

Feature

ARCHELON'S SATELLITE TAGGING PROGRAM
FOR THE PROTECTION OF SEA TURTLES

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and member of ARCHELON's Scientific Committee



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New technologies are crucial for studying and protecting nature and endangered species. Telemetry, satellite tracking, and drones are increasingly becoming important tools for safeguarding threatened wildlife.

Since 1983, ARCHELON has been at the forefront of adopting new technologies to carry out its diverse mission. In 2000, we began using radio transmitters to monitor the movements of sea turtles in Amvrakikos Gulf.



Due to the transmitters' limited range, we had to be in close proximity to the turtles, using a boat with an antenna, to receive their signals. This made radio transmitters unsuitable for tracking the turtles' long-distance migrations.

As satellite technology advanced, ARCHELON became a pioneer in Greece, as one of the first organizations to use satellite tags to study endangered species.

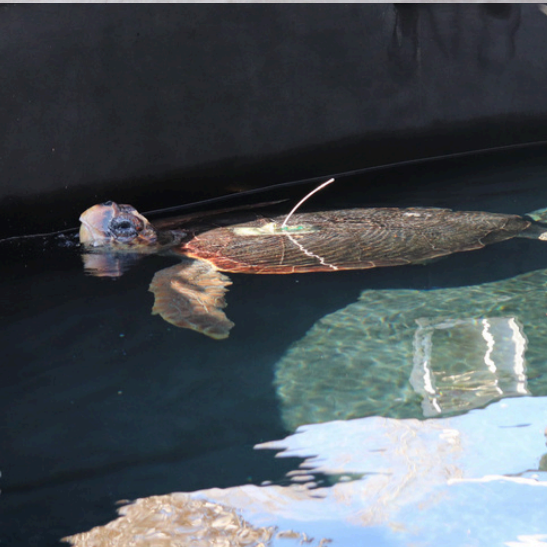


What is a satellite tag?

It's a small, waterproof device that is usually securely attached to the turtle's shell using a special adhesive.

How does it work?

Each time the turtle comes to the surface to breathe, a special sensor activates the transmitter's battery, sending out a signal that is picked up by Argos satellites orbiting the Earth. This signal is then relayed to ARCHELON's computers, allowing us to track the turtle's movements and create detailed maps of its journey. After about 2-3 years, the battery runs out and the transmitter naturally detaches from the turtle's shell. To make it easier to follow individual turtles and raise awareness, we give names to the turtles. In some cases, the public can even track their journeys in real time.



FIRST SATELLITE TAGS IN AMVRAKIKOS GULF

In 2002 and 2003, we attached the first 6 satellite tags to turtles in the Amvrakikos Gulf, a key feeding ground.

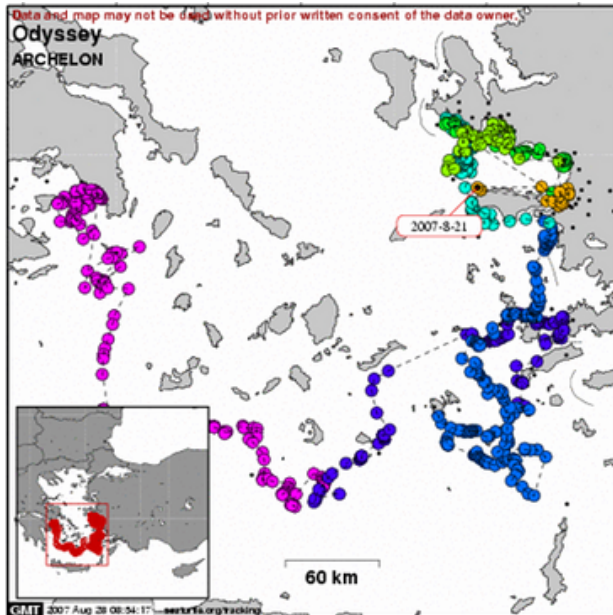
Given the high cost of these tags, we wanted to ensure they were used effectively, so we focused on studying turtles in this area. Despite our efforts, a female turtle named 'Luar' left the gulf in July 2003 and migrated to Syria. She then spent the winter in southern Turkey before tracking was lost in July 2004. It is likely she nested on the nearby beaches.

Luar's journey from Amvrakikos Gulf to Syria and Turkey. Her tracking lasted 14 months: May 2003 - July 2004 (Rees et al. 2017).

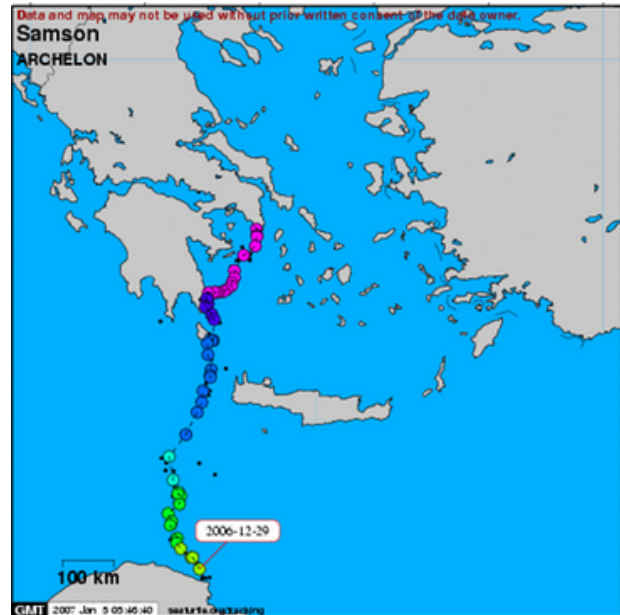


FOLLOWING RESCUED TURTLES AFTER THEIR RECOVERY

Six rehabilitated sea turtles from the ARCHELON Sea Turtle Rescue Centre (STRC) in Glyfada were fitted with satellite tags between 2004 and 2006 to track their health. These turtles embarked on extensive migrations, reaching Turkey and Libya, demonstrating the success of their rehabilitation at the STRC.



After its release on 4/10/2006, 'Odyssey' spent the winter in southern Cyclades and the Dodecanese islands, and in the spring of 2007, she settled in Samos and then Turkey, covering a distance of 2,880 km.



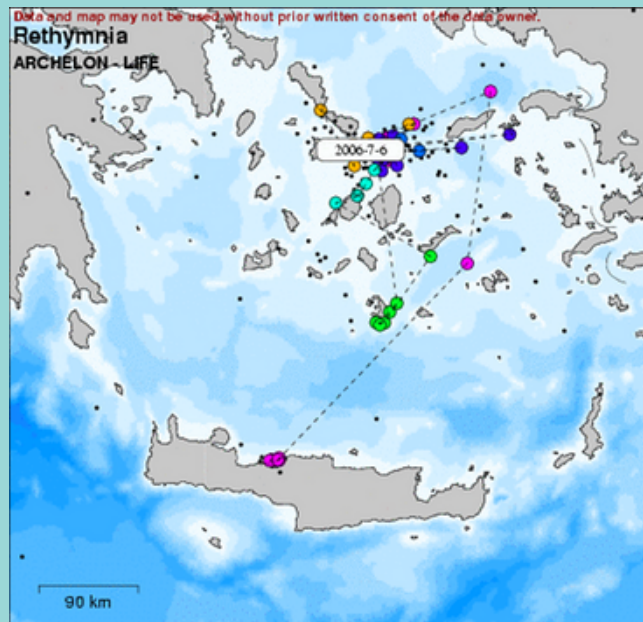
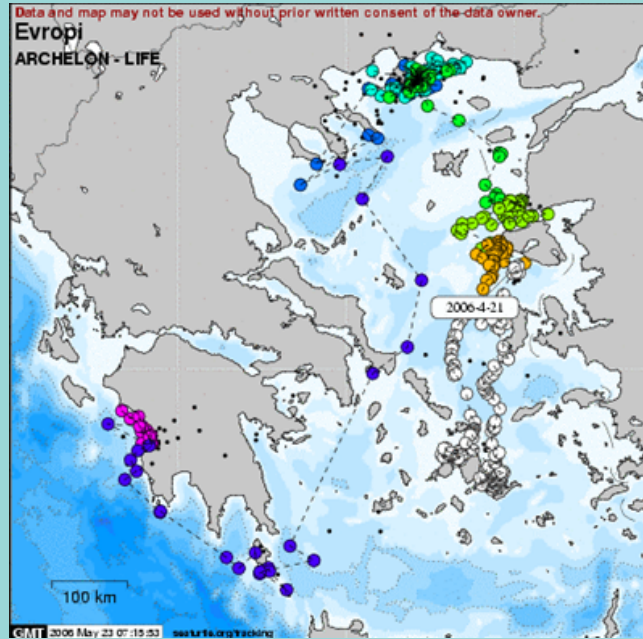
'Samson' was released in Sounion on 14/12/2006 and immediately headed south, where, after a journey of 676 km, he reached Libya in 15 days, presumably to spend the winter.

TAGGING THE FIRST MOTHER TURTLES

In 2005, we placed the first satellite tags in the nesting areas of Kyparissia Bay and Rethymno.

After nesting in Kyparissia Bay, 'Europe' headed to the northern Aegean where she spent the rest of summer 2005. When the cold weather arrived, she moved south to the Cyclades for the winter. In the spring of 2006, as the temperature was rising, she went to Lesvos where the tracking signal was lost.

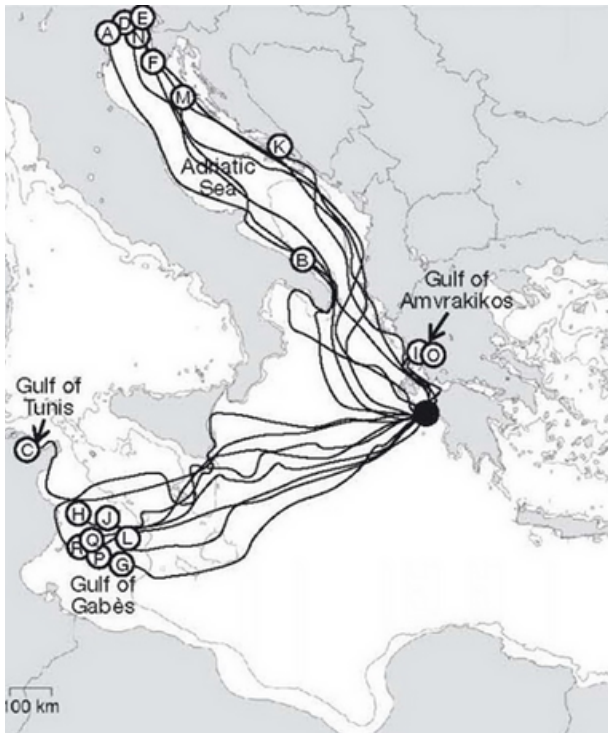
'Rethymnia', after nesting in Rethymno, spent a lot of time in the Cyclades, particularly around Mykonos, and also made trips around Ikaria island.



JOURNEYS WITH ZAKYNTHOS' TURTLES

As part of a PhD thesis by an ARCHELON volunteer, satellite tags were attached to 18 turtles in 2004, 2005, and 2007 after they nested in Zakynthos, in order to document their movements to feeding grounds.

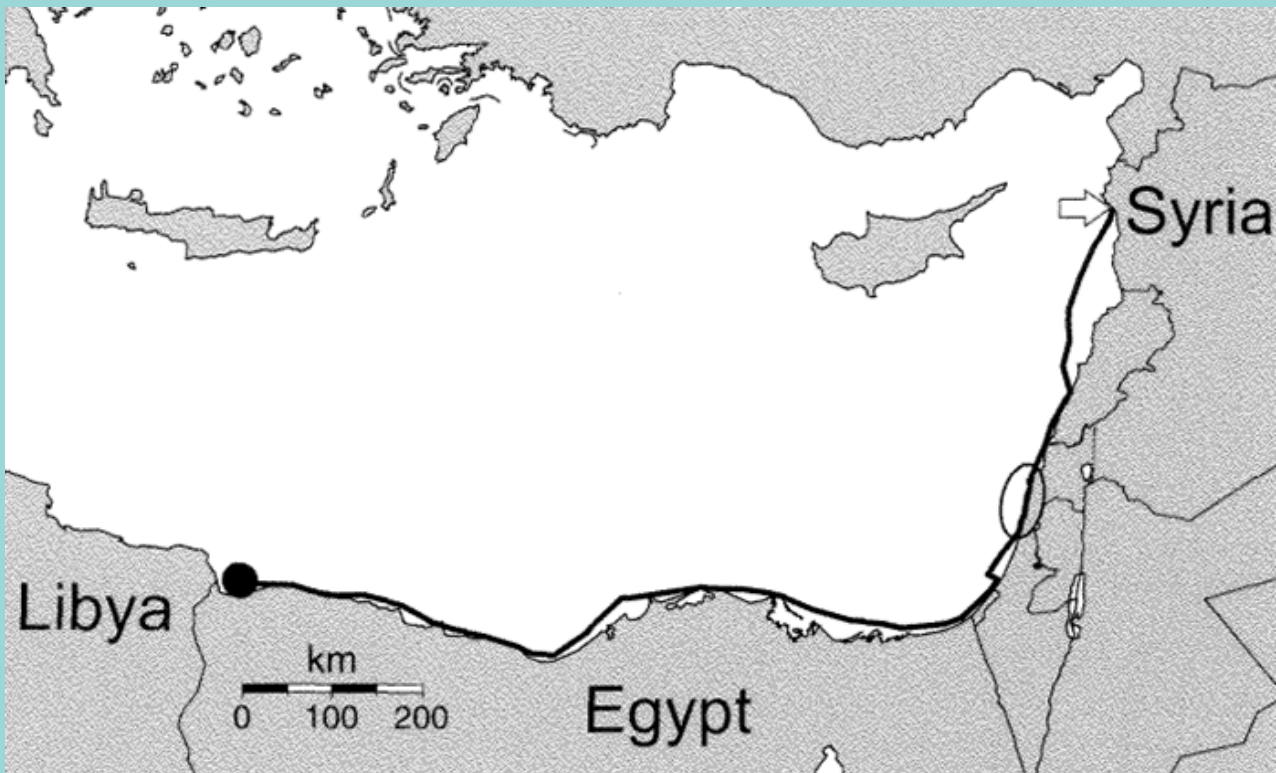
Indeed, 16 of these turtles migrated to the Adriatic Sea and Tunisia, confirming a previous ARCHELON study that had identified these areas as feeding grounds for turtles nesting in Greece, based on returns of identification tags from marked turtles.



Migrations of 18 sea turtles tagged after nesting in Zakynthos (Source: Zbinden et al. 2007). Most turtles reached their main feeding grounds in the Adriatic Sea and the Gulf of Gabès, while two turtles settled in the Amvrakikos Gulf, an important feeding area for loggerhead turtles.

A GREEN SEA TURTLE IN SYRIA

During the summer of 2006, an ARCHELON partner made a significant discovery: a new green turtle nesting area in the Mediterranean Sea, located in Syria. To study these turtles, a satellite tag was attached to a nesting female in Latakia, Syria.



Migration of a green turtle (*Chelonia mydas*) satellite-tagged by an ARCHELON partner in Latakia, Syria (Source: Rees et al. 2008). Most green turtles nesting in southern Turkey, Cyprus, and Syria spend the winter on the North African coast.

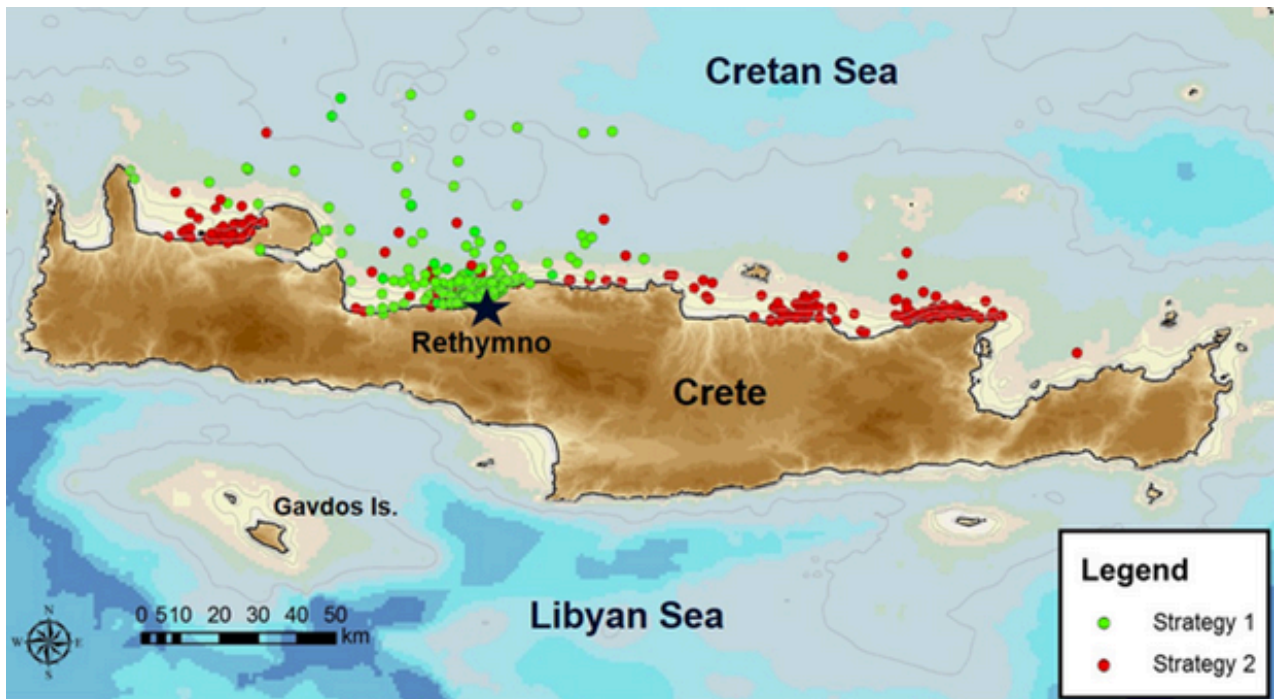
NEW SATELLITE TRANSMITTERS SHED LIGHT INTO TURTLE BEHAVIOUR IN RETHYMNO

In 2010 and 2011, as part of their PhD studies, two ARCHELON partners attached satellite tags to 20 turtles after nesting in Rethymno. These tags provided data not only on the turtles' location but also on their diving depth. Additionally, instead of being glued to the shell, the tags were 'suspended' behind the shell using a special connector that detached after a certain period, releasing the transmitter.



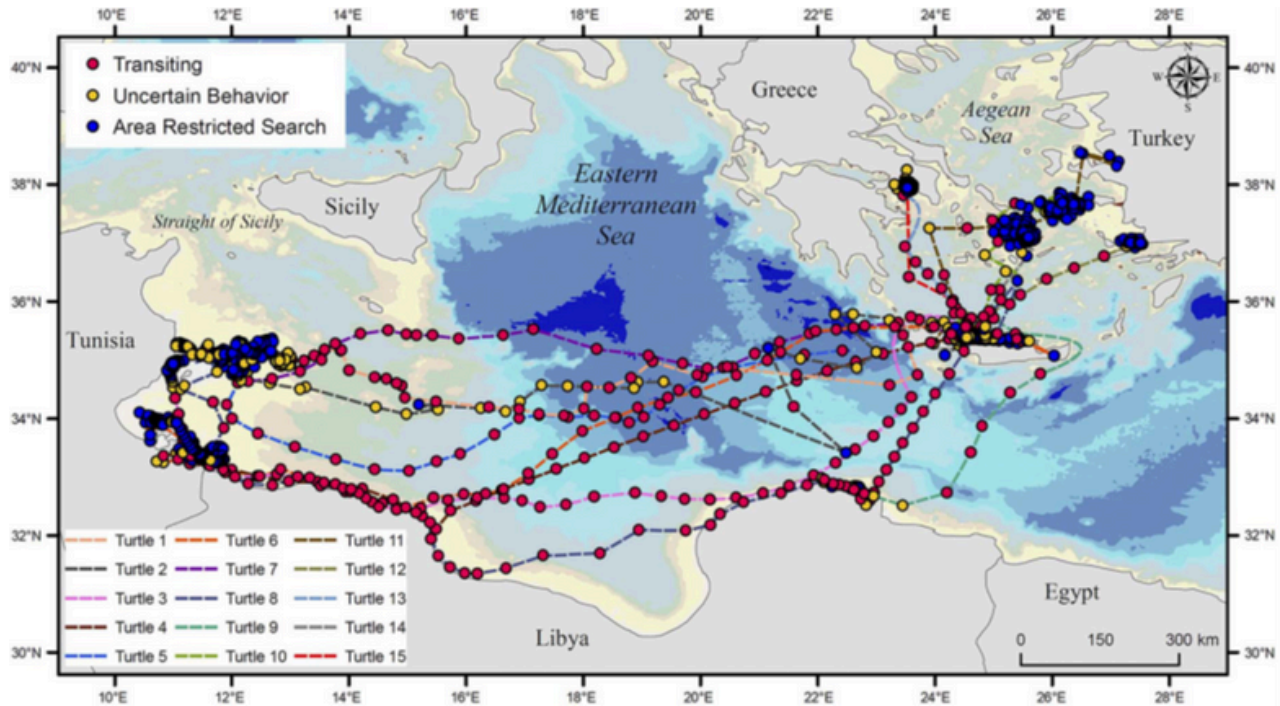
Representation of the satellite tag attachment method used on turtles in Rethymno: (a) Supracaudal plate, (b) plastic retainer, (c) plastic tag attachment cord, (d) biodegradable connector, (e) satellite tag (Source: Panagopoulou 2015).

Two significant findings emerged from this study. The first was that between successive nesting events, Rethymno turtles can migrate up to 150 km from their original nesting beach and may potentially nest on a different beach.



Successive positions of the 20 tagged turtles after nesting on Rethymno beach. Fifteen turtles (their successive positions are shown in green dots) remained relatively close to Rethymno beach, where they nested again after 2 weeks. Five turtles moved up to 150 km away (red dots) and may have nested at another beach in Crete (Source: Panagopoulou 2015).

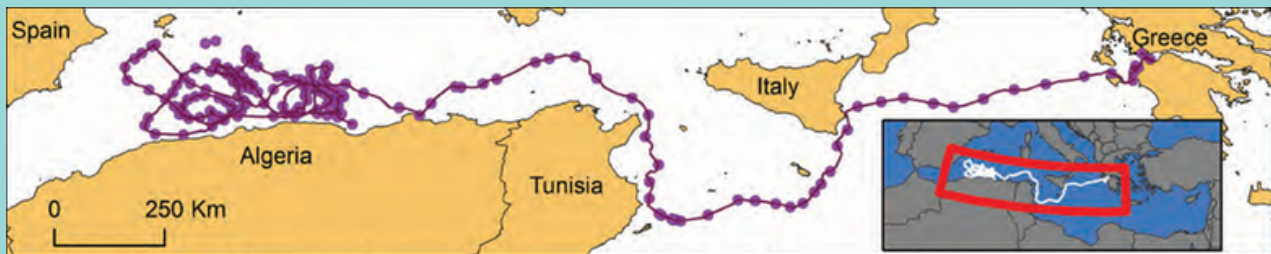
The second finding of this study is that after the breeding season, Rethymno turtles migrate to the Gulf of Gabes (Tunisia) and the Aegean Sea, but not to the Adriatic Sea, which is a common destination of turtles from Zakynthos and Kyparissia Bay.



Map showing the migration paths of 20 satellite-tagged loggerhead turtles following nesting in Rethymno, as tracked by ARCHELON researchers (Source: Patel et al. 2015).

FROM MESSOLOGI TO IBIZA

In 2013, with funding from an INTERREG program, we attached satellite tags to 14 turtles in Amvrakikos Gulf and Messologi lagoon to track their movements. One of them, 'Regina', made the longest migration ever recorded in Greece, from Messologi to Ibiza, Spain (>1800 km by the shortest sea route).



'Regina's journey from Messologi, Greece to Ibiza, Spain was the longest migration ever recorded for a sea turtle from Greece (Source: Rees and Margaritoulis 2019).

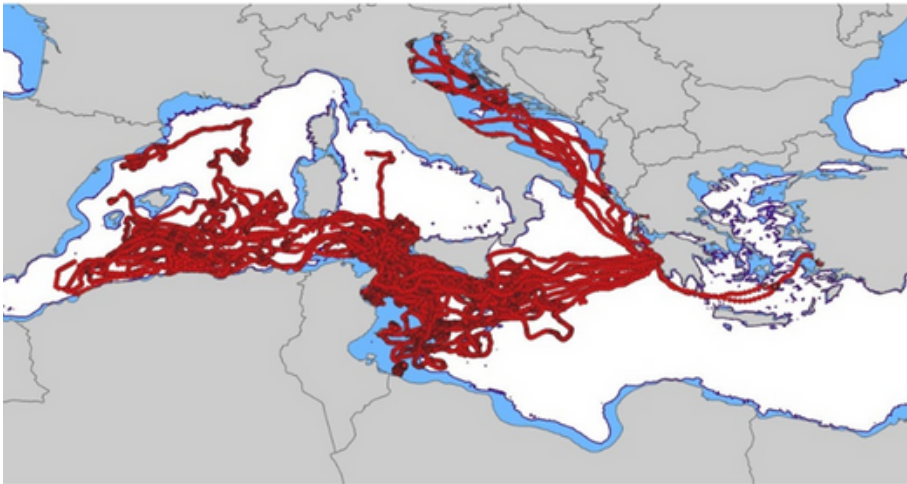


'Regina' was observed nesting 3 years later (July 21, 2016) in Sekania, Zakynthos! She was identified by the tags on her flippers, as the satellite tag had stopped transmitting and had been detached.

KYPARISSIA BAY TURTLES TRAVEL THE WEST MEDITERRANEAN SEA

In 2018, 2019, and 2022, satellite tags were attached to 29 female turtles in Kyparissia Bay as part of a Mediterranean program funded by the UNEP's RAC/SPA and the MAVA Foundation. The majority of these turtles migrated to the Adriatic Sea and the Gulf of Gabes in Tunisia, similar to the turtles of Zakynthos, with the difference that many of the turtles that went to Tunisia subsequently crossed into the Western Mediterranean.

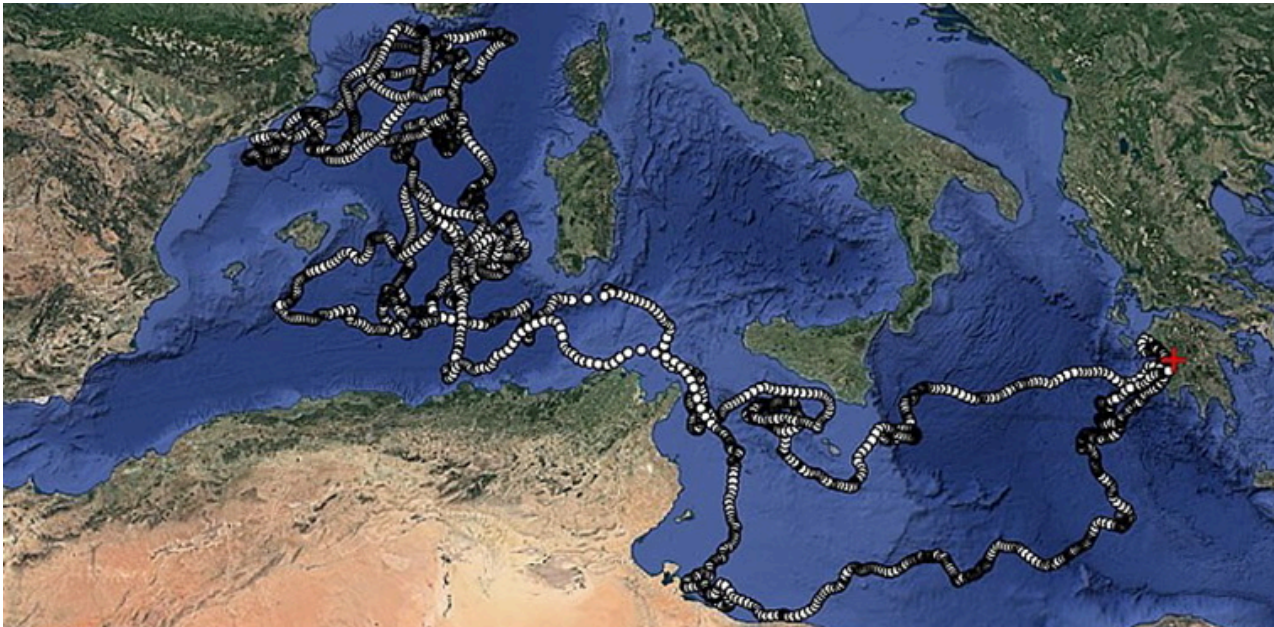
This may be due to the increase in temperature observed in the Mediterranean in recent years, causing the turtles to prefer the cooler waters of the Western Mediterranean. However, it could also be due to the longer battery life of satellite tags, allowing for longer-term monitoring of the turtles.



Movements of 29 turtles after nesting in Kyparissia Bay, indicating a possible increase in migrations towards the Western Mediterranean.

A notable example, observed due to the increasing battery life, was Ella's journey, a turtle that after nesting in Kyparissia Bay in 2019, travelled to the Western Mediterranean, as far as the coasts of France, and returned to Kyparissia for her next reproduction 2 years later.

A particular feature of these cases was that the turtles did not necessarily have to 'settle' in a specific feeding area, as we previously thought, but can also live in the open sea feeding on pelagic organisms.



After nesting in Kyparissia Bay, 'Ella' migrated to the Western Mediterranean and, after two years of continuous movement primarily in the open sea, returned to Kyparissia Bay for her next reproduction. Her case demonstrates that some turtles do not settle in specific feeding grounds but roam the open sea, feeding on pelagic organisms.

GSM TAGS

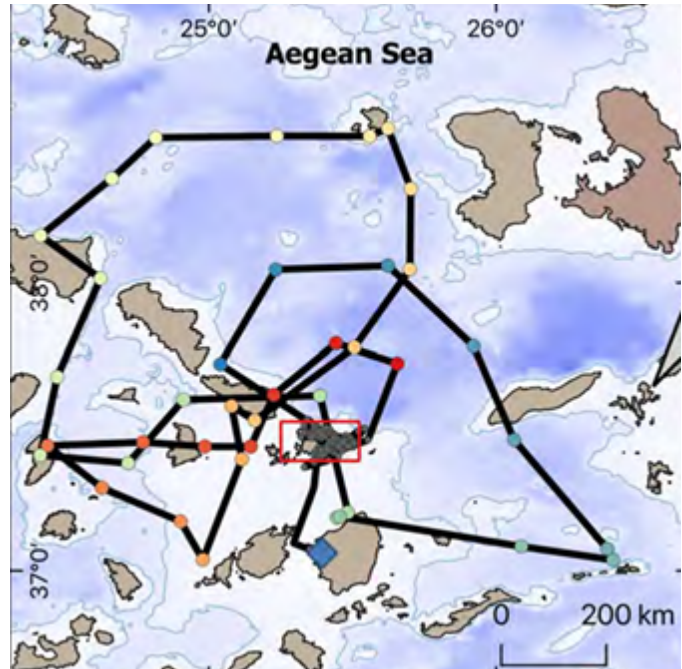
Between 2019 and 2021, as part of the LIFE Euroturtles project, we used GSM (Global System for Mobile Communication) tags for the first time, which operate on the mobile phone network. These tags were less expensive but less suitable than satellite tags for tracking long-distance migrations. We attached 25 of these tags (20 in Kyparissia, 2 in Rethymno, and 3 for the first time in Lakonikos Bay).



A particularly important finding from the movements of turtles with both satellite and GSM tags near the Kyparissia Bay nesting beach (before the turtles began their migration to feeding grounds) was that the average nesting frequency (i.e. the number of nests each turtle makes in a nesting season) was higher than previously assumed, revising previous estimates of the size of loggerhead breeding populations in Greece.

VISITING MYKONOS AFTER REHABILITATION

In May 2019, a satellite tag was attached to a rehabilitated turtle from Naxos at the STRC. This rescued turtle was released back in Naxos after treatment and roamed the central Aegean Sea for 2 years until the tag stopped functioning in April 2021.

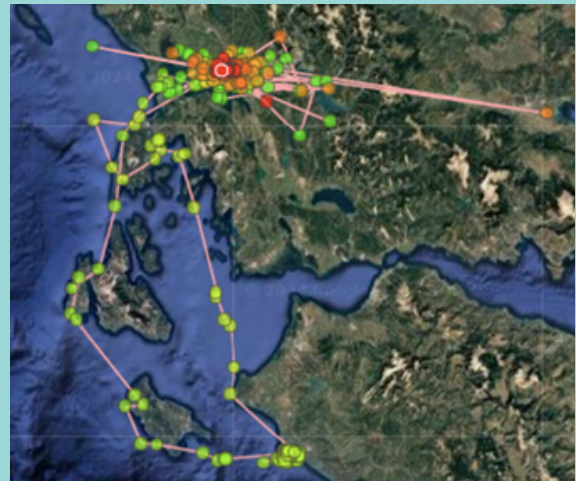


'Zoe' the sea turtle was found in poor condition in Naxos on 5/9/2018 and was transferred from the Naxos Wildlife Protection to ARCHELON's STRC in Glyfada. After rehabilitation, 'Zoe' was fitted with a satellite tag, donated by the Cyclades Preservation Trust, and released in Naxos. Over the next 684 days, 'Zoe' was based in Mykonos but also visited many islands of the Cyclades, Ikaria, Psara, and southeastern Evoia (Rees et al. 2022).

THE SECRET LIVES OF MALE TURTLES

In 2020 and 2021, with funding from the MAVA Foundation, 8 tags were placed on adult male turtles in Amvrakikos Gulf in order to determine if and when they go to the nesting areas to mate with females. Indeed, two of these turtles visited Kyparissia Bay during the breeding season and returned back to their feeding area in Amvrakikos after that.

This result supports the hypothesis that sea turtles exhibit "philopatry" not only to their breeding areas but also to their feeding grounds!

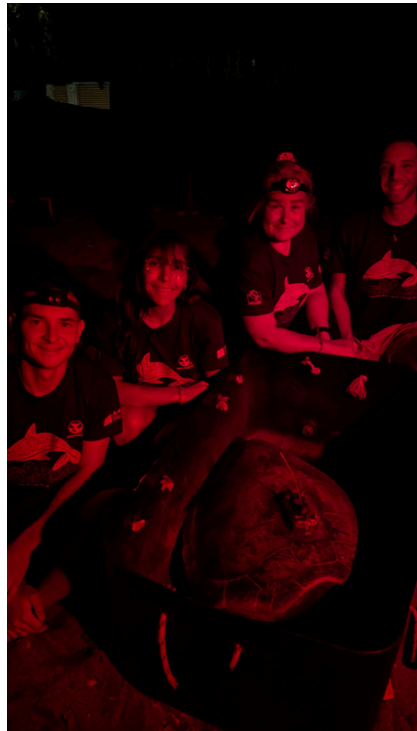


Two male turtles left their feeding area in Amvrakikos Gulf and visited Kyparissia Bay (one also passed through Laganas Bay) during the breeding season, presumably to mate with females congregating near the nesting areas. Afterwards, both males returned to Amvrakikos Gulf.

TAGGING MORE TURTLES IN 2024



In 2024, as part of the LIFE MareNatura program, we placed transmitters on a total of 20 turtles; 5 in Kyparissia Bay, 5 in the Lakonikos Bay, 5 in Chania and 5 in Messara Bay. We are awaiting the processing of the results, while in the summer of 2025 another 20 satellite transmitters are expected to be placed as part of the program.



THE REHABILITATED “TRITON” BECOMES AN AMBASSADOR



The most recent project concerns the placement of a satellite transmitter on the turtle “Triton”, with the support of the TUI Care Foundation. After a year of intensive care and rehabilitation at the Sea Turtle Rescue Centre, “Triton” (found with a head injury in Kythnos in 2023) was released in November 2024 with a satellite transmitter attached to his shell. Already from the first month of his travels, he has gone beyond the borders of Greece and has been traveling in the Libyan Sea!



In total, from 2002 to 2024, ARCHELON and its partners have placed 150 satellite and GSM tags on sea turtles. The tags ranged from simple to more advanced technologies that -in addition to location- recorded depth and temperature data as well. The tags were placed on adult and juvenile turtles, both males and females. All tags were placed on loggerhead turtles except for one tag placed on a green turtle (in Syria).



The results obtained so far (most of which have been published in scientific journals or presented at conferences) have led to significant conclusions regarding the migrations and ecology of the Loggerhead sea turtle in Greece, with the ultimate goal of better protecting the species in the Mediterranean. We thank all the researchers, partners, supporters and volunteers who have contributed to this enormous monitoring work over the years!

**YOU CAN NOW WATCH THE 2024
TURTLE JOURNEYS LIVE ON OUR
WEBSITE!**





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