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Basking olive ridley observed in the waters of Madeira, Portugal, in the Northeastern Atlantic. See pages 1-2. Photograph: Magno Carreira/H2O Madeira.

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Guest Editorial: Recovering Sea Turtles: How and When Should We Intervene?

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The recent (2026) annual International Sea Turtle Society Symposium was held at Kailua-Kona, Hawai'i, an ideal location for participants predisposed to appreciate an inviting climate and natural beauty that is characteristic of this island. Normally, those surroundings promote a relaxed atmosphere that encourages pleasantries and convivial interactions between participants and for the most part, that was what transpired. But in one session, entitled "Head Starting Revisited: Effectiveness, Ethics, and Evidence," disagreements surfaced that reflected differences of opinion within the scientific community about how to promote the recovery of the most Critically Endangered sea turtles: the eastern and western populations of the Pacific leatherback. That discussion raised the more general question of how conservationists should approach recovery efforts when extinction of a population of an endangered species is imminent or, in contrast, when that outcome is most likely to occur in future decades. Like it or not, marine turtle biologists often face this pair of conundrums! Here, I describe the issues and document where things now stand for two species: leatherbacks in the western Pacific and loggerheads in the northwestern Atlantic, along with my recommendations for further action.

What to Do when Populations are in Rapid Decline?

Globally, the leatherback sea turtle (*Dermochelys coriacea*) is listed as Vulnerable by the IUCN. However, specific leatherback subpopulation assessments range from Vulnerable to Critically Endangered. The two Pacific populations (East and West) are considered Critically Endangered.

The global population has declined by 40% over the past three generations, but the Pacific populations have experienced a more precipitous and dramatic decline. The Malaysian nesting subpopulation has essentially disappeared, declining from ~ 10,000 nests in 1953 to only one or two nests per year, currently. That decline is attributed to many years of a nearly complete collection of eggs from nests for human consumption. About 75% of the remaining western population nests in Papua Barat, Indonesia. However, in that location nesting has declined by over 80% (Hays *et al.* 2025). Eastern populations nest in Mexico and Costa Rica although there are small and ephemeral assemblages nesting in Panama, Nicaragua, Colombia and Ecuador. Nevertheless, over the last 60 years nesting there has declined by over 90% (Hays *et al.* 2025). These grim statistics have led to the certainty that absent any effective intervention, extinction is inevitable and will occur within this century.

The issue debated at the Symposium centered on what intervention strategy would be most effective, and that is where the differences surfaced. Everyone was clearly aware of the variables causing population decline (egg harvesting; hunting of juvenile and adult turtles; habitat degradation; and accidental injury or death because of interactions with trawls, longlines, or ghost nets). All agreed that recovery efforts must be multifaceted, involving both protection at nesting beaches and at critical foraging sites, as well as modifications of fisheries practices. But, doing so will require complex and difficult international efforts that will take time to become effective. Unfortunately, when populations are in steep decline, time is a limiting variable.

Here is where the audience disagreed. Some participants favored an approach centering on reducing threats. Others favored coupling those efforts with *head-starting*, the captive rearing of young turtles to a larger size before returning them to the wild. Doing the latter could have potentially two benefits. First, the subjects reared would be selected to promote population genetic diversity so that when recovery began, the turtles involved would be vigorous survivors. Second, and perhaps most importantly, adding head-started turtles to the population might reduce the rate of decline (if older turtles in sufficient numbers were released), thereby prolonging the available time for implementing effective mitigation strategies.

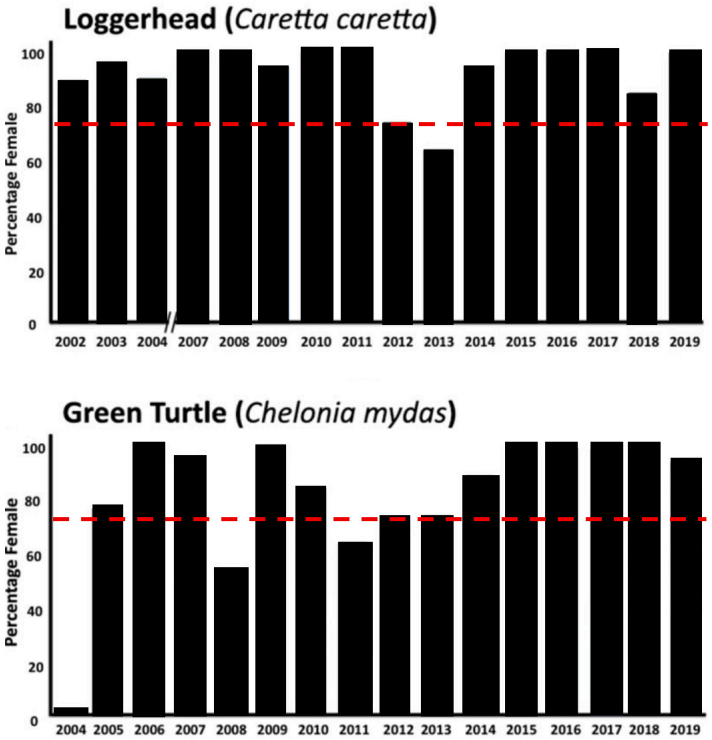

Figure 1. The estimated proportion of female loggerhead (top) and green turtle (bottom) hatchlings emerging from nests placed on the beach at Boca Raton, Florida, between 2004 and 2019. The dashed red line designates a 3:1 female to male sex ratio (modified from Wyneken & Salmon 2020).

Opposition participants argued that because head-starting leatherbacks could not reverse the threat of extinction, its benefits did not exceed the costs. But, in this instance *the purpose of head-starting was to slow the decline and prepare for a more likely recovery,* not to reverse that decline. That said, many participants remained unconvinced, although they presented no evidence that their approach (without head-starting) was more likely to result in population recovery.

What Action is Best When Threats Have No Immediate Impact, but Will Have Future Consequences?

Sex in marine turtles is determined by the temperature embryos experience during a critical period of development. The general rule is "hot chicks and cool dudes." Under moderate climatic conditions, the sex ratio is female biased; a 2:1 or 3:1 ratio of females to males is typical for most species. Since males seek mates more frequently than do females, that skew does not impede effective reproduction. In fact, the breeding sex ratio (ratio of sexually active males to receptive fertilizable females during each breeding season) favors males and often, the hatchlings emerging from a single nest, are half siblings sired by different males in loggerheads (Lasala *et al.* 2013).

The world is currently experiencing a warming climate and as a result, sex ratios are becoming even more strongly biased toward females. A long-term study at a nesting beach in Florida (Wyneken & Salmon 2020) documents those trends (Fig. 1). In only one of the 16 years sampled were more than 25% of the loggerhead hatchlings destined to become males, and in 8 of the years of observations *no males were produced*. Green turtles also nest at that site, but this species digs deeper nests placed higher on the beach that are often shaded by vegetation, and so better insulated from the prevailing climate. Consequently, effects on sex ratios have been less extreme and largely confined to the more recent, and hotter, years (Fig. 1). For both species, warmer temperatures also affect nest productivity as when embryos are thermally stressed, the frequencies of embryonic death and of developmental abnormalities increase (Wyneken & Salmon 2020). The correlate has been a decline over the last 20 years in the average number of hatchlings that depart from each nest, particularly among loggerheads (Wyneken & Salmon 2020).

At other rookery sites, a decline in male production, especially over longer periods of time, has additional consequences. Initially, there is a decline at major rookery sites in the proportion of females with multiple mates from 50-90%, to less than 40% (Hays *et al.* 2023), an indication that fewer males are participating in reproduction. Such an outcome is associated with persistent sex ratios of less than 1 male for every 3 females (Fig. 2). At a loggerhead nesting beach on Florida's West Coast, only 25% of the females had mated multiply (Lasala *et. al.* 2023). How this change might affect female reproductive success is currently unknown but from a female's perspective, the result is a lowering of offspring genetic diversity. Such a change might reduce survival probabilities of offspring by limiting their repertoire of effective resistance to predators, microbes and other potential threats.

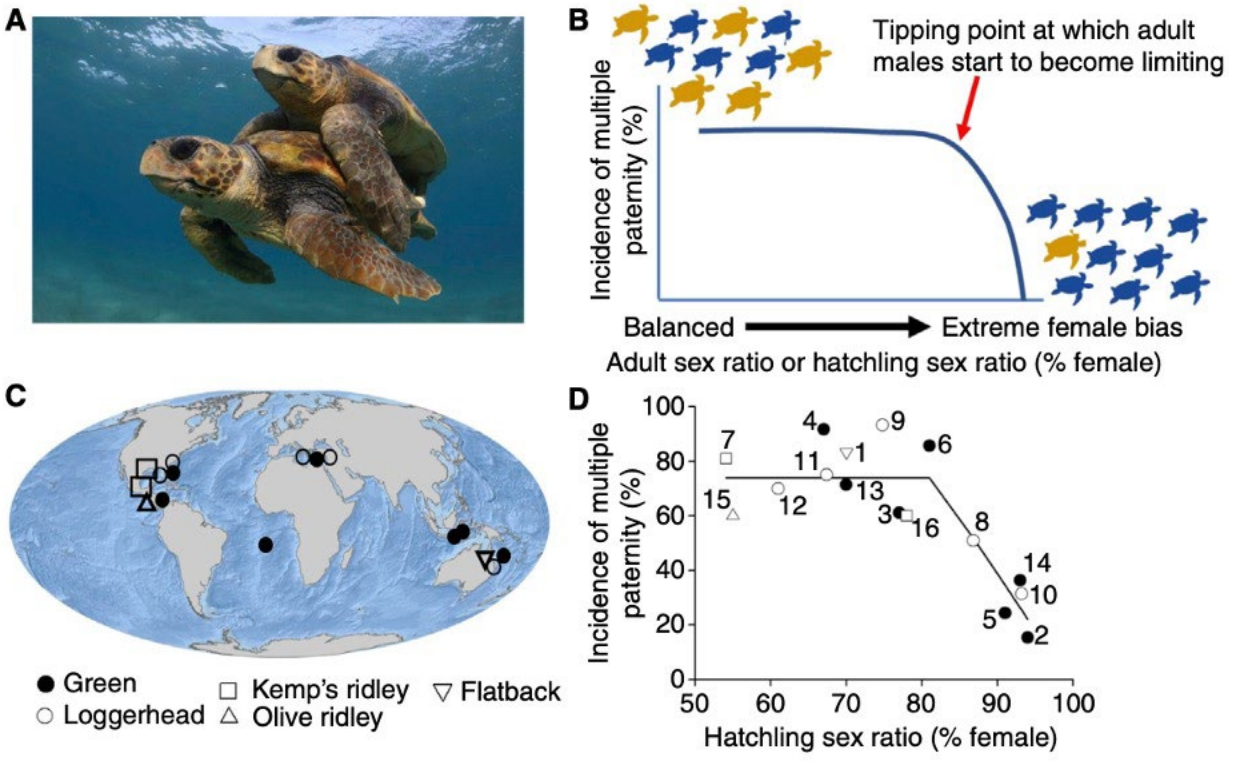

Figure 2. Relationships between multiple paternity and sex ratios. A. Mating loggerhead turtles. B. How the incidence of multiple paternity might be related to the excessive production of female offspring. The hypothesis: as that bias increases over time, males become so scarce that females no longer mate multiply. C. Nesting sites worldwide and the species used to test the hypothesis. D. Evidence supports that hypothesis as when sex ratios over long time periods exceed 75% females, the frequency of multiple paternity declines (reprinted from Hayes *et al.* 2023).

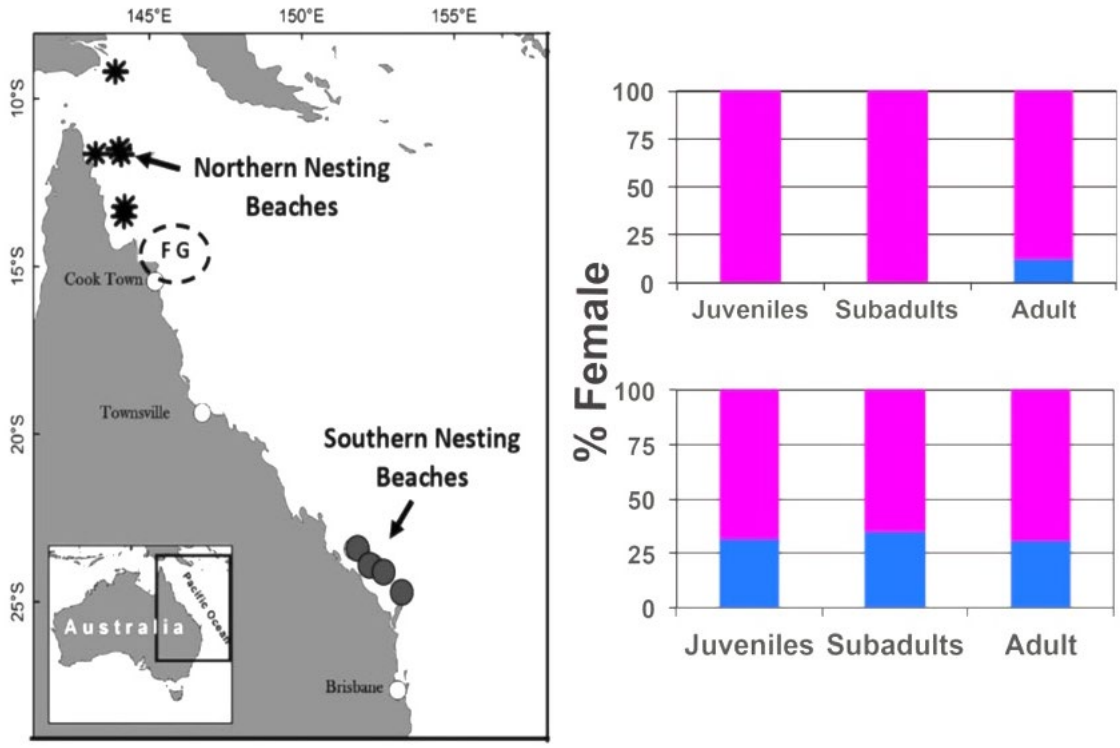

Figure 3. Results of a sex ratio study done on a large green turtle population that grows to maturity at a common feeding ground (FG) off the Queensland coast of Australia. In this population, both sexes show great fidelity to geographically separate nesting beaches. One assemblage places nests at a rookery to the north while the other nests to the south. The two groups are also distinguished by differences in their genetic profiles. Graphs to the right show the proportion of females (pink) to males (blue) among their age classes. See the text for details and interpretation (modified from Jensen et al. 2018).

A decline in male production over even longer time periods can ultimately lead to more serious consequences, including population extinction. A key study pointing to this outcome was done in Australia and involves one of the world's largest assemblages of green turtles (Jensen *et al*. 2018). These turtles forage and grow to maturity at the same feeding grounds adjacent to the Queensland coast but when it is time to breed, adults of both sexes migrate with great fidelity to different nesting beaches: one to the north and the other to the south of where they forage. The turtles from each group can be identified by their unique genetic profiles. At the southern nesting site, climatic conditions are moderate and the sex ratios shown by the turtles nesting there are typical and similar among the age classes (Fig. 3). But to the north, warming has been extreme and for more than two decades, no male hatchlings were produced. The few mature males are old and represent the remnants of progeny produced years earlier before warming became extreme. Most critically, no males are present among the younger life history stages. When the existing mature southern males die, they will be replaced by younger males that become sexually mature. But when the remnant older northern males die, there will be no younger turtles "in the pipeline" to replace them. The presumed outcome is that northern females will be unable to find mates and the population will crash.

Concluding Remarks

Unfortunately, countering the downward spiral of the Pacific leatherback requires immediate and sustained efforts to protect the turtles and their critical habitats. But sea turtles take decades to mature and have long adult life spans. Consequently, it can take years to determine whether a specific conservation strategy is positively impacting population recovery. Additionally, while in terrestrial species surveys can readily quantify changes in subject abundance and distribution, those changes are hidden from view in the marine realm where individuals are widely distributed in a vast ocean. In the absence of immediate assessment, the best options are to institute mixed, and varied, strategies: conventional procedures that are most likely to work, combined with new procedures that might be effective but have not been tried before. Head-starting (used uniquely in this instance to reduce the severity of the decline) and the transfer and release of Atlantic hatchlings from healthy populations at Pacific nesting beaches, are but two new alternatives worthy of further consideration, coupled with investigation. Other possibilities, limited only by one's imagination, should also be contemplated.

It is also important to recognize that the changes in climate we are now witnessing are already affecting marine turtle populations in ways that may not be obvious (*e.g*., nest feminization; smaller, less vigorous hatchlings that develop too quickly; lower nest productivity), then take proactive steps to counter those threats before they become even more serious. Sporadic efforts are underway to reduce temperature effects by shading nests, relocating eggs into deeper nests, or by watering nests to promote evaporative cooling. These procedures promote the production of male hatchlings. But what is really needed, at least at major rookeries like

the beaches of Florida, is a government coordinated effort to incubate large numbers of eggs under controlled thermal conditions so that appropriately large numbers of male hatchlings can be released on an annual basis. That such an effort has not yet been instituted in Florida, despite the warning signs that nest "feminization" and declines in hatchling production may be widespread, should be of major concern to both state and federal workers responsible for managing and conserving marine turtle populations. But thus far authorities have been content to document problems without recommending or promoting any creative or innovative solutions. That complacency needs to end if we are to succeed in our efforts to restore western Atlantic loggerhead populations.

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First Record of the Olive Ridley Turtle (*Lepidochelys olivacea*) in Madeira, Portugal (Northeastern Atlantic)

Thomas Dellinger[1,2,3,5], Magno Carreira[4], Lino Jardim[4], Beatriz Gomes[5] & Tomás Oliveira[5]

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On 29 June 2023 at approximately 1206 h UTC, a sea turtle was observed and photographed offshore Paúl do Mar, Madeira Island, Portugal (32.70897° N, -17.33783° W), by a whale-watching vessel operated by H2O Madeira (observer: Magno Carreira). A total of 15 high-resolution photographs were obtained and subsequently submitted to our research group for identification and archival. The sighting was registered in our Madeira sea turtle sightings database under record ID 1929.

The turtle was observed basking at the sea surface, remaining motionless with the carapace exposed and dry at its highest point (Fig. 1). The foreflippers were resting dorsally over the anterior carapace. Numerous pilot fish (*Naucrates ductor*) accompanied the turtle. The animal exhibited minimal avoidance behavior, allowing very close vessel approach and detailed photographic documentation.

Photographic examination permitted unequivocal identification of the specimen as an olive ridley turtle (*Lepidochelys olivacea*) based on diagnostic morphological characteristics visible in multiple images. These include a nearly circular, relatively flattened carapace, uniform olive-grey dorsal coloration, relatively small triangular head, and the characteristic high and variable number of costal scutes (7-8 visible in this individual). These features clearly distinguish *L. olivacea* from both the loggerhead turtle (*Caretta caretta*) and the Kemp's ridley turtle (*Lepidochelys kempii*), both of which have been recorded in Madeira waters (Table 1).

Using a reference scale provided by the observer's hand visible near the turtle in one photograph (see cover photo), and calibrating against a measured thumb-to-index finger span of approximately 14-15 cm in equivalent orientation, the straight carapace length (SCL) of the turtle was estimated at approximately 64 cm (±2 cm). This size falls within the typical adult size range reported for the species (Zug *et al.* 2006; Petitet *et al.* 2015). Adult olive ridley turtles are known to occupy oceanic habitats extensively outside nesting periods, where they forage and undertake large-scale movements across pelagic environments (Plotkin *et al.* 1995; Morreale *et al.* 2007; Plotkin 2007). The present record therefore represents an adult occurring at the northeastern periphery of the species' Atlantic oceanic distribution.

This observation represents, to our knowledge, the first confirmed record of *L. olivacea* in Madeira waters. Since systematic



Figure 1. Left: olive ridley turtle (*Lepidochelys olivacea*) observed basking at the sea surface offshore Paúl do Mar, Madeira Island, Portugal (32.70897° N, -17.33783° W), on 29 June 2023. Estimated straight carapace length ≈ 64 cm. Photo: Magno Carreira / H2O Madeira. Right: reference size of the hand photographed next to the carapace (see cover).

Species	Number	%
Caretta caretta	2008	98.92
Dermochelys coriacea	12	0.59
Eretmochelys imbricata	5	0.25
Chelonia mydas	3	0.15
Lepidochelys kempii	1	0.05
Lepidochelys olivacea	1	0.05

Table 1. Sea turtle species recorded in Madeira waters since 1993 (n = 2,030 records).

recording began in 1993, a total of 2,030 sea turtle sightings have been documented in the region, overwhelmingly dominated by loggerhead turtles, with other species occurring only rarely (Table 1). The present record represents the sixth sea turtle species documented in Madeira waters.

Within the northeastern Atlantic region, olive ridley turtles have previously been recorded in the Azores (Barcelos *et al.* 2021) and Cape Verde (Varo-Cruz *et al.* 2011) and are known from tropical eastern Atlantic waters along the West African coast (Fretey 1998; Hama *et al.* 2019). Occasional extralimital occurrences have also been documented in the western North Atlantic (Foley *et al.* 2003). Nesting in the Atlantic occurs primarily along tropical coasts of West Africa and South America (Fretey 2001).

Continued monitoring of opportunistic sightings allows both population monitoring and the detection of rare species, thereby improving our understanding of sea turtle distribution and oceanic habitat use in the northeastern Atlantic Ocean (Dellinger *et al.* 2022). With confirmed records of both olive ridley (*Lepidochelys olivacea*) and Kemp's ridley (*Lepidochelys kempii*) turtles, the present record helps confirm that olive ridley turtles do occur in this region and contributes to resolving the broader Atlantic distribution limits of the species.

Acknowledgements. We thank H2O Madeira and skipper Magno Carreira for reporting this sighting and providing photographic documentation. We also acknowledge the continued collaboration of whale-watching operators and citizen observers contributing to the Madeira sea turtle monitoring program.

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An Assessment of Sea Turtle Nesting Habitat and Nest Counts on St. Thomas, US Virgin Islands, from 2021 to 2025

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In the United States Virgin Islands (USVI), there are three species of sea turtles that are frequently found nesting on the beaches of the USVI. These include the green sea turtle (*Chelonia mydas*), the leatherback sea turtle (*Dermochelys coriacea)*, and the hawksbill sea turtle (*Eretmochelys imbricata*). Of these three species, the hawksbill is the most widely distributed species among the three main islands and is frequently found nesting on St. Thomas, St. John, and St. Croix.

Female hawksbills typically return to their nesting beaches every two to three years following maturation and lay multiple clutches per season at two-week intervals (Meylan 1999; Kamel & Delcroix 2009; NMFS-USFWS 2013). In the Lesser Antilles, hawksbills have been found to return to their natal beaches within one kilometer of where they were hatched (Browne *et al*. 2010; Levasseur *et al.* 2019, 2020) and generally prefer to nest in vegetated areas just inside the forest edge. Many of the beaches throughout the USVI have been identified as having suitable hawksbill nesting habitats (Horrocks & Scott 1991; Kamel & Mrosovsky 2004; Eckert & Eckert 2019).

Between St. Croix, St. John, and St. Thomas, 36 beaches have been identified as hawksbill nesting habitats (Eckert & Eckert 2019). St. Croix and St. John have consistent monitoring programs that detect new nests and track population trends and have confirmed nesting habitats listed by Eckert & Eckert (2019). Many beaches on St. Thomas are difficult to access without a four-wheel drive vehicle or are secluded. Due to this, the beaches on St. Thomas lack the continuous monitoring necessary to determine the extent to which these nesting beaches are used and to identify beaches that are essential nesting habitats.

The purpose of this study was to investigate beaches on St. Thomas (18.3434129, -64.9578107) during 2021 and 2022 for hawksbill nesting activity to ground truth the list of suitable hawksbill nesting habitats provided by Eckert & Eckert (2019). Here, we also report opportunistic nesting observations of all three USVI nesting species from 2020 to 2025 on St. Thomas.

For the focused study in 2021-2022, using the Eckert & Eckert (2019) sea turtle nesting habitat atlas for the Wider Caribbean region and beaches with previously reported nests, a list of known beaches on St. Thomas that have previously reported sea turtle activity was created to prioritize beach surveys. Beaches were surveyed by volunteers and graduate students at the University of the Virgin Islands, in collaboration with the St. Croix Sea Turtle Project at Sandy Point National Wildlife Refuge. Volunteers and students were trained to identify sea turtle activity to species level and to distinguish between a nest and a false crawl (a crawl that

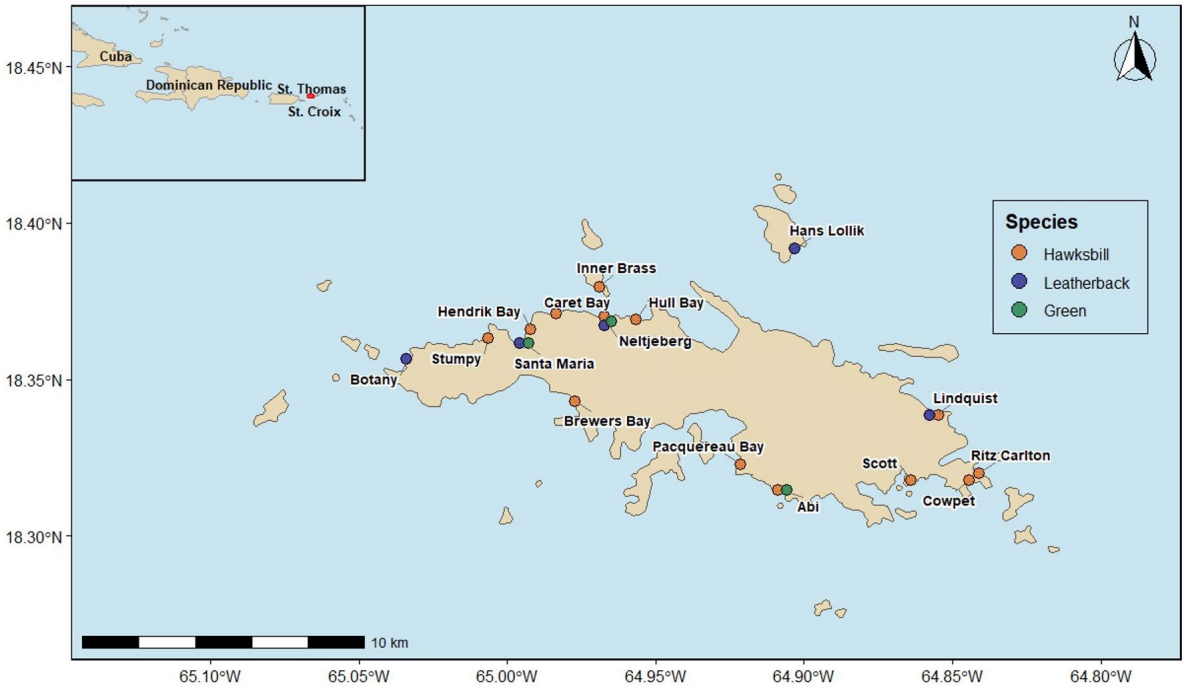

Figure 1. Beaches on St. Thomas, USVI, that have documented sea turtle nesting activity. Orange dots represent beaches with hawksbill nesting activity, blue dots represent beaches with leatherback nesting activity, and green dots represent beaches with green turtle activity. Map made by Abigail Lewine.

Beach	2020		2021		2022		2023		2024		2025	
Hawksbill	**Nests**	**FCs**	**Nests**	**FCs**	**Nests**	**FCs**	**Nests**	**FCs**	**Nests**	**FCs**	**Nests**	**FCs**
Abi **+	--	--	2	11	--	--	2	7	--	--	--	--
Brewers Bay	--	--	1	3	--	--	--	--	--	--	1	--
Caret Bay **	--	--	5	2	2	3	--	--	--	--	--	--
Cowpet	--	--	--	--	--	--	--	--	--	--	1	--
Mandahl**	--	--	--	1	--	--	--	--	--	--	--	--
Hull Bay	--	--	--	--	--	--	1	--	--	--	--	--
Lindquist	--	--	--	--	--	--	--	--	1	--	--	--
Hendrik Bay**	--	--	7	7	--	4	--	--	--	--	--	--
Inner Brass**	1	--	--	--	--	--	--	--	--	--	--	--
Santa Maria	--	--	--	--	--	--	--	2	--	1	--	--
Stumpy**	--	--	1	1	1	--	--	--	1	--	--	--
Scott**	--	--	1	--	--	--	--	--	--	--	--	--
Neltjeberg**	--	--	4	4	9	15	--	--	-	--	--	--
Ritz Carlton	--	--	--	--	--	--	--	--	1	--	--	--
Perserverance	--	--	--	1	--	--	--	--	--	--	--	--
Pacquereau Bay	--	--	--	--	--	--	--	--	--	--	2	--
Leatherback												
Neltjeberg**	--	--	--	--	5	1	2	--	--	--	--	--
Botany	--	--	--	--	--	--	1	--	--	--	--	--
Lindquist	--	--	--	--	1	--	--	--	--	--	--	--
Santa Maria	--	--	--	--	--	--	2	--	--	--	--	--
Hans Lollik**	--	--	--	--	--	--	--	--	1	--	--	--
Green												
Neltjeberg**	--	--	1	2	--	--	--	--	--	--	--	--
Abi**+	--	--	--	--	--	--	1	--	--	--	--	--
Santa Maria	--	--	--	--	1	--	--	--	--	--	--	--
Total Activities												
	1	0	22	32	18	23	9	9	4	1	4	0

Table 1. Beaches on St. Thomas, USVI, with documented sea turtle nesting activity between 2020 and 2025. ** are beaches listed in Eckert & Eckert (2019) as suitable hawksbill nesting habitat. A + were beaches listed by Eckert & Eckert (2019) as suitable leatherback nesting habitat.

did not result in eggs being laid). Each trained volunteer chose a designated beach to survey before 9:00 AM.

Beaches were surveyed by walking just above the high tide line to look for sea turtle tracks. Each survey and sea turtle activity was recorded using the Kobo Collect App (www.kobotoolbox.org) in a standardized form. A survey form was filled out for each survey day, regardless of presence of nesting activity, and each nesting activity was documented individually. All reports of sea turtle activity were responded to by a team lead to confirm the species and activity type.

To collect the most meaningful data, we aimed to conduct surveys three days a week before and after peak season and daily during peak season, following the SWOT (2011) suggestions, on as many beaches as possible. Due to safety concerns and accessibility, not all beaches were surveyed using this method. Table 1 provides a list of beaches where turtle nesting activity was confirmed and documented. Vessup Beach was listed in Eckert & Eckert (2019) as having suitable nesting habitat, but no activity was recorded. Magens Bay and Lindbergh Beach were surveyed, however they had no nesting activity and were not listed in Eckert & Eckert (2019).

For 2021, patrols were done 1 July to 20 November, and then periodically through December. From 1 August to 19 September, Abi Beach, Caret Bay Neltjeberg Beach, Brewers Bay, Vessup Beach, and Lindbergh Beach were patrolled daily. The remaining beaches listed in Table 1 were patrolled between 1 and 3 times per week. For 2022, daily patrols started on 1 June, ending on 1 November. Weekly patrols began on 17 March due to reported leatherback nesting activity. From 1 August to 19 September, Abi Beach and Neltjeberg Beach were patrolled daily, and the remaining beaches listed in Table 1 were patrolled between 1 and 3 times per week. Outside of our focused study, nesting activities in 2020, and 2023 through 2025, were recorded opportunistically based on reports received and verified by various organizations and documented in the database maintained by the St. Croix Sea Turtle Project.

In all, 59 nests and 65 false crawls were documented for all three species on St. Thomas between 2020 and 2025 across 18 beaches. Neltjeberg Beach had the most nests and false crawls and was visited by all three species (Table 1). Caret Bay had the second highest number of activities, followed by Abi Beach and Hendriks Beach, with hawksbill activity (Table 1). Hawksbills used most of the beaches that were listed in Eckert & Eckert (2019), as well as 3 additional beaches (Table 1). Leatherback activities were found on five beaches, none of which were originally listed as suitable leatherback nesting habitat (Eckert & Eckert 2019) (Table 1). Green turtles used three beaches on St. Thomas (Figure 1, Table 1). There was no suitable green nesting habitat listed by Eckert & Eckert (2019) on the island of St. Thomas.

We were interested in discovering the extent to which sea turtles used St. Thomas beaches, and we confirmed several of the beaches reported by Eckert & Eckert (2019) being used by hawksbills. The beaches they listed as nesting habitat for hawksbills did have nesting

activity with less than 25 crawls per year. We did however identify green and leatherback nesting on beach habitats not listed in their original habitat assessment.

Sea turtles do not typically nest every year but return in 2-to-4-year intervals (Richardson *et al.* 1999; Dutton *et al.* 2005). This study encompassed only two years of regular patrol data and opportunistic reports, but annual differences may be noticed when looking at the data regarding beach use and species presence. For example, in 2021, hawksbill turtles frequented Abi Beach, leaving 12 crawls. No crawls were documented at Abi Beach during the 2022 nesting season, but reports of hawksbills were documented again in 2023. In 2021, no leatherback turtle crawls were recorded on any St. Thomas beaches, but three green turtle crawls were found. Seven leatherback turtle crawls were documented during the 2022 nesting season, but only one green crawl. These differences may be explained by the typical nesting intervals of the species, and consistent long-term monitoring is needed to understand if these are atypical nesting years or if this is a regular nesting pattern that may be occurring on St. Thomas.

The accessibility of different beaches likely created a slight bias in the survey effort during the 2021-2022 study period and limited the number of reported sightings outside of the study. Many beaches on St. Thomas are difficult to get to without a four-wheel drive vehicle, and many are secluded and involve hiking to get there, making it unsafe to do early morning surveys alone at many locations. Many previously reported nesting beaches, such as Caret Bay, Hendriks Beach, Neltjeberg Beach, and Stumpy Beach, are among the most difficult beaches to access on the island. From the data collected during this study, these difficult beaches may be the most important to monitor in the future, as most of the nesting activity documented were on these beaches. However, even with the potential bias of over-surveying easily accessible beaches, many of the difficult beaches were surveyed three times per week during the peak season in 2021 and 2022, and Table 1 adequately represents the total activity that occurred on these beaches during that timeframe.

The most active nesting beaches were Abi Beach, Caret Bay, Hendriks Beach, and Neltjeberg Beach (Table 1). Three of the four beaches have similar characteristics that may be of importance to investigate in future studies. Caret Bay, Hendriks Beach, and Neltjeberg Beach are all facing approximately the same direction (N/NW). Kamel & Delcroix (2009) found that hawksbill sea turtle nest site selection has high repeatability and shows high fidelity to certain beach characteristics, including the location along the shoreline. It may be of interest to see if beach orientation may be playing a role in nest selection on St. Thomas. It is also possible that these beaches are chosen by hawksbill turtles because they are the least disturbed by human activity due to their inaccessibility and have little artificial light pollution from coastal development, creating ideal nesting conditions for any sea turtle species, in comparison to beaches such as Brewers Bay and Lindbergh Beach. Abi Beach was the exception in that it is a southern facing beach, is closer to coastal development, and is heavily used in the mornings and evenings by locals and tourists on foot and by boat.

This study was the first step in assessing the extent to which sea turtles may be using St. Thomas beaches as nesting habitat, specifically for the hawksbill turtle. We share this data in hopes that it will be helpful for future monitoring programs and give guidance as to which beaches to survey, as well as adding some raw historical nest numbers for beaches on St. Thomas. Through the efforts of this study, Abi Beach, Caret Bay, Hendriks Beach, and Neltjeberg Beach were identified as potentially important hawksbill nesting habitats and should continue to be monitored in the future, particularly from July through October, annually, at least three days a week.

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Report on Stranded Sea Turtles in 2025 on the Southern Part of Boso Peninsula, Japan

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The Boso Peninsula, Chiba Prefecture, in northern Japan, has the eastern side facing the Pacific Ocean and the western side facing Tokyo Bay. The peninsula has a long coastline (over 200 km); the eastern part consists of Kujukuri Beach, which is a sandy beach nearly 66 km long. This beach is the main nesting site for the loggerhead sea turtle (*Caretta caretta*) in Chiba Prefecture. In contrast, the southern tip of the peninsula has a mix of rocky and sandy beaches with loggerheads nesting there only occasionally.

Over one hundred sea turtle strandings have been reported annually along the Japanese coast (MOE & STAJ 2006). In the Boso Peninsula, strandings of loggerheads and the green sea turtle (*Chelonia mydas*) are unfortunately commonly observed, and a large number of strandings have been reported particularly on the southern tip of the peninsula (Moriya 2010). However, to date, there are no published data on sea turtle strandings for the Boso Peninsula. Therefore, to assess the current situation of strandings, we conducted a preliminary survey of beaches on the southern part of the Boso Peninsula.

In Japan, the number of strandings increase in the summer during the nesting season (Matsuzawa *et al*. 2006). Thus, the survey was conducted during the summer; 21 June - 3 July 2025, at seven sites along nine beaches (Fig.1). A total of 19 km of beach was surveyed. The survey was carried out by a single person walking along the shoreline to search for stranded turtles. At every beach, the surveyor first walked along the shoreline and returned on the landward side; beaches were checked at least twice.

For each stranded sea turtle found, it was identified to the species level, straight carapace length (SCL) was measured by caliper, and, when possible, sex was determined by gonad observation via dissection. The condition of the carcass was classified into five stages according to Shaver & Teas (1999).

We found 25 dead turtles, 14 loggerheads and 11 greens. The decomposition status for each was determined: three turtles were fresh and three were moderately decomposed; five were severely decomposed; seven turtles were dry carcasses; and we found seven skeletons (Table 1, Figs. 1 and 2). In Japan average adult carapace

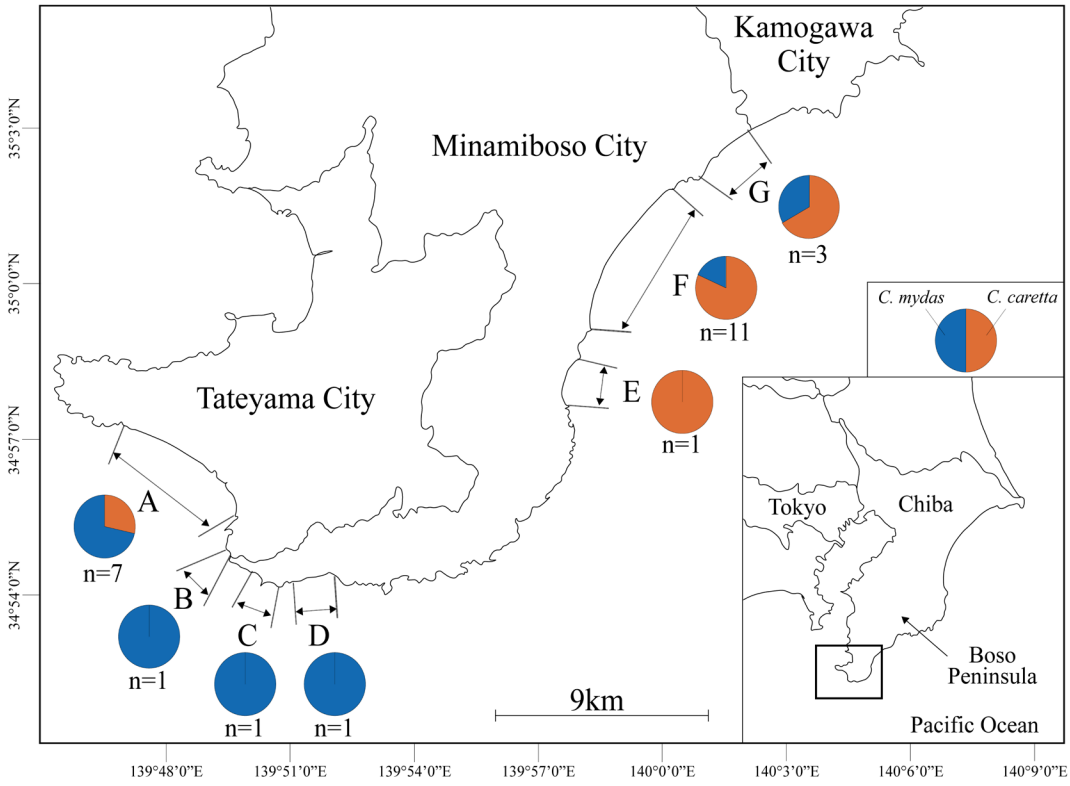

Figure 1. Survey area. A: Heisaura Beach (5.6 km), B: Mera Beach (0.2 km), C: Nemoto Beach (0.8 km), D: Shirahama Beach (1.8 km), E: Chikura Beach South (1.9 km), F: Chikura Beach North, Mishima and Shirasuka Beaches (6.5 km), G: Wadaura Beach (2.3 km). The pie charts on the map show the stranding number at each site.

	Date	City	Site	Species	Condition	SCL (cm)	SCW (cm)	Sex
1	21 June 2025	Tateyama	A	*C. mydas*	Moderately decomposed	36.9	31.0	–
2	21 June 2025	Tateyama	A	*C. caretta*	Dried carcass	68.3	51.9	–
3	21 June 2025	Tateyama	A	*C. mydas*	Fresh	60.3	–	♀
4	21 June 2025	Tateyama	A	*C. mydas*	Dried carcass	45~50*	36.0	–
5	21 June 2025	Minamiboso	C	*C. mydas*	Dried carcass	40~50*	–	–
6	22 June 2025	Minamiboso	F	*C. caretta*	Moderately decomposed	45~50*	39.1	♂
7	24 June 2025	Minamiboso	F	*C. mydas*	Skeleton, bones only	–		–
8	24 June 2025	Minamiboso	F	*C. caretta*	Severely decomposed	60~65*	–	–
9	24 June 2025	Minamiboso	F	*C. caretta*	Severely decomposed	55~60*	–	–
10	24 June 2025	Minamiboso	F	*C. caretta*	Moderately decomposed	64.3	49.4	♀
11	25 June 2025	Minamiboso	F	*C. caretta*	Skeleton, bones only	–	–	–
12	25 June 2025	Minamiboso	F	*C. caretta*	Dried carcass	55~60*	–	–
13	25 June 2025	Minamiboso	E	*C. caretta*	Severely decomposed	76.3	61.2	–
14	25 June 2025	Tateyama	D	*C. mydas*	Skeleton, bones only	–	–	–
15	26 June 2025	Minamiboso	G	*C. caretta*	Fresh	64.9	47.5	♂
16	26 June 2025	Minamiboso	G	*C. caretta*	Skeleton, bones only	–	–	–
17	26 June 2025	Minamiboso	G	*C. mydas*	Skeleton, bones only	–	–	–
18	26 June 2025	Tateyama	B	*C. mydas*	Skeleton, bones only	–	–	–
19	27 June 2025	Tateyama	A	*C. mydas*	Dried carcass	377.8	58.6	–
20	27 June 2025	Tateyama	A	*C. mydas*	Dried carcass	40~45*	35.0	–
21	29 June 2025	Minamiboso	F	*C. caretta*	Dried carcass	61.5	42.9	–
22	30 June 2025	Minamiboso	F	*C. caretta*	Severely decomposed	54.0	43.9	♀
23	30 June 2025	Minamiboso	F	*C. caretta*	Severely decomposed	57.0	48.4	–
24	1 July 2025	Minamiboso	F	*C. mydas*	Skeleton, bones only	30~35*	–	–
25	2 July 2025	Tateyama	A	*C. caretta*	Fresh	69.3	50.7	♂

Table 1. Sea turtle stranding records in this study. SCL = Straight carapace length (cm), SCW = Straight carapace width (cm). An asterisk in SCL and SCW means we estimated the value.

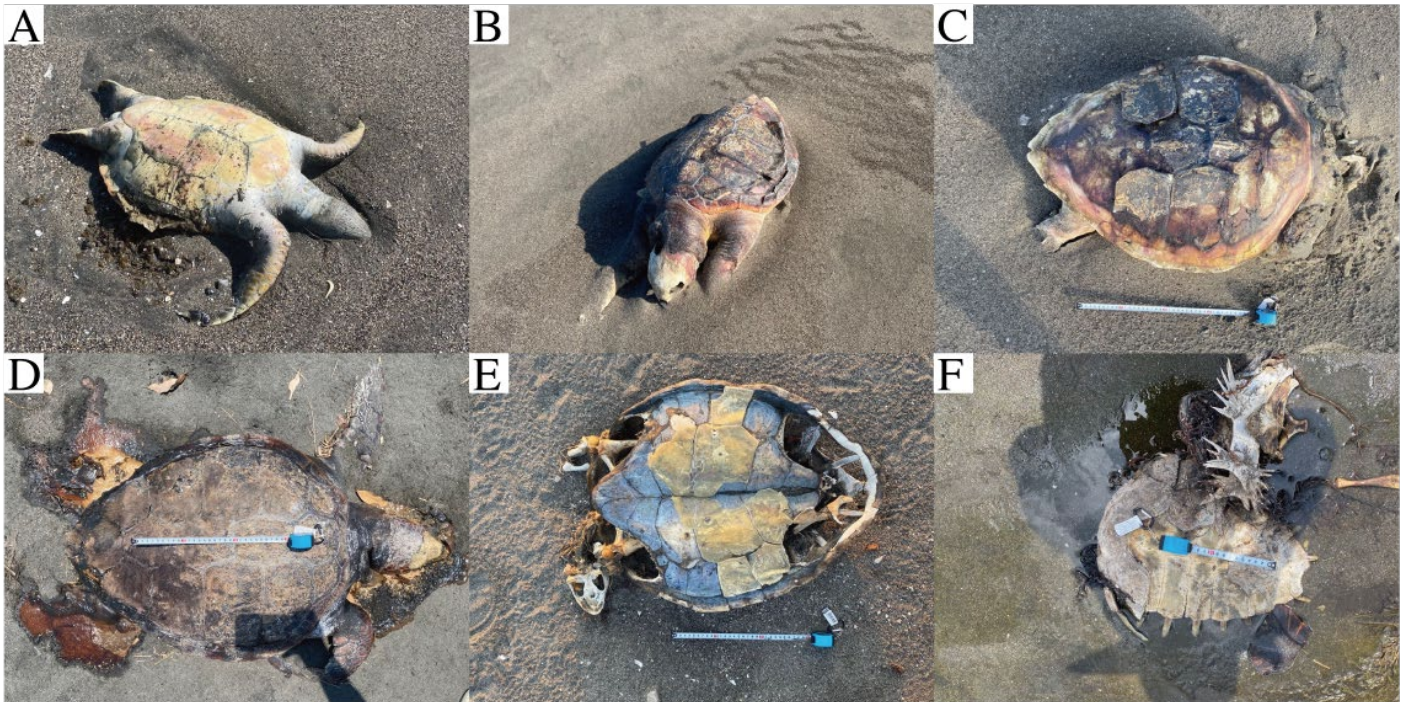

Figure 2. Stranded sea turtles along the southern Boso Peninsula. A) Fresh, B–C) Moderately decomposed, D) Severely decomposed, E) Dry carcass, F) Skeleton.

size (SCL) is 82.1 cm (Ishihara & Kamezaki 2010). Based on carapace size, most of the loggerheads were considered subadults, while greens were mostly juveniles. This result is similar to turtles found during surveys by Moriya (2010). Offshore of the southern Boso Peninsula is an abundant fishing ground with rocky reefs at depths of over 200 m for more than 10 km along the coast. In addition, there are seaweed beds (*Gelidium* sp.), which greens prefer, in the southwestern area of this peninsula (Kameda & Ishihara 2009; Chiba Prefecture 2019). Our observation of the smaller sea turtles found on the Boso Peninsula coast suggests that this area may serve as an important feeding ground for loggerheads (subadult) and greens (juvenile). In this survey, many carcasses appeared to have been dead for several weeks based on the level of decay.

Despite the short time for this survey, the occurrence of strandings in this region was confirmed and more detailed surveys are required to assess the reasons for strandings. The collected data are also being shared with Chiba Marine Fisheries Adjustment Commission to facilitate regional collaboration and conservation efforts. This study serves as an important snapshot into the frequency of strandings on the southern Boso Peninsula during the busy summer nesting season.

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Microchipping Green Turtles at Atol das Rocas, Brazil, for Long-Term Identification (2015-2018)

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Green turtles (*Chelonia mydas*) have critical nesting areas in Brazil, specifically on oceanic islands such as Atol das Rocas, the Fernando de Noronha Archipelago and Trindade Island. The species has primarily coastal habits and commonly uses estuarine and lagoon environments during juvenile development (Hirth 1997; Santos et al. 2011). Its complex life cycle makes it challenging to obtain accurate population estimates, especially during oceanic phases. Nest counts and the monitoring of nesting females during the breeding season remain the most widely used methods for population assessment. However, these approaches are subject to uncertainty, as only a fraction of reproductive females nest in a given year, and interannual variation may be influenced by both environmental and population-level factors (Marco 2012).

At Atol das Rocas, frequent loss of metal flipper tags has raised concerns regarding the reliability of external tagging for long-term monitoring. In contrast, Passive Integrated Transponder (PIT) tags offer high retention rates, are difficult to remove and do not interfere with normal behavior or movement. Previous studies have demonstrated the reliability and longevity of PIT tags in sea turtles, particularly when compared to external metal tags (Balazs 1982; Dutton & McDonald 1994; Elbin & Burger 1994; Braun-McNeill et al. 2003; Wyneken et al. 2010). Given this context, we evaluated the application of microchips in nesting green turtle females at Atol das Rocas, assessing their efficacy, durability and recapture rates over four consecutive nesting seasons.

The study was conducted between 2015 and 2018 at the Atol das Rocas Biological Reserve, the only atoll in the western South Atlantic, located 144 nautical miles off the northeastern coast of Brazil (-3.8667°, -33.8167°). Two small islands are permanently above the water line (Farol Island and Cemetery Island). Farol Island was selected for this study due to its logistical advantages for nocturnal monitoring of nesting females. Night patrols were conducted starting approximately one hour before high tide to increase the likelihood of encountering females on land. For each turtle, we checked for the presence of metal flipper tags and previously implanted microchips.

Individuals without any identification were microchipped during oviposition, via intramuscular implantation in the triceps muscle of the right front flipper. Immediately after implantation, each microchip was scanned to confirm successful reading and registration. Biometric data (curved carapace length, CCL; and straight carapace length, SCL) and general observations were recorded for all individuals. Microchips were applied during all nesting seasons between 2015 and 2018, and all marked females were scanned on subsequent encounters to detect intra- and interannual recaptures.

Over the four-year period, 285 female green turtles were microchipped at Atol das Rocas, with 106 individuals marked in 2015, 59 in 2016, 89 in 2017 and 31 in 2018. Biometric measurements recorded during the study showed mean values of 110.4 cm for CCL (range: 99-126 cm) and 103.4 cm for SCL (range: 91-106 cm), consistent with those reported for adult nesting females in Atlantic rookeries (Hirth 1997).

Individual identification is essential for studies of abundance, site fidelity, dispersal patterns and population structure in sea turtles (Elbin & Burger 1994). Although external flipper tags remain widely used, high rates of tag loss in green turtles can compromise long-term datasets and affect estimates of re-nesting frequency and survival. In contrast, PIT tags are designed to remain functional for many years and to provide unequivocal identification when scanned with an appropriate reader.

Across the study period, we documented 26 interannual recaptures. Of these, 23 females microchipped in 2015 were recaptured during the 2016, 2017 and/or 2018 nesting seasons, and three females microchipped in 2016 were recaptured in 2018 (Table 1). These results demonstrate that PIT tags remained functional across multiple nesting seasons and allowed us to identify the same individuals in subsequent years. In addition to interannual recaptures, we observed high intraseasonal recapture rates, confirming that many females nested multiple times within a single season, as expected for the species. Our results demonstrate the successful long-term identification of microchipped females under field conditions.

The main limitation of PIT tags remains the short reading range, typically less than 10 cm, which requires proper alignment between the reader and the implantation site to avoid missed detections (Elbin & Burger 1994). This constraint may be minimized by incorporating standardized scanning protocols into nightly patrol routines and by ensuring that all observers are trained to locate and scan the implantation site consistently.

The use of microchips in nesting green turtle females at Atol das Rocas proved to be an efficient, safe and reliable method for individual identification. Consistent intra- and interannual recaptures and the successful identification of females tagged in

Year	Marked females	Return 1	Return 2	Return 3	Return 4
2015	106	70	44	14	2
2016	59	48	32	16	4
2017	89	37	9	4	—
2018	31	18	9	5	3
Total	285	173	94	39	9

Table 1. Number of nesting *Chelonia mydas* females marked with PIT tags and number of intra-seasonal returns (re-nesting events) at Atol das Rocas Biological Reserve, Brazil, from 2015 to 2018.

previous years demonstrate the effectiveness and reliability of PIT tags for individual identification and long-term monitoring at this rookery, while minimizing the need for repeated handling of nesting females. We recommend the continued use of microchips in long-term monitoring programs for green turtles at Atol das Rocas and encourage the expansion of this technique to other nesting sites in Brazil. This approach can enhance the accuracy of population assessments, strengthen long-term datasets and provide more robust information for conservation strategies targeting this threatened species. A complete list of microchip identification numbers by year is provided in Table 2, which may support future cross-referencing and re-analysis efforts.

Acknowledgements: We thank all field assistants and collaborators involved in nightly patrols and data collection at Atol das Rocas Biological Reserve. All work was conducted under appropriate research permits (SISBIO 406363-5) and followed institutional and national guidelines for research on protected species. We would like to thank our sponsors iGUi Piscinas and iGUi Ecologia, this work would not have been possible without their financial support.

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2015	963008000262951
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2015	963008000262954
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2015	963008000262962
2015	963008000262963
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2015	963008000523240
2015	963008000523241
2015	963008000523242
2015	963008000523243
2015	963008000523244
2015	963008000523245
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Table 2. Microchip identification numbers for nesting green sea females marked at Atol das Rocas Biological Reserve, Brazil, from 2015 to 2018 (continues on next page).

2015	963008000523247
2015	963008000523248
2015	963008000523249
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2018	963008000866916
2018	963008000865758
2018	963008000866903
2018	963008000865798
2018	963008000866713
2018	963008000865800

Limb Amputation and Age Estimation in a Plastic-Entangled Olive Ridley Turtle

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The olive ridley turtle (*Lepidochelys olivacea*) is widely distributed across tropical and subtropical waters and is listed as Vulnerable by the IUCN (www.iucnredlist.org). Anthropogenic interactions, especially with discarded plastic, remain a major source of injury and mortality for marine turtles along the Brazilian coast (Jerdy *et al.* 2017). Age-estimation analyses have proven valuable for understanding how such threats affect individuals at different life stages (Snover & Hohn 2004; Zug *et al.* 1986). In this note, we describe the rescue, clinical treatment, limb amputation, and release of an adult male *L. olivacea* severely injured by plastic debris, including age estimation using skeletochronology.

During routine monitoring under the Beach Monitoring Project for the Campos and Espírito Santo Basin (PMP-BC/ES, see Werneck *et al.* 2018), a male olive ridley with a curved carapace length of 79.8 cm, a curved carapace width of 80.0 cm and a body mass of 30.2 kg, was found in January 2025 in Armação dos Búzios, Rio de Janeiro, Brazil (-22.768862, -41.91438). The turtle exhibited a deep circumferential constriction around the neck (Fig. 1) and severe entrapment of the left foreflipper caused by an entangled plastic balloon (Fig. 2). Carapace abrasions with caseous material indicated chronic friction-related injury. The animal was taken to another institution, which is also part of the PMP-BC/ES program, for stabilization, and in February was transported to the Institute BW Sea Turtle Hospital for treatment.

Radiographs revealed a complete comminuted fracture of the mid-left humerus with partial anatomical alignment, as well as soft-tissue swelling and radiopaque debris adjacent to the mid-right humerus (Fig. 3). Although the turtle responded well to stabilization, analgesia, antimicrobial therapy, and wound care, the left fore-flipper progressed to extensive necrosis due to compromised vascular supply (Fig. 4). Limb amputation was therefore performed on 21 February 2025. The left humerus was collected for skeletochronological analysis.

Osteohistology identified three distinct lines of arrested growth (LAGs) and 18 resorbed LAGs, yielding a minimum estimated age of 21 years, which is at or beyond the age of maturity, according to published skeletochronological assessments for the species (Avens & Snover 2013). Indeed, the tail of this turtle extended well beyond the edge of the carapace, confirming it as an adult male and highlighting the conservation relevance of the case given the potential loss of reproductive adults to plastic debris.

Postoperative care included amikacin (5 mg/kg IM), tramadol (10 mg/kg IM), meloxicam (0.5 mg/kg IM), and laser therapy (3 J for 30 s every 48 h). The turtle resumed voluntary feeding shortly after surgery, consuming an average of 1.3 kg/day of sardines with vitamin supplementation. Over the following months, it showed steady clinical improvement, satisfactory adaptation to the loss of the left fore-flipper, and excellent surgical wound healing. Hematological and biochemical parameters remained within acceptable ranges, reflecting good recovery.

After behavioral assessment and evaluation of swimming performance, the turtle was deemed fit for release and returned to the wild on 15 May 2025. It weighed 28.7 kg at the time of amputation and 31.8 kg at release.

This case underscores the severe consequences of plastic debris for marine turtles, including constriction injuries, necrosis, and limb loss. It also emphasizes the importance of rapid clinical intervention, specialized surgical care, and the usefulness of skeletochronology



Figure 1. Deep neck constriction and entrapment of the left fore-flipper of a male olive ridley caused by an entangled plastic balloon.

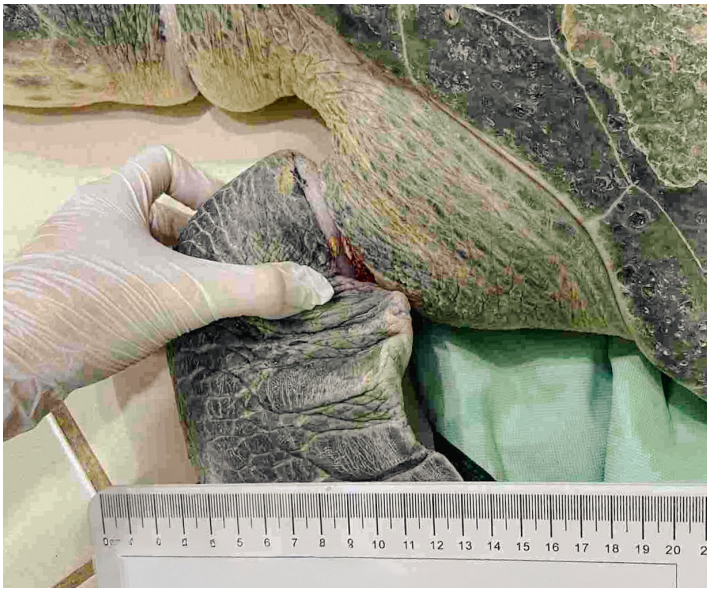

Figure 2. Severe entrapment of the left fore-flipper caused by an entangled plastic balloon.

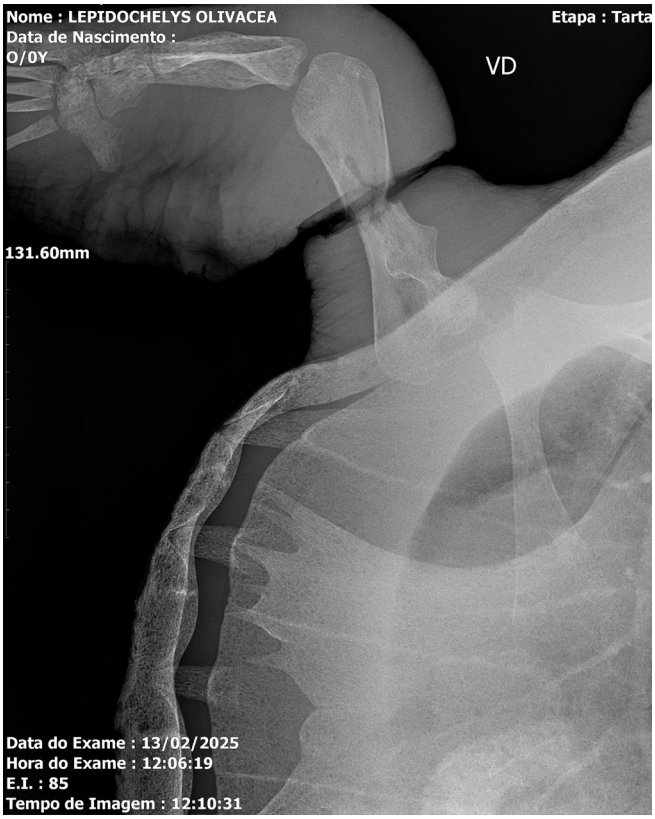

Figure 3. X-ray image revealed a complete comminuted fracture of the mid-left humerus with partial anatomical alignment.



Figure 4. Progressive necrosis and tissue loss of the left fore-flipper prior to amputation.

in understanding the biological significance of affected individuals. The successful rehabilitation and release of this adult male olive ridley highlight the critical role of rescue and rehabilitation programs in the conservation of threatened marine turtle populations.

Acknowledgments. The PMP-BC/ES is part of the requirement established by the federal environmental licensing process of the Brazilian Environmental Agency (IBAMA), under authorization ABIO-1424/2025, for the exploration of oil and gas by PETROBRAS in the Campos Basin pre-salt province. The Institute BW is involved in biology and veterinary medicine activities, and one of its main aims is to disseminate scientific study results to contribute to the conservation of aquatic organisms.

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First Record of Green Turtles (*Chelonia mydas*) in Araruama Lagoon, Rio de Janeiro, Brazil

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Araruama Lagoon is located in the Lakes Region of Rio de Janeiro State, southeastern Brazil, centered approximately at -22.882° S and -42.210° W. The lagoon constitutes one of the largest hypersaline coastal lagoons in the world with 220 km² and represents an important environmental and hydrodynamic system in the Brazilian coastal zone (Kjerfve 1994). Its connection with the sea occurs through the narrow and shallow Itajurú Channel, located in the eastern portion of the lagoon, in the municipality of Cabo Frio.

Several studies have addressed the region's aquatic biodiversity, with an emphasis on seabirds (Rodrigues & Michelin 2005) and fish (Saad 2003; Massante & Lima 2011). However, to date no scientific records are available to confirm the presence of sea turtles at Araruama Lagoon. In this sense, this note aims to report the occurrence of eight individual green turtles (*Chelonia mydas*) in this lagoon. According to Singaúque (2013), the hydrodynamic regime of the channel is strongly influenced by tidal action, resulting in high-intensity currents in the region, and it is plausible that such currents contributed to the passive transport of the turtles toward the interior of the Araruama Lagoon.

Eight green turtles were recorded in different Araruama Lagoon areas between June 2024 and August 2025, one found alive and weak, and seven found dead. All were taken to the BW Institute Lakes Region Rehabilitation and Stabilization Center (CRD-RL), in the city of Araruama, Rio de Janeiro, Brazil (Fig. 1).

Biometric data comprising total length and curvilinear carapace length (CCL) were obtained for all individuals, and their locations were recorded (Table 1). The CCL of specimen IBW-7B/FAI000408 was not determined due to an extensive carapace injury, making this measurement impossible. The individuals reported herein were juveniles and subadults (Table 1), with CCLs ranging from

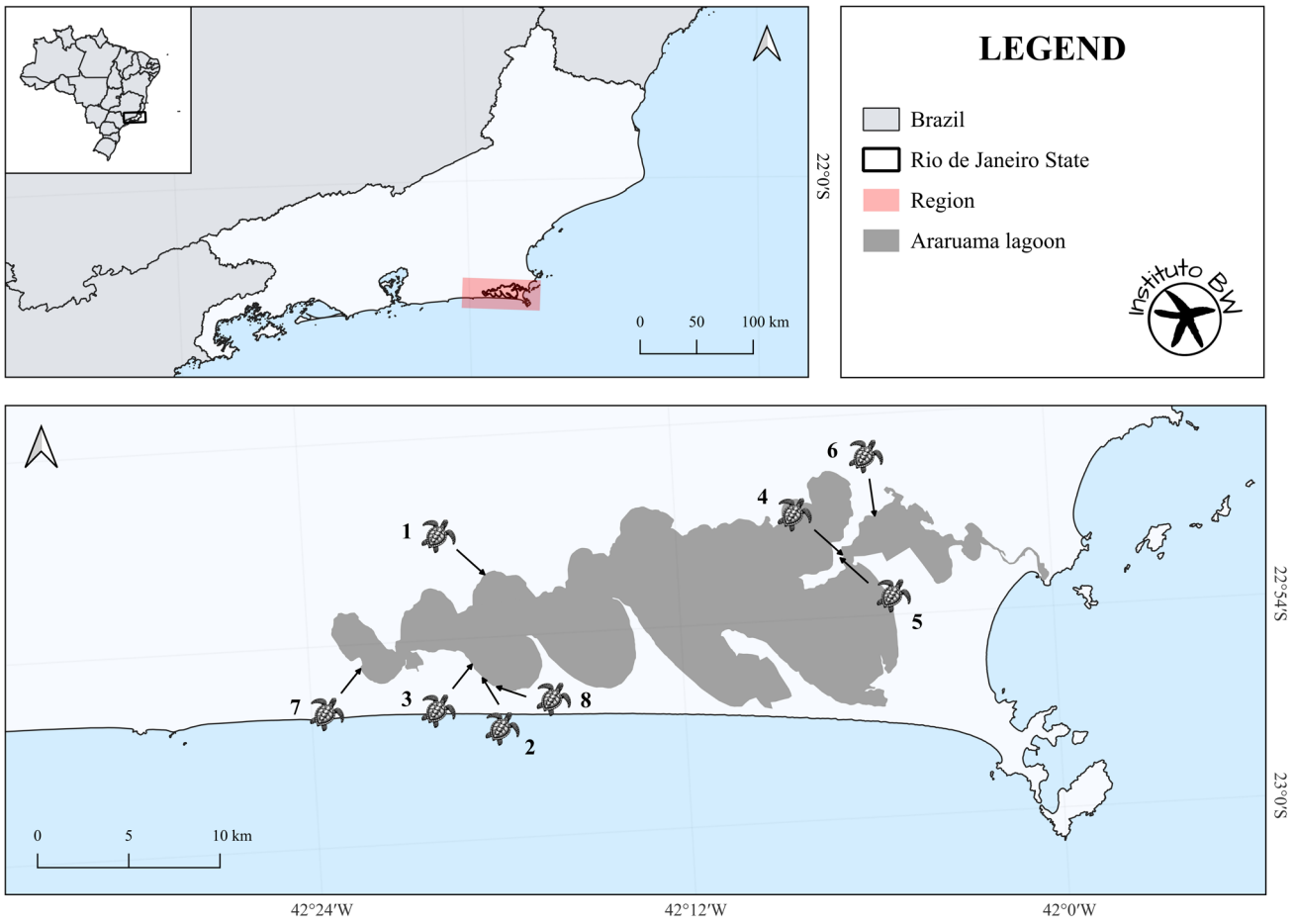

Figure 1. Green turtle (*Chelonia mydas*) occurrence at Araruama Lagoon, in the state of Rio de Janeiro, southeastern Brazil.

Turtle ID	Location	Total length (cm)	CCL (cm)	Date of occurence
IBW-7B/FAI000319	-22.911700, -42.372500	73.2	54	31-Oct-24
IBW-7B/FAI000320	-22.850800, -42.093000	65.8	53	3-Nov-24
IBW-7B/FAI000376	-22.871664, -42.111133	62	48.5	1-Feb-25
IBW-7B/FAI000398	-22.869847, -42.110978	86	66.1	20-Mar-25
IBW-7B/FAI000408	-22.912600, -42.312900	-	-	1-Apr-25
IBW-7B/FAI000441	-22.919586, -42.307658	39.8	33.5	23-Apr-25
IBW-7B/FAI000519	-22.924400, -42.300200	84.5	73.1	16-Jun-25
IBW-7B/FAI000520	-22.868828, -42.302900	43	32	21-Jun-25

Table 1. List of individual green turtles (*Chelonia mydas*) found in Araruama Lagoon from October 2024 to June 2025, in the state of Rio de Janeiro, southeastern Brazil.

45.0 cm to 73.1 cm (Grossman *et al.* 2007). Although green turtles in the southwest Atlantic nest primarily on oceanic islands, they occur along the entire Brazilian coast (Almeida *et al.* 2015). Our analysis, however, did not allow us to determine the reason why these individuals entered Araruama Lagoon, whether due to oceanographic conditions or in search of food. In this context, future studies may contribute to elucidating these factors.

Sea turtles have been previously reported in lagoon environments in Brazil. Soto & Beheregary (1997), for example, described the occurrence of 11 juvenile green turtles captured in fishing nets from January 1992 to January 1996 at Lagoa dos Patos, in the state of Rio Grande do Sul, southern Brazil. This report presents the first occurrences of sea turtles at Araruama Lagoon and provides important records of these animals in this region.

Acknowledgments. Although the one living turtle was documented in the Araruama Lagoon, all financial support for its care was provided by the beach monitoring project in Rio de Janeiro State which is part of the requirements established by the federal environmental licensing process of the Brazilian Environmental Agency (IBAMA) under authorization for the capture, collection, and transportation of biological material (ABIO) number 861/2017, first amendment 22023451, for the exploration of oil and gas by PETROBRAS in the Campos Basin Pre-salt province. All data related to these animals are available on the SIMBA platform - Aquatic Biota Monitoring Information System (https://simba.petrobras.com.br/simba/web/). The BW Institute is involved in biology and veterinary medicine activities, and one of its main aims is to disseminate scientific study results to contribute to the conservation of aquatic organisms. The authors thank all the IBW team members who fight daily for the marine species conservation in Rio de Janeiro State, as well as the local community whose efforts made these important records possible.

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REPORT

President's Report: 44th International Sea Turtle Society Symposium, Kailua-Kona, Hawai'i, USA 2026

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The 44th International Sea Turtle Society (ISTS) Symposium was held from February 28 to March 6, 2026 in Kailua-Kona, Hawai'i (Fig. 1). This meeting marked a historic milestone as the first symposium hosted in Hawai'i or anywhere in the Pacific Islands, bringing the global sea turtle conservation community into a region where sea turtles are deeply embedded in cultural, ecological, and spiritual systems.

Convened under the theme *Kaiāulu*, the symposium emphasized interconnected relationships between people, place, and environment. This framework shaped both the design and delivery of the meeting, guiding an approach that placed equal value on scientific exchange, cultural grounding, and community well-being. The result was a symposium that not only advanced scientific knowledge, but also intentionally created space for reflection, dialogue, and connection across diverse perspectives.

Plenary Program and Intellectual Impact. A defining feature of the 44th ISTS Symposium was the structure and impact of its plenary program, which, together with the Opening Ceremony, was intentionally designed as a cohesive intellectual and cultural foundation for the week (Fig. 2).

The symposium opened with a traditional Hawaiian oli and blessing, grounding the meeting in place and establishing a tone of respect, connection, and shared responsibility. Invited speakers emphasized themes of stewardship, responsibility to place, and the deep relationships between people, place, sea turtles, and ocean. This opening was not simply ceremonial, but set the conceptual framework for the sessions that followed, reinforcing the symposium theme of *kaiāulu* and positioning conservation within broader social, cultural, and ethical contexts.

Building on this foundation, three plenary sessions moved beyond traditional keynote formats to create space for dialogue around complex and, at times, contested issues in sea turtle conservation. The first plenary, *Pacific Island Nations, Shared Seas: Indigenous Perspectives on Sea Turtle and Marine Conservation*, elevated Indigenous leadership and Pacific Island voices, centering customary stewardship, cultural relationships with sea turtles, and the integration of traditional knowledge into conservation practice. This session reframed conservation as a process grounded in place, culture, and community, rather than solely as a scientific or management exercise.



Figure 1. Welcome display for the 44th ISTS Symposium in Kailua-Kona, Hawai'i. Featuring the symposium theme, *Kaiāulu*, and welcome messages in multiple languages, the display reflected the symposium's emphasis on community, inclusivity, and global participation. Photo provided by Ana Barragán.



Figure 2. Opening Ceremony and plenary sessions of the 44th ISTS Symposium. Images show the traditional Hawaiian oli and blessing (top left), participants and organizers of Plenary Sessions 1 and 2 (top right and bottom left), and panelists, moderator, and translator during Plenary Session 3 (bottom right). Together, these events established the cultural and intellectual framework for the symposium. Photos provided by Laura Prosdocimi & Kelly Hogan.

The second plenary, *Headstarting Revisited: Effectiveness, Ethics, and Evidence*, revisited a long-standing and historically debated practice in sea turtle conservation, situating it within the broader question of how conservation strategies evolve over time. The session critically examined the biological effectiveness and ethical considerations of headstarting, while also addressing its appropriateness in a modern conservation context. Discussion reflected continued divergence within the field, with some practitioners supporting its use under certain conditions and others questioning its value relative to alternative strategies.

The third plenary, *Surviving to Thriving: Evolving the Ethos of Sea Turtle Conservation*, explored the transition from crisis-driven conservation toward long-term stewardship. As some populations recover while others remain imperiled, the session challenged the field to reassess its assumptions, adapt its strategies, and incorporate a broader range of perspectives into conservation decision-making.

Together, the Opening Ceremony and plenary sessions created a deliberate progression, from grounding in place and values, to critical examination of existing practices, to forward-looking reflection on the future of the field. This structure marked a clear shift in the role of the symposium, from a venue primarily for presenting results to one that more intentionally fostered dialogue, reflection, and direction-setting within the global sea turtle conservation community.

These themes were not confined to the plenary sessions, but were further explored through complementary workshops and discussions during the symposium, including sessions addressing decolonization in conservation practice and the role of sustainable use in contemporary management frameworks. Together, these elements reflected a broader engagement across the program with evolving and, at times, challenging questions in the field.

Innovation, Technology, and Firsts. The 44th ISTS Symposium introduced several first-of-their-kind advancements in

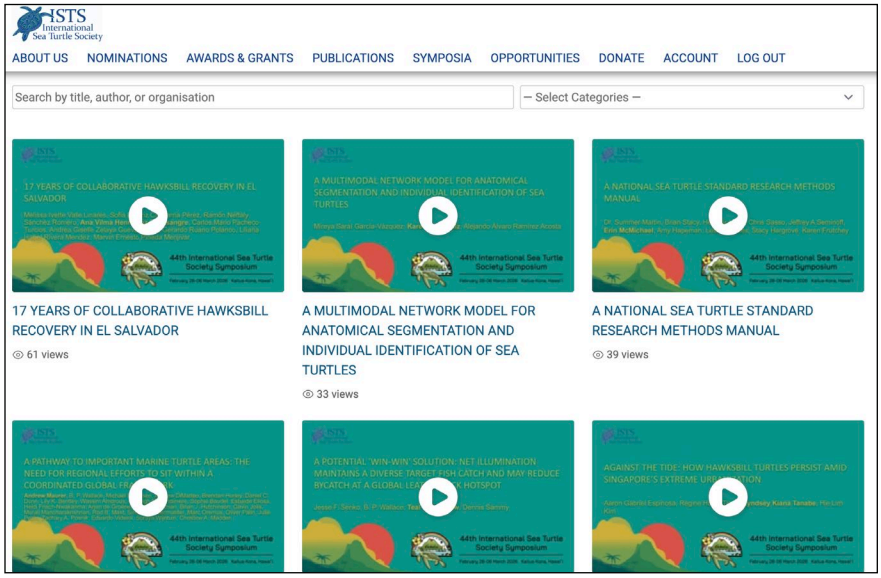

Figure 3. Online archive of recorded presentations from the 44th ISTS Symposium. The symposium marked the first comprehensive effort to record oral presentations, poster sessions, plenaries, and the opening ceremony, creating a lasting digital resource that expands access to symposium content beyond the meeting itself.

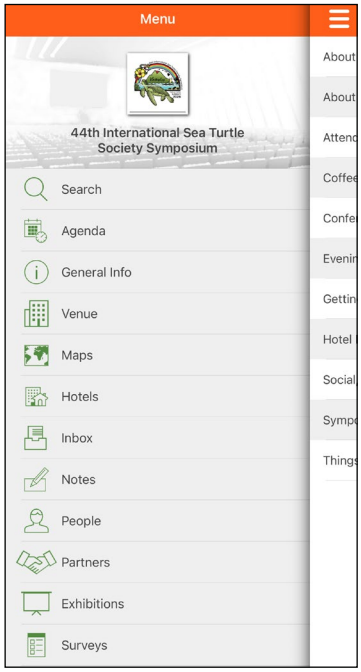

Figure 4. Mobile program application developed for the 44th ISTS Symposium. The app provided participants with real-time access to the program schedule, event information, venue details, maps, exhibitor information, and symposium communications, enhancing participant engagement and improving meeting navigation and coordination.

symposium delivery, communication, and long-term accessibility, fundamentally expanding how the meeting is experienced and accessed. The symposium marked the first comprehensive effort to record core components of the meeting, including oral presentations (Fig. 3), poster sessions, plenaries, and the opening ceremony. A total of 342 (87.9%) of presenters opted in to recording, with only 47 opting out, reflecting strong community support for broader dissemination of content.

This effort extended beyond documentation to significantly expand access and extend the lifespan of the symposium. Recordings create opportunities for participants who were unable to attend specific sessions, as well as for the broader global community, particularly those facing financial, geographic, or logistical barriers to participation. They also establish the foundation for a lasting digital archive, enabling continued learning, reference, and engagement well beyond the meeting itself.

The symposium also marked the first time a dedicated mobile program application (Fig. 4) was developed, with 640 installations, representing adoption by the vast majority of attendees. Used alongside the printed program, the app significantly improved real-time communication, scheduling, and participant engagement, demonstrating the value of integrated digital tools for large international scientific meetings.

The scale of coordination required for the symposium was also substantial, with more than 21,000 system-generated communications supporting registration, scheduling, and participant coordination. Together, these advancements represent a meaningful step toward a more accessible, connected, and resilient model for future ISTS symposia.

Participation and Global Reach. The symposium attracted 693 participants (Fig. 5), representing 53 nations. Participation reflected strong global engagement across regions and sectors. Attendees included representatives of NGOs, government agencies, and academic institutions. Registration data also reflected the broad diversity of the symposium community, including 128 students, 54 participants from Pacific Island regions, 205 participants from low-income countries, 228 from high-income countries, 34 non-ISTS members, and 44 single-day registrants. These categories highlight important dimensions of participation, though they are not mutually exclusive. Extensive travel support also played an important role in enabling attendance from a diverse and globally distributed community.A total of 363 participants had no prior recorded attendance since tracking began at the 40th ISTS Symposium, underscoring the meeting's success in expanding its reach to new and previously unrecorded members of the global sea turtle conservation community.

Scientific Program. The scientific program was substantial, with 437 abstracts submitted and 1,177 completed reviews conducted by Session Chairs. Following withdrawals prior to the symposium, the final program included 389 scientific contributions, consisting of 180 oral presentations and 209 poster presentations (Fig. 6).

Sessions covered the full breadth of sea turtle science and conservation, including in-water ecology, nesting biology, population monitoring, fisheries interactions, conservation management, and socio-cultural dimensions of conservation. Delivery of the scientific program was supported by three Program Chairs, 41 Session Chairs and 118 volunteers, whose contributions were essential to coordinating reviews, managing sessions, and ensuring the smooth execution of the program.

Student Participation and Engagement. Student participation continued to be a defining strength of the symposium, spanning



Figure 5. Group photograph of participants attending the 44th ISTS Symposium in Kailua-Kona, Hawai'i. Approximately 693 participants from 53 countries attended the symposium. Photo provided by Miguel Reynoso.

both the scientific program and a range of dedicated engagement activities. A total of 126 students applied for Student Presentation Awards, reflecting strong interest in competitive recognition within the scientific program. In parallel, 145 student presentations were evaluated by 129 volunteer evaluators through the symposium's student evaluation process, including 83 poster presentations and 62 oral presentations. Because participation in the awards and evaluation processes was optional, the total number of student contributions to the symposium was likely higher than these figures alone.

Engagement extended beyond the scientific program through a well-attended suite of student-focused events. The student mixer brought together 69 participants (Fig. 7), while 42 students and 5 experts participated in the student workshop. Speed chatting sessions included 19 students and 9 experts, contributing to a total of 14 experts engaged across student programming. Together, these efforts facilitated meaningful interaction between students and established researchers, supported professional development, and reinforced the symposium's role in cultivating the next generation of sea turtle scientists and conservation practitioners.

Workshops, Regional Meetings, and Capacity Building. Workshops and regional meetings held during the first three days of the symposium remained a central component of the program, providing structured opportunities for training, collaboration, and regional coordination. Nineteen workshops engaged 846 participants, providing opportunities for technical training, skill development, and collaboration. Individual workshops ranged from approximately a dozen to >90 participants, reflecting both specialized and broadly attended topics. Several workshops also engaged directly with themes highlighted in the plenary program, extending discussions on topics such as decolonization in conservation practice and the role of sustainable use into more applied and participatory settings. In addition, six regional meetings (e.g., Fig. 8) brought together 243 participants to discuss region-specific conservation priorities, strengthen networks, and coordinate efforts across geographic areas. Together, these sessions played an important role in building capacity, fostering collaboration, and supporting coordination across the global sea turtle conservation community.



Figure 6. Examples of oral and poster presentations at the 44th ISTS Symposium. The scientific program included 180 oral presentations and 209 poster presentations spanning the full breadth of sea turtle research, conservation, management, and outreach. Photos by José Urteaga and Laura Prosdocimi.



Figure 7. Students participate in an interactive icebreaker activity during the student mixer at the 44th ISTS Symposium. The mixer provided an informal setting for students to build connections with peers from around the world, helping to foster networking and community among emerging sea turtle scientists and conservation practitioners. Photo by Laura Prosdocimi.



Figure 8. Participants in the Oceania Regional Meeting at the 44th ISTS Symposium. Regional meetings provided a forum for practitioners, researchers, managers, and community representatives to discuss region-specific conservation priorities, strengthen professional networks, and coordinate conservation efforts across geographic areas. Photo by Irene Kelly.



Figure 9. Highlights from the Welcome Social at the 44th ISTS Symposium, including live Hawaiian music, hula and Tahitian dance performances, fire knife dancing, and informal opportunities for participants to connect. Attended by approximately 500 participants, the event provided a culturally grounded welcome to the symposium and reinforced its connection to place and community. Photos provided by Laura Prosdocimi and Brian Hutchinson.

Outreach, Community Events, and Cultural Programming. A diverse suite of community, cultural, and special events complemented the scientific program and were intentionally integrated into the symposium to reinforce the theme of *Kaiāulu*, fostering connection, place-based engagement, and shared experience.

The Welcome Social and Farewell Luau served as cornerstone events, each integrating cultural elements that grounded the symposium in its Hawai‘i setting. The Welcome Social featured traditional Hawaiian music and performances, alongside hula, Tahitian dance, and fire knife dancing (Fig. 9), and was attended by approximately 500 participants. The Farewell Luau similarly combined a traditional Hawaiian culinary experience with live local music, drawing more than 440 attendees and providing a meaningful and celebratory close to the symposium.

Additional events supported both community engagement and professional exchange. These included Video Night, which provided a public-facing platform for storytelling and outreach and featured 24 films representing a wide range of countries and perspectives. The Origin Stories session created space for personal narratives from individuals working in sea turtle conservation, highlighting diverse pathways into the field and the experiences that have shaped practitioners’ careers. The IUCN Marine Turtle Specialist Group (MTSG) meeting also served as an important forum for global coordination and collaboration.

The Makana Aloha program offered a mechanism for participants to support the symposium while sharing locally inspired goods, reinforcing the event’s connection to place and community. Together, these events extended the impact of the symposium beyond the formal scientific program, reinforcing its role as both a



Figure 10. Support and community engagement activities at the 44th ISTS Symposium. Images show the symposium partner and sponsor recognition display (top left), silent auction (top right), live auction (bottom left), and Turtle Trading Post (bottom right). Photos provided by Laura Prosdocimi and José Urteaga.

professional gathering and a vibrant global community.

Sponsorship, Partnerships, and Fundraising. The 44th ISTS Symposium achieved an unprecedented level of financial support and partnership engagement, reflecting substantial investment in both the scope and delivery of the meeting. In total, sponsorship and partnership contributions generated approximately $290,000 in support of the symposium, representing the highest level of financial support in its history

The symposium was anchored by Wild Earth Allies as Lead Partner (Fig. 10), whose support was instrumental in shaping both the scope and ambition of the meeting, including the development of the plenary program and other key initiatives. Additional major contributions were provided by three Platinum Sponsors, the Coastal Wildlife Club, Oceans and Wildlife Institute, and the National Oceanic and Atmospheric Administration. Further support was provided by the Pacific Cooperative Studies Unit at the University of Hawai‘i at Mānoa as a Gold Sponsor, alongside a broader base of event-specific and general sponsors whose contributions supported student participation, program delivery, and community events throughout the week.

The symposium’s live and silent auctions were exceptionally successful, generating a combined total of $39,185, including $12,161 from the silent auction and $27,024 from the live auction. This represents a record-breaking outcome for the symposium and reflects a high level of engagement and generosity from the global sea turtle conservation community.

Merchandise sales were also highly successful. Through an in-kind contribution from Free Fly Apparel, sun hoodies (Fig. 11) were made available for purchase, generating $15,290 in gross revenue. With production costs of approximately $5,000, net proceeds of roughly $10,000 directly supported the symposium. The symposium also included 18 exhibitors and vendors, including 6 commercial exhibitors and 12 non-profit exhibitors (Fig. 12).

Travel grant support remained a major priority, with 180 applications received and 121 grants awarded (67.2% of applicants). Delivering this level of support in Hawai‘i required substantial investment, with approximately $149,000 allocated to support participant accommodations, reflecting both the success of fundraising efforts and the symposium’s commitment to accessibility. Together, these contributions enabled an expanded



Figure 11. Participants wearing commemorative symposium sun hoodies produced through an in-kind contribution from Free Fly Apparel. Merchandise sales provided important financial support for the symposium while creating a lasting connection to the meeting and its Hawai‘i setting. Photo provided by Claire Jean.



Figure 12. Exhibitor and vendor area at the 44th ISTS Symposium. The symposium included 18 exhibitors and vendors, representing both commercial and nonprofit organizations that contributed to participant engagement, outreach, and information sharing throughout the meeting. Photo by Laura Prosdocimi.

scope of programming, accessibility, and participant support beyond what has been achieved in previous symposia.

Legacy and Forward Impact. The 44th ISTS Symposium represents a clear inflection point in the evolution of the Society’s flagship meeting. Combining one of the largest scientific programs to date with strong global representation, expanded accessibility, and a willingness to engage directly with complex and evolving conservation topics, the symposium broadened both the scope and purpose of the meeting.

Together, these elements reinforced the symposium’s longstanding role as a platform for sharing research while elevating its function as a space for reflection, dialogue, and direction-setting within the global sea turtle conservation community. The conversations initiated in Hawai‘i, particularly those centered on Indigenous leadership, contested conservation practices, and the evolving ethos of conservation, are likely to influence both discourse and practice in the years ahead. In this way, the 44th ISTS Symposium not only reflected the current state of the field, but also contributed to shaping its future trajectory.

ANNOUNCEMENT

Simone J., a Brazilian contemporary multidisciplinary artist, created this monumental sculptural work centered on the turtle, developed around ideas of time, longevity, protection, memory and permanence. This work and others has been accepted for the CNI AMAZONIA 2027 in the Brazilian Amazon. Contact information for more information: Instagram: @archivej__ museum; E-mail: archivej@icloud.com



RECENT PUBLICATIONS

This section consists of publications, books, reports, and academic theses that feature subject material relevant to marine turtles. Most references come from major search engines, and the editors encourage authors to submit their publications directly by email to the Recent Publications editor: mtnrecentpubs@gmail.com.

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Sand disposal during a beach nourishment project, Bald Head Island, North Carolina, USA. Photo by M.H. Godfrey

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