Olive Ridleys
The Quirky Turtles That Conquered the World
Molecular studies of specific mitochondrial DNA sequences of olive ridleys show two main genetic clusters. One of these clusters, which comprises a particular sequence called “K” and others closely related to it, is found in olive ridleys in India and Sri Lanka. Because of the similarity of the DNA sequence with Kemp’s ridleys, this is thought to be the ancestral type. The other cluster has a sequence called “J” and, with its relatives, is found in olive ridleys throughout the Indian and western Pacific Ocean basins, as well as in the eastern Pacific and Atlantic Oceans. Olive ridleys sharing this sequence are therefore likely to have served as the evolutionary sources for their current populations in the Pacific and Atlantic Oceans.

The climatic stability of the Indian Ocean during the original split might explain why it is the probable source of global olive ridley populations. Ancestral olive ridleys may have dispersed there from the East Pacific and persisted because of favorable environmental conditions. Another possibility is that warm climates facilitated the survival of an ancestral ridley population in the Indian and North Atlantic Oceans, from which the two species that we know have evolved. Either way, the Pacific and Atlantic Oceans have probably been colonized many times over by olive ridleys, with the most recent event being just 100,000 years ago.

Thus far, only a tiny portion of the ridley turtles’ fascinating genealogical history has been revealed, and new techniques will improve our understanding of the evolutionary history of this and other sea turtle species and populations.

GLOBAL DISTRIBUTION AND TRENDS

Olive ridleys are the most ubiquitous and abundant of the world’s seven sea turtle species. Solitary nesting beaches can be found throughout the tropics on all continents and in most island groups. Beaches that each host hundreds to thousands of nests per year can be found throughout the Pacific coasts of Mexico and Central America, the Atlantic and Pacific coasts of South America, the west coast of Africa, all of South Asia, and parts of Southeast Asia.

However, a handful of mass nesting (arribada) beaches account for the largest numbers of nesting females. The term arribada has been used to refer both to a physical space (a nesting beach and nearshore waters) and to the synchronous nesting behavior of a large number of ridleys (more than 1,000 females) over just a few days (see p. 29). Olive ridley arribada sites are restricted mainly to Pacific Mexico and Central America, and in India’s east coast. Today there are 5 major sites (greater than 100,000 nests per year) and 8–10 minor sites (10,000–100,000 nests per year) globally. Many beaches in those regions, but also in Suriname and French Guiana, have (or had) mini arribadas with a few hundred or up to 1,000 nests on some nights. (See the map on p. 29 for trends and relative abundance.)

The largest arribada sites on Earth have historically been in Mexico, with the largest occurring on Playa Escobilla. Beginning in the 1960s and continuing for three decades, tens of thousands of
negative impact on hatching rates from the buildup of organic matter resulting from broken eggs, perhaps arribada rookeries blink on and off depending on conditions, as has been suggested for Nancite. Most arribadas occur as such solitary turtles, appear to prefer beaches near river mouths. Because seasonal flooding “cleans” those beaches of organic buildup, they may be the most optimal nesting sites, thus enabling long-term resilience of turtle populations. However, the dynamic nature of the beaches may also cause fluctuations in the presence and size of arribadas. Precisely how and why arribadas are born, expand, and contract remains a mystery.

**MIGRATIONS**

Sea turtles are migratory, and they spend most of their time engaged in some sort of movement—either for breeding or for foraging. Olive ridleys exhibit a great deal of behavioral plasticity in this regard; they can be nomadic oceanic migrants feeding on surface fauna, or they may stick to the coast while feeding on shallow-water invertebrates. Satellite tracking studies in recent years have shed much light on the movements of olive ridleys. A diversity of patterns can be seen even within the same population. Post-nesting olive ridleys that were tracked from their nesting grounds in Sri Lankan, Northeast Brazil, moved north and south along the continental shelf, but also east into oceanic waters toward West Africa. In the Pacific, although some males were tracked from Sinulou, Mexico, and remained close to breeding zones, some females swam directly up the coast to rich foraging grounds off Baja California Sur; still others stayed close inshore or meandered in oceanic gyres.

In India, some post-nesting females migrated to the coast of Sri Lanka and the Gulf of Mannar, while others followed gyres in the Bay of Bengal. In contrast, some long-term data sets show olive ridleys widely distributed in pelagic zones, with no evidence of migration corridors at all. Australian ridleys seem to remain mainly in nearshore areas after nesting, and the same behavior has been recorded for nesters in French Guiana and Oman.

Distinct migration patterns may reflect different reproductive or foraging strategies among individuals. Forensic analyses of stable isotopes of carbon and nitrogen have been used to draw further inferences about migratory patterns and connectivity of individual turtles. For olive ridleys, these studies have confirmed what was found by satellite tracking studies: the turtles use both nearshore and oceanic habitats, with high individual variability.

The variety of migratory behaviors in this species across the world is remarkable. The nomadic behavior of many olive ridleys does not mean they lack navigation abilities; rather it represents a successful mode of opportunistic searching for prey, which is patchily distributed. Such flexibility could be a strategy to cope with unpredictable changes in highly dynamic environments, suggesting that olive ridleys might prove to be resilient to threats such as climate change. This flexibility may also help to explain why olive ridleys are the most abundant of all sea turtles.

**CULTURAL SIGNIFICANCE**

Historically, olive ridleys have had great commercial value, and they have been harvested for their meat, oil, and eggs across much of their range. But they also figure prominently in a variety of traditional cultures because they have held salient roles in diet, materials, medicine, religious beliefs, and spiritual values.

In much of Central America, turtle eggs are still believed to possess sexual enhancement powers and are sold as snacks in bars, where they are prized as a side dish to accompany a shot of rum or aguardiente. Although this belief may have no basis in fact, it nonetheless fuels an enormous legal and illegal trade in turtle eggs—mostly those of the olive ridley, given its relative abundance. This claim is just one of the countless and widespread cultural beliefs prevalent in coastal Latin America that presume sea turtle parts have aphrodisiac or sexual enhancement properties.

In parts of Guyana, the leatherback turtle is believed to be the “Mother of All Turtles,” and it is said that “if her blood is spilled, then the beach will wash away.” Those communities favor olive ridleys over leatherbacks as food. In French Guiana, Kaila’i Amerindian coastal communities are mostly olive ridley eggs during the 1980s and 1990s, but this consumption shifted to leatherback eggs around 2010, the reasons for which are not known.

In much of India, turtles are believed to be an incarnation of the god Vishnu and are therefore not killed or consumed. Indeed, there is a temple for Kurma (the turtle avatar) at Srirumam, just south of Rushikulya. However, turtle eggs were widely consumed as food and for various purported medicinal properties along much of the country’s coast until the implementation of wildlife laws and conservation programs. In Calungamolua, turtle eggs were dried and used as cattle feed until the 1970s.

Harvest of olive ridley adults and eggs also occurs in Australia’s Northern Territory. As traditional owners of local land and sea estates, the indigenous groups are at the forefront of olive ridley conservation, particularly concerning threats from ghost fishing gear. Aboriginal (Yolngu) ranges have identified ghost fishing gear hotspots, from which they remove debris and release entangled turtles. In southwest Madagascar, the indigenous Vezo people have a long history of traditions that are associated with sea turtles and that involve offerings to ancestors as well as ceremonies and rituals for preparing and eating turtle meat. Although olive ridleys are rarer than green turtles, they are included in Vezo spiritual practices. Indigenous groups in the Andaman and Nicobar Islands have similar spiritual relationships with sea turtles, which form an important part of their food traditions and culture.

Olive ridleys are highly valued for their medicinal qualities by the Wayúu people of the Guajira Peninsula in Colombia and Venezuela. Sea turtles are considered gifts from the ancestral God Malewa; olive ridleys are believed to be a kind of rare green turtle and their parts are used to treat various conditions, including hypertension, diabetes, rheumatism, and menstrual disorders. Those traditions are passed on orally through stories told by healers and play a vital role in preserving the cultural identity of the Wayúu.

Although olive ridleys have been used by many cultures for food, materials, and medicine, their relationship with some ethnic groups in Globies, however, is entirely different, and is based mostly on a variety of traditional social taboos. The Dunghma people of Ada believe that a turtle once saved their ancestors’ lives during a war with the Ashante; hence, all turtles are sacred to them and are off limits for hunting. Olive ridley turtles are now protected across most of their global range, although various uses remain an essential cultural practice in some countries.

**THE ARRIBADA**

Derived from the Spanish word for arrival, arribada refers to the phenomenon of synchronized nesting of thousands of ridley turtles, one of nature’s most impressive and mysterious wildlife spectacles.

Prior to an arribada, thousands of female turtles aggregate in front of the beach before hatching out at once to lay their eggs. Studies have examined the cues that may elicit emergence, ranging from oceanographic and atmospheric features, lunar phases, and possibly even phenomes or other agents released by the gravid females. As yet, however, there are no definitive answers. No matter how it is triggered, the consequence is a dramatic onset of synchronous nesting by thousands of ridleys depositing millions of eggs over a few weeks, followed by a rapid tailing off. Any given site, this phenomenon may repeat several times each year.

Arribada behavior likely evolved as an antipredator strategy. As the smallest of all sea turtles, ridleys lay relatively shallow nests, which tend to be susceptible to predation. Indeed, on many solitary nesting beaches, more than 80 percent of nests are taken by predators. An arribada ensures predator glut, as mammals, birds, crustaceans, fish, and others are unable to consume more than a fraction of the brief surfeit of prey in the form of adults and eggs, and—roughly seven weeks later—hatchlings. Thus, the population’s chance of survival is increased. This survival advantage has a price, because hatching rates at arribada beaches may be significantly lower than at solitary nesting beaches. Though there are trade-offs, the strategy seems to have worked well for the olive ridley, the world’s most abundant sea turtle species.
The abundance of olive ridleys was once believed to be so great that the species rose to the category of Endangered on the IUCN Red List of Threatened Species. However, the 1980s brought such alarming crashes in many rookeries, particularly on the West African coast, that the species became critically endangered. Community-based conservation programs exist in many parts of the world, including Brazil, Colombia, Guatemala, Kenya, and Mexico. In India, every coastal state has multiple NGOs working on the conservation of olive ridleys. Besides their importance for conservation, research, and education, beach projects take advantage of sea turtles as a flagship species and provide opportunities to conserve species and habitats that are otherwise fragile.

The abundance of eggs laid at mass-nesting sites and solitary beaches serves as food and as an income source in some marginalized coastal communities. In the 40 years since its establishment, the legal, community egg harvest program at the Ostional National Wildlife Refuge in Costa Rica has been largely successful, with long-term monitoring studies suggesting that the rookery nesting there remains stable. Furthermore, studies on the illegal egg trade suggest that these eggs may play an important role in swapping out the black-market egg trade. The community egg harvest program continues to generate substantial funding and resources for conservation as well as to support local family incomes. Turtle tourism is also on the rise, providing sustainable income for the community. With stable or increasing populations, some conservationists have suggested that such approaches can be transferred to other arribada sites, but this strategy remains controversial.

CONCLUSION

Olive ridleys may be abundant and widespread, but they remain an enigma in many ways. Their large arribadas drive not only global trends and status, but also public imagination about the turtles. The disappearance of arribadas at many sites has led to various declines in turtle numbers, or the failure of the arribada to occur during a particular year at Gahirmatha or Rushikulya can lead to greatly exaggerated reports of their impending demise. But then new arribada rookeries appear, such as those at Camaronal, at Corozalito, and in the Andaman Islands. Even more interesting is the role that beaches with solitary nests play. Are they future arribada sites, produces of male hatchlings in cooler areas, or perhaps a source of genetic variation?

To best determine future management strategies for the olive ridley, local studies on habitat use, incidental capture, and genetics must be expanded. As new arribada sites emerge and the species recovers, monitoring protocols and conservation strategies must be adapted accordingly. Solitary nesting rookeries need more conservation and research attention. On the whole, olive ridleys are doing rather well, but larger-scale global and development threats still loom. Sustainable fishing practices need to be implemented wherever sea turtle interactions occur if we are to ensure a safe future for the animals. As some of the most effective ambassadors for conservation worldwide, these turtles have an important role to play in the future of coastal and marine ecosystems.

GLOBAL STATUS, THREATS, AND CONSERVATION

The abundance of olive ridleys was once believed to be so great that they were immune to overexploitation. This belief was hardly true. In fact, the large scale of industrial extraction from the 1960s to the 1980s brought such alarming crashes in many rookeries, particularly in Mexico, that the species rose to the category of Endangered on the IUCN Red List of Threatened Species.

Evaluating a species’ risk of extinction is complex and requires knowledge of global trends over generational time frames. In the case of olive ridleys, however, it is changes in their massive arribada populations that drive global status. Although monitoring arribada sites has proven to be highly challenging, local programs now provide reliable data for status evaluation. Decades of conservation effort from nesting beach protection, together with policies banning sea turtle harvesting and strict enforcement of the use of Turtle Excluder Devices in some areas have decreased this pressure. Fisheries impacts. The overlap of olive ridley at-sea distribution with fisheries makes this species particularly vulnerable to entanglement in fishing gear. Although bans on trawl fishing and strict enforcement of fishing gear. Although bans on trawl fishing and strict enforcement of the use of Turtle Excluder Devices in some areas have decreased this pressure, fisheries remain the primary threat to ridleys worldwide. Large-scale mortality (approximately 10,000 turtles per year) in trawl fisheries still occurs in India’s Odisha state and elsewhere in the world where enforcement is lax.

Olive ridley behavior also increases the likelihood of encountering abandoned, lost, or discarded fishing gear, known collectively as ghost gear. A study of ghost gear in the Maldives found that 97 percent of entangled turtles were olive ridleys. Addressing threats from ghost gear requires strong collaboration between multiple stakeholders, including national governments, regional fisheries management organizations, and local communities.

Though many olive ridley nesting beaches are located in protected areas, threats to nesting habitats persist, particularly from coastal development for tourism, aquaculture, urban growth, or industrial activities. The construction of Dhamra Port near the Gahirmatha mass nesting site in India may have caused significant changes to the geomorphology of the nesting beach, in addition to causing increased light and water pollution. In Gabon, the nesting habitat is affected by the accumulation of beached timber lost from commercial logging activities, thereby changing the erosion and accretion dynamics of the beach system and blocking access to nesting areas. Such large-scale threats are difficult to address and require sustained, high-level engagement with decisional actors.

At many sites, conservation programs conduct beach patrols and relocate olive ridley nests to hatcheries to protect them from human and natural predators. At many solitary nesting beaches, upward trends in olive ridley populations are probably the result of such long-term efforts. Community-based conservation programs exist in many parts of the world, including Brazil, Colombia, Guatemala, Kenya, and Mexico. In India, every coastal state has multiple NGOs working on the conservation of olive ridleys. Besides their importance for conservation, research, and education, beach projects take advantage of sea turtles as a flagship species and provide opportunities to conserve species and habitats that are otherwise fragile.

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Nonetheless, causes for concern remain, including the following: low hatching success at some arribada sites; decreased survival of all age classes due to plastic ingestion; climate change; and, above all, fisheries impacts. The overlap of olive ridley at-sea distribution with fisheries makes this species particularly vulnerable to entanglement in fishing gear. Although bans on trawl fishing and strict enforcement of the use of Turtle Excluder Devices in some areas have decreased this pressure, fisheries remain the primary threat to ridleys worldwide. Large-scale mortality (approximately 10,000 turtles per year) in trawl fisheries still occurs in India’s Odisha state and elsewhere in the world where enforcement is lax.

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