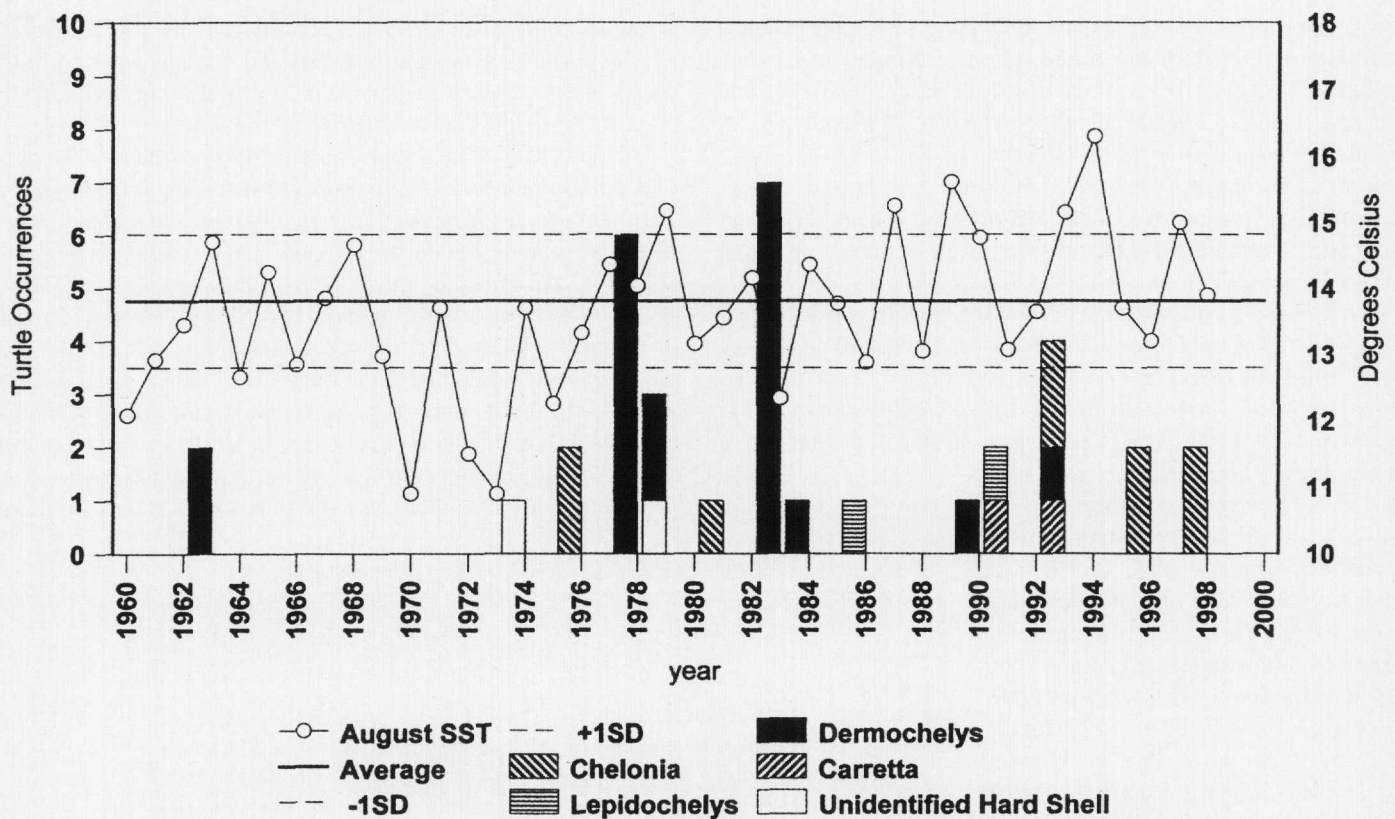


FIG. 2. Annual distribution of marine turtle occurrences in Alaska waters and annual variation of August sea surface temperatures at Auke Bay, Alaska.

October 1993) are believed to be individuals later found and reported as carcasses (Table 1). The *Chelonia* captured October 1996, near Cordova, Alaska, was obviously cold-stressed and transported to Sea World Aquarium, San Diego, California, for rehabilitation. This turtle did recover and subsequently was tagged and released off southern California (Hubbs-Sea World 1998).

Marine turtles are a natural part of the Alaska marine environment, although they are uncommon in the northeast Pacific Ocean north of Oregon (Stinson 1984). Marine turtles occur in Alaska waters too frequently to be considered 'accidental' as defined in ornithological literature. The occurrence terminology

developed for Alaska birds by Isleib and Kessel (1973) and referenced by Armstrong (1990) appears to apply equally well to Alaska marine turtle occurrences and marine turtle occurrences generally. Using this terminology, *Dermochelys* are uncommon, *Chelonia* rare, and *Caretta* and *Lepidochelys* casual visitors to Alaska waters. The low frequency of occurrence of hard shell turtles in Alaska indicates they are straying beyond their tolerable range. The higher frequency of occurrence of *Dermochelys* suggests they are ranging into marginal habitat that may not be consistently used from year to year.

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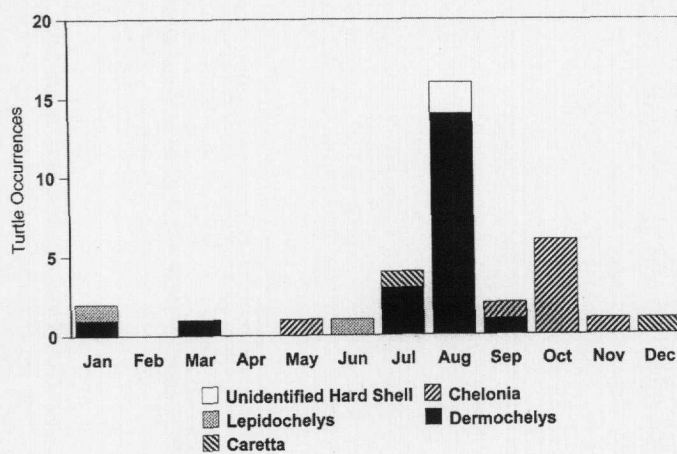


FIG. 3. Seasonal distribution of marine turtle occurrences in Alaska waters.

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Maternal Care and Infanticide in the Australian Skink, *Egernia stokesii*

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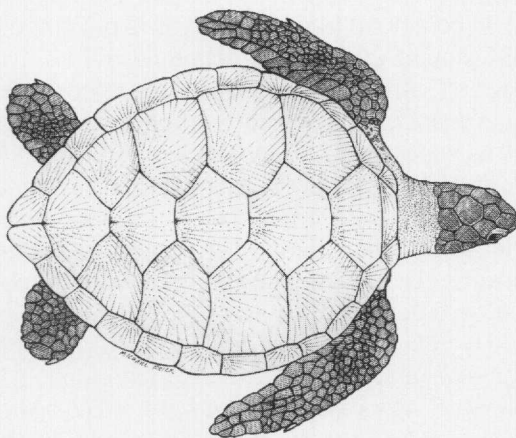
Maternal care is often reported among mammal, bird, and crocodylian taxa. It also occurs less commonly among oviparous squamates, usually in the form of attendance of eggs by the female (Shine 1988). It is, however, rare among viviparous lizards (but see Niekisch 1975 and Halloy and Halloy 1997 for exceptions). Maternal care in viviparous species includes female defense of a home range that also contains neonates (Halloy and Halloy 1997), and increased female aggression to the approach of humans after the birth of her offspring (e.g., *Tiliqua nigrolutea*; A. Edwards, pers. comm).

Some species of mammals and birds exhibit both maternal care and, rarely, maternal infanticide. Many reptiles and amphibians exhibit a form of infanticide—oophagy—where a female consumes her own eggs for nutrition or to remove dead or decaying eggs and thus enhance survivorship of the remaining clutch (Mitchell and Groves 1993). However, most reports of consumption of live young involve adults devouring unrelated neonates. Maternal infanticide, where a female consumes her own live young, is still considered rare (Jenssen et al. 1989).

Maternal infanticide may be advantageous if it results in reduced competition for limited resources either for the adult or for its remaining offspring, if it provides otherwise unavailable energy resources, or if it improves inclusive fitness of parents by selective killing of deficient offspring (Huntingford and Turner 1987).

In this note we report maternal care and infanticide in the Australian skink, *Egernia stokesii*. This medium-sized lizard (average adult SVL = 19 cm) occupies crevices in rocky outcrops throughout central and southern Australia. It forms stable aggregations of up to seventeen individuals. One adult of each sex and their offspring share several crevices within highly overlapping home ranges. These groups remain together both between and within years. Other unrelated adults are also often found in some groups. Juveniles remain in their natal group for up to five years (G. Duffield, pers. comm).

Eleven gravid females, collected in January 1996 from several sites in South Australia, were held in glass tanks (35.5 x 30 x 60 cm) with shelter, water ad libitum, and food twice weekly. Live young were born in February and early March 1996. Births in two litters were video recorded on 25 February 1996 in tanks with shelters removed (but with the glass sides covered with paper to minimize disturbance and awareness of lizards in other tanks). Seven births, four from Female 1 and three from Female 2, were recorded over 6.5 h, beginning at 1340 h. Before parturition, contractions, shown by a lateral movement of the tail, lasted up to 40



Chelonia mydas (Green Turtle), subadult. Illustration by Michael G. Frick.