

Where, How, and Why Do Sea Turtles Bask?

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All reptiles, except for leatherbacks, are ectothermic hence entirely dependent on external sources of body heat for physiological processes. In contrast, endothermic animals (mammals and birds) generate their own body heat. Basking by freshwater turtles for thermoregulation is widespread and well known. However, of the seven species of ocean turtles, only the green turtle emerges from the sea to bask, as defined by Mirriam Webster "to lie or relax in a pleasant warmth or atmosphere". Olive ridleys, and sometimes other sea turtles, are known to bask but only at the ocean surface with carapace exposed during sunny calm periods. Some hard-shelled sea turtles, including the herbivorous green turtle, are known to seek out pockets of warm water for basking, such as in cooling water discharge from electrical generating stations.

Although green turtles commonly occur circumglobally, emergence from ocean-to-atmosphere for basking, in contrast to nesting or stranding from injury or illness, only occurs at a few well-documented locations, all in the Pacific. These sites include the Galapagos, Socorro Island, Australia's Wellesley Islands in the Gulf of Carpentaria, and the Hawaiian Archipelago. An outlier report of basking green turtles in Namibia Southwest Africa is currently under investigation. Basking by green turtles in the Galapagos and Northwestern Hawaiian Islands has been known for centuries from logbooks of early European voyagers that turned turtles for food.

Green turtles of all sizes, life stages, male and female are known to bask. In Hawaii basking occurs on shorelines where nesting occurs, or adjacent to algal foraging pastures. Pelagic-phase green turtles have been found basking on floating objects. Hawaii's green turtles crawl ashore on their own, while at other locations basking is achieved passively from falling tides in shallow bays. Basking can take place during the day or night. Basking has been documented in captivity on artificial nesting beaches (Sea Life Park Hawaii) and in rearing tanks with ramps allowing small turtles to emerge. Basking turtles often cluster together suggesting a social component. There may be a genetic component to basking. Substrates used to bask range from black to light colored sand of varying particle sizes; on rocks and old lava flows; on limestone benches and the tops of offshore coral heads; on shipwrecks; and even on beach lounge chairs. Basking turtles in Hawaii have become accustomed to people close to them in conjunction with tourism. Beach conflicts erupt between people of differing views on how or if it's necessary to manage turtle viewing. It's significant that basking in the Main Hawaiian Islands didn't exist prior to the 1990s when the behavior began to spread rapidly in both scope and magnitude, concomitant with a sharp turtle population increases tied to the 1970s ban on commercial harvest. The ease of access to basking turtles has facilitated an array of life history research projects and publications previously not possible.

So **why** do green turtles bask? That should be simple enough to answer, i.e. They bask like freshwater turtles primarily to optimize body temperature. But it's not that straightforward. A major study of the thermal ecology of basking in Hawaii found that heat gain was only part of the story. Elevated body temperatures can mobilize depot fat hence theoretically accelerate egg maturation for nesting females. And optimum body temperatures can theoretically promote digestion in all sizes of turtles that bask. However, parsimony indicates basking can be a means for females to avoid unwanted copulation by males, and for turtles to stay out of harm's way from predators like tiger sharks. And, intuitively, basking serves to conserve energy, since a turtle out of the water doesn't need to periodically rise to the surface to breathe when resting in underwater refugia. Another hypothesis under debate, with support from published research, is that carrying capacities of certain foraging pastures in Hawaii are being exceeded as the result of the increased turtle population. That is, turtles with suboptimal nutrition find basking to be a necessity.

The first published photo of "a green turtle asleep on a sandy beach" in the Northwestern Hawaiian Islands appeared in a 1925 issue of National Geographic Magazine. The caption reads as follows, possibly giving the most concise and best answer as to why green turtles bask- "These grotesque creatures browse in submarine fields of algae until hunger is satisfied, and then crawl heavily out to sprawl in the sand, safe from enemies in the sea."