



UNIVERSITY
OF PRIMORSKA



6TH MEDITERRANEAN CONFERENCE
ON MARINE
TURTLES
POREČ/CROATIA 2018



BOOK OF ABSTRACTS

EDITORS

Bojan Lazar, Matic Jančič

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Building Synergies

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- *Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention)*
- *Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention)*

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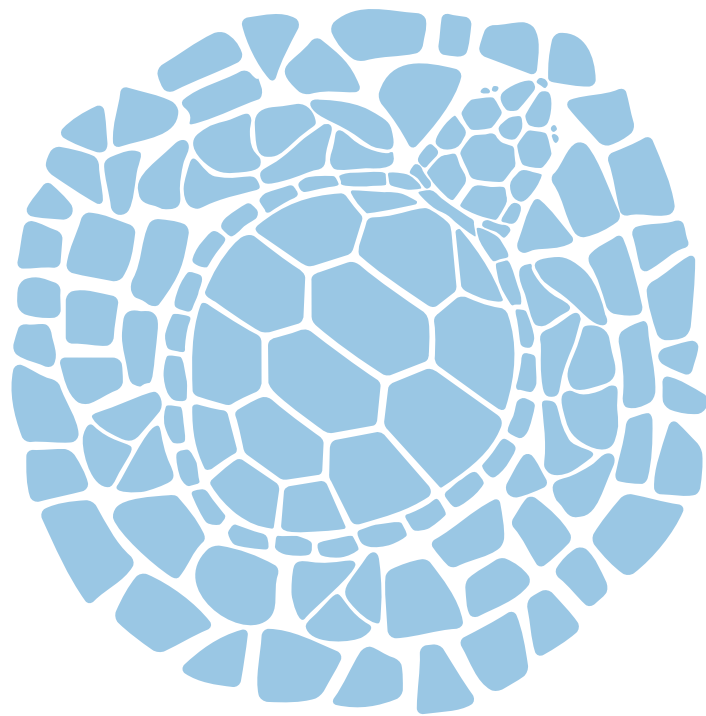
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Dear friends and colleagues, Mediterraneans by origin or by soul,

It is my great pleasure and honour to welcome you at the 6th Mediterranean Conference on Marine Turtles! Over 180 participants, 30 oral and 88 poster presentations assigned to five thematic sections, six workshops and two plenaries – this is what the Conference looks like in numbers.

Organized by the Department of Biodiversity of the University of Primorska (Slovenia) and in collaboration with the Blue World Institute of Marine Research and Conservation (Croatia), the Conference takes place in the picturesque town of Poreč in Croatia, located on the coast of the northern Adriatic Sea - one of the most important feeding habitats for Mediterranean loggerhead turtles.

It has been 17 years since the First Mediterranean Conference on Marine Turtles was held in Rome 2001. However, the history of the Mediterranean Marine Turtle Conferences goes back 20 years. The organisation of a Mediterranean conference on marine turtles was proposed by the Secretariat of the Convention on Migratory Species at the RAC/SPA meeting for the revision of the Action Plan for the Conservation of Mediterranean Marine Turtles in Arta, Greece in October 1998. The initiative was endorsed at the RAC/SPA Meeting of Experts for Priority Actions (Tunis, February 1999), and the proposal was formally adopted by the Fourth Meeting of the National Focal Points for SPAs in the context of the Barcelona Convention (Tunis, April 1999). The Secretariat of the Bern Convention supported the idea, and eventually the three conventions, in collaboration with the IUCN/SSC Marine Turtles Specialist Group (MTSG), organized the First Mediterranean Conference on Marine Turtles.

The support of UNEP MAP-RAC/SPA, Bern Convention and MTSG continued to date. Another institution joined to the supporters of the 6th Conference: the Croatian Natural History Museum, which initiated the first studies on marine turtles in the Adriatic 25 years ago. Their assistance, along with co-funding provided by our sponsors, made this conference possible and allowed us to provide travel and accommodation grants for over 30 participants.

Since the beginning, Mediterranean Marine Turtle Conferences had the same mission: to gather those who share the common goal of the conservation of marine turtles and their environment, acting as a platform for enhancing collaboration, exchanging ideas and sharing the state of the art knowledge on sea turtle biology and conservation in the Mediterranean. However, with the 6th Conference we tried to go one step further. Sea turtles share similar life histories, threats, and research and conservation challenges with other highly mobile marine megafauna. Yet, our collaboration with researchers and conservationists working with other large vertebrates is often limited. It's only by joining forces with our colleagues and creating new collaboration

opportunities can we move our research and conservation efforts to a higher level and reach our common goal: healthy marine ecosystems. The 6th Conference aims to start bridging these gaps in the Mediterranean, and this is why the conference theme is "Building Synergies." We have stepped out from our exclusive 'sea turtle world', and invited our prominent colleagues working in the field of conservation science across multi taxa in order to discuss collaborative opportunities which can benefit our common conservation goals.

We present an exciting, dynamic and interactive meeting, from which we can all take home some new knowledge and practical skills. Thanks to a remarkable job done by the Scientific Committee, we have limited the number of oral presentations, which will be held just during the morning sessions. Whole afternoons are dedicated to practical activities, workshops and poster sessions, allowing you to talk to your Mediterranean colleagues and arrange new collaborations. In that way each participant can shape its conference experience based upon individual interests and needs.

This conference is a product of teamwork, and I express my deepest gratitude to all who made it possible: the organizing team from the University of Primorska and Blue World Institute, members of the steering and scientific committees, our plenary speakers, workshop organizers, travel grant and silent auction chairs, as well as the staff of the Valamar Diamant Hotel.

However, the success of a conference is always about the people. We did our best to make this Conference a memorable scientific, professional and social event – a reunion of old friends with the new generation of sea turtle researchers and conservationists. Thank you all for coming to Poreč!

On behalf of the organizers,



Bojan Lazar

President of the 6th Mediterranean Conference on Marine Turtles



Once a major port in the Roman Empire, the city of Poreč is among the most famous tourist destinations in Croatia, with diverse historic and cultural heritage, including the grand Euphrasian Basilica dating back to the Byzantine Empire. Declared a World Heritage Site by UNESCO, the Basilica contains marvellous mosaics put in place under the bishop Euphrasius. This is why Poreč is also known as a city of mosaics. **These mosaics inspired the logo of the 6th Conference, connecting history with our contemporary efforts aimed at conservation of sea turtles and the marine environment.**

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PLENARY LECTURES



DYNAMIC OCEAN MANAGEMENT: A NOVEL APPROACH TO INTERACTIONS BETWEEN PEOPLE AND OCEANIC PELAGIC ORGANISMS

Crowder L.B.

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Managing interactions between human activities, like fishing or shipping, and large mobile marine animals, like sea turtles, is challenging. Bycatch and ship strikes can have devastating effects on these protected species populations. Managers often reject the use of marine protected areas to reduce these interactions because these species range too widely. I will present data to show that static marine protected areas could provide benefits for protected species in the California Current ecosystem. But what if we considered the possibility of mobile marine protected areas? If we could integrate animal movement data with data on fixed and dynamic ocean features, perhaps we could model expected animal movements under different environmental conditions. In this way,

we can understand when and where conflicts are likely to occur and develop spatial management policies that reduce conflicts while allowing sustainable fisheries to continue. I will present a case study based on the California swordfish fishery in which we model the target species and three bycatch species, including Pacific leatherback, California sea lions, and blue sharks. I will also present results using these dynamic habitat models to examine the impact of climate change on the expected distributions of these animals over the next 100 years.

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INTRODUCING MULTI-SPECIES APPROACH TO CONSERVATION OF MARINE MEGAFUNA BEYOND BORDERS: THE ADRIATIC CASE-STUDY

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Species that transcend administrative and political boundaries require cooperative approaches to conservation. This basic principle pertains to multiple relevant fields and, at least, policy, management, research and public awareness. In order to have a chance of success in conserving wide-ranging taxa, such as sea turtles and cetaceans, these four fields need to be organised and coordinated among and between themselves. International intersectoral cooperation and shared responsibility is the only way to move forward if we are to be successful. In the Adriatic region, and perhaps in the entire Mediterranean, a number of perceived and real barriers still prevent successful collaborations for conservation of these species. Institutional and personal differences, con-

fused management processes, availability of financial and human resources, inconsistency among national legislation, competition and ambiguous goals and expectations are issues that need to be tackled. To illustrate some of these elements, a case study on the application of Natura 2000 site protection to loggerhead turtles and bottlenose dolphins is presented. This example is also discussed in relation to two well-known threats, accidental catches in fisheries and seismic surveys, and the necessary mitigation of these threats.

Presenting author: Caterina M. Fortuna
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SESSION 1:
POPULATION
BIOLOGY
AND ECOLOGY



ORAL PRESENTATIONS

6TH MEDITERRANEAN CONFERENCE
ON MARINE
TURTLES
POREČ/CROATIA 2018

ORAL PRESENTATIONS

SESSION 1: POPULATION BIOLOGY AND ECOLOGY

TROPHIC ECOLOGY OF LOGGERHEAD TURTLES (*Caretta caretta*) FROM THE AEOLIAN ARCHIPELAGO (ITALY) THROUGH STABLE ISOTOPE ANALYSISBlasi M.F.¹, Tomassini L.^{1,2}, Gelippi M.³, Careddu G.¹, Insacco G.⁴, Polunin N.V.C.²¹ Filicudi Wildlife Conservation, Località Stimpagnato Filicudi, 98055, Lipari (ME), Italy² School of Marine Science & Technology, Newcastle University, Tyne and Wear, UK³ Centro de Investigación Biológica del Noroeste, La Paz, Baja California Sur, México⁴ Museo Civico di Storia Naturale, Comiso, Ragusa, Italy

Carapace scute from 50 loggerhead turtles of different size (CCL) and health status (good health, injured and dead) were collected in the Aeolian Archipelago (Italy) from 2010-2013. The $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ isotopic values were compared with those of 4 loggerhead turtles from the Ionian Sea and 8 potential prey items (benthic, pelagic and fishery discards). Bayesian mixing models (MixSIAR) showed that the Aeolian loggerheads feed more on pelagic prey rather than on benthic or fishery discards with small individual variations depending on size ($\delta^{13}\text{C}$ and $\delta^{15}\text{N}$) and health of individuals ($\delta^{15}\text{N}$). Assuming an enrichment factor of 15N between 2-3‰ for consecutive trophic positions, the Aeolian loggerheads were considered secondary consumers (third level) of zooplanktivorous, barnacles, copepods, fish larvae, amphipods and sea urchins. The 4 Sicilian loggerheads showed higher $\delta^{15}\text{N}$ that might be related to habitat or prey

differences between the two areas. The small $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ variations observed with turtles' size ($p < 0.05$) might reflect changes in dietary habitats during life stages. Accordingly Mattei et al. (2015), found a different distribution of heavy metals along scutes of Aeolian loggerheads, potentially reflecting accumulation of these contaminants during different life stages. Finally, some injured/dead turtles feeding on longlines baits or debris showed a marked increase in $\delta^{15}\text{N}$ that might be related to the larger size (CCL) of healthy/dead turtles but also to stressing and physiological conditions for these individuals such as dietary dilution. Further isotope analyses are in progress including skin and blood samples and prey collected in different seasons.

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ORAL PRESENTATIONS

SESSION 1: POPULATION BIOLOGY AND ECOLOGY

FORAGING LOCATION AND SITE FIDELITY OF MEDITERRANEAN LOGGERHEAD TURTLES USING SATELLITE TELEMETRY AND STABLE ISOTOPE ANALYSISHaywood J.¹, Fuller W.², Godley B.¹, Shutler J.³, Snape R.^{1,4}, Widdicombe S.⁵, Broderick A.¹¹ Marine Turtle Research Group, Center for Ecology and Conservation, University of Exeter, Penryn Campus, TR10 9FE, Cornwall, UK² Faculty of Veterinary Medicine, Near East University, North Cyprus, Mersin 10, Turkey³ Centre for Geography, Environment and Society, University of Exeter, Penryn Campus, TR10 9FE, Cornwall, UK⁴ Society for the Protection of Turtles, 5 Barbaros Sokak, Gonyelli, North Cyprus⁵ Plymouth Marine Laboratory, Prospect Place, West Hoe, PL1 3DH, Plymouth, UK

Loggerhead turtles (*Caretta caretta*) migrate thousands of kilometres between foraging and nesting grounds. Within one nesting aggregation, several geographically distinct foraging grounds will be used. To determine the foraging grounds and foraging site fidelity of an important nesting ground in North Cyprus, 29 satellite transmitters were deployed on nesting females. This nesting population foraged across a large extent of the eastern Mediterranean basin and within the Adriatic Sea. No neritic-oceanic foraging dichotomy was observed with all foraging grounds located on the continental shelf. Over-wintering was observed, with several females moving to a second foraging ground between November and April. To determine the foraging location of the entire nesting population, stable isotope analysis ($\delta^{13}\text{C}$ and $\delta^{15}\text{N}$) was performed on epidermal tissue collected annually since 2001 from tracked and untracked nesting females. We determined if there were isotopic differences between foraging grounds and, when possible,

assigned untracked females to putative foraging grounds. Low variance in serially collected isotopes suggests strong foraging site fidelity. This also suggests that neophytes do not change foraging ground after their first nesting season. Satellite telemetry supports high foraging site fidelity as three individuals tracked over a nesting season returned to the same foraging grounds and five over-wintering individuals returned to the same summer foraging ground after the winter period. This work demonstrates the use of stable isotopes in conjunction with tracking to identify the connectivity between foraging and nesting grounds which can enable population-wide trends to be better represented. Understanding the importance of each foraging ground to the nesting population is critical for management of migratory species.

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ORAL PRESENTATIONS

SESSION 1: POPULATION BIOLOGY AND ECOLOGY

MITOCHONDRIAL DNA STRs UNVEIL HIDDEN POPULATION STRUCTURING AND MIGRATION ROUTES OF MEDITERRANEAN GREEN TURTLE POPULATIONS

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The assessment of links between sources of mortality and the affected populations is crucial for the management and conservation of endangered species, but sometimes this assessment is hampered by the lack of resolution of the genetic markers used. We investigated the genetic structuring of the Mediterranean green turtle (*Chelonia mydas*) nesting populations and the origin of the stranded animals found along the Israeli coast by using new highly polymorphic STR markers. A clear population genetic structure not detected before was unveiled using pairwise genetic distances and a Principal Coordinates analysis (PCoA). The four nesting populations (Turkey, Alagadi, Akamas and Israel) were genetically well differentiated and thus should be considered as different management units in conservation plans. Although genetically different, the populations from Turkey and Israel showed higher resemblance despite residing at opposite edges of the Mediterranean distribution. A Mixed Stock Analysis was used to assess the con-

tribution of the different nesting populations to the stranded sample of Israel. The Turkish nesting population was revealed the main source of the stranded turtles sampled along the Israeli shore indicating that individuals from this population migrate from north to south along the eastern shore of the Mediterranean as previously shown by telemetry studies. The use of a highly polymorphic haplotyping method enabled the detection of a deep genetic structuring of the green turtle populations in the eastern Mediterranean Sea that was not revealed in previous studies, demonstrating the importance of marker selection in population genetics. The analysis of the stranded turtles' genetic composition allowed us to look into the migration patterns from nesting to foraging areas, supporting previous satellite tracking and stable isotopes results.

Presenting Author: Carlos Carreras
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ORAL PRESENTATIONS

SESSION 1: POPULATION BIOLOGY AND ECOLOGY

OVERESTIMATION OF SEA TURTLE POPULATIONS FROM REMIGRATION INTERVALS: ERROR ASSESSMENT AND NOVEL METHOD

Paolo Casale

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Estimating population abundance is particularly important for species of conservation concern. This is particularly challenging for marine animals, like sea turtles, with ocean-scale distribution and migratory nature. Luckily, sea turtles lay clutches on land where they can be easily counted and have always been the most common index of population abundance. However, a female lays more than one clutch per year and does not reproduce every year, therefore to convert the number of egg clutches to the number of adult females two conversion factors are needed: the number of clutches laid by a female in a nesting season and the fraction of adult females which reproduce in a season or breeding proportion (BP). Traditionally, BP has been assumed to be equal to the inverse of the average remigration interval (the number of years between two consecutive breeding seasons). I show that this is not correct and provide the true

mathematical relationship between remigration intervals and BP. The effects of mean and SD remigration interval, probability of detection and annual survival probability on the observed remigration intervals and BP were investigated through simulating a virtual population of adult females during a 15 years beach monitoring period. Results indicate that the traditional method may have greatly overestimated the abundance of sea turtle populations, especially in situations with a low detection probability, including temporary emigration. A new simple method is proposed which shows excellent performances in estimating the real population abundance in a variety of simulated situations.

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ORAL PRESENTATIONS

SESSION 1: POPULATION BIOLOGY AND ECOLOGY

PATTERNS OF NESTING OF THE LOGGERHEAD SEA TURTLE (*Caretta caretta*) IN THE SPANISH MEDITERRANEAN

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Until the beginning of the 21. century, the number of registered nests in the warm Spanish coast was extremely low. However, since 2001 records of nesting events have steadily been increasing to the point that during the last 4 years, several females have been recorded nesting each year in this area. Until 2017, a minimum of 33 nesting events have been recorded on Spanish Mediterranean beaches, being 27 of them recorded between 2014 and 2017. These nesting events have been linked, using genetics, to colonisation from distant nesting areas, and are expected to be favoured by global warming. These nesting events have been detected from early June to late August with hatchling emergence recorded until October. 14 culminated on successful egg laying. However, the real number of nesting events could be higher, since some of these events may happen in beaches with low human attendance. Most of the recorded nests until now have occurred in developed beaches, modified by anthropogenic activities. Up to 9 nesting attempts on the beaches have been unsuccessful due to direct intervention of unexperienced people using these beaches. A total of 10 clutches have been incubated using different methodologies, from relocation

and incubation in protected beaches to artificial incubation in electric incubator, to achieve a successful eggs incubation and hatching. Hatching success was variable ranging from 0% to 84.5%. Different "head starting" programmes were carried out to increase hatchlings survival and also improve our knowledge about the dispersion and habitat use of the newborns in this new nesting. These areas have warmer waters than the rest of the Spanish coast. However, very warm beaches in southern Spain have no records of nesting. The spatial concentration of nesting events have been registered only once in Murcia in 2017. In several years, there was an apparent displacement of nesting females throughout the nesting season from northern to southern areas. Social awareness and training campaigns promoted in order to record as much as nesting events of this species in our coasts. area. These nesting events are dispersed over more than 2000 km of coastline from Girona to Almeria provinces.

Presenting Author: Marco Adolfo
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ORAL PRESENTATIONS

SESSION 1: POPULATION BIOLOGY AND ECOLOGY

THE EVOLUTIONARY ADVANTAGES OF HETEROPLASMY IN mtDNA INHERITANCE OF GREEN SEA TURTLES

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There are two haplotyping systems of the mtDNA control region (D-loop) of green turtles. The traditional one compares and detects the scarce mutations in the first 800bp of the D-loop region. The second was recently developed by us and is based on the D-loop short tandem repeats (STRs). While an organism gets only one set of chromosomes from each parent, it inherits a few thousand molecules of mtDNA from its mother. This mitochondrial population within an ovary (and in later in the developing organism) is not necessarily identical, a phenomenon termed heteroplasmy. Using Illumina high throughput sequencing, we were able to look at thousands mtDNA molecules in ~200 green sea turtles. Unlike the scarce

point mutations, we have found heteroplasmy levels in the mtSTR ranging from 5% and up to 45% in all of the samples. Heteroplasmy gives another dimension of haplotyping and actually allows for individual fingerprinting. We have constructed a Python-based model simulating the accumulation of mutations and establishment of new haplotypes in a homogeneous population of turtles. Our model helps us understand why SNPs-based haplotypes are so infrequent in sea turtles and realize the importance of heteroplasmy in a maternal lineage of inheritance.

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THE EFFECT OF GLOBAL TEMPERATURE RISE ON LOGGERHEAD TURTLE NESTS IN DALYAN BEACH, TURKEY

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The environmental factors directly affect the behavior of the creatures. Adapting ability for the environmental conditions which may play an important role in sustaining a generation. It is well known that one of the most important environmental factor is temperature, plays a vital role in determining sea turtle's sex during the embryonic stage and affects their growth and survivorship. Temperature may also play role in timing of the breeding behavior. However, the effect of global temperature rise is considered as an important threat to sea turtles which may result in feminization of the populations in the future. In this study, we evaluated the temporal changes of the nesting dates in the last 10 years in Dalyan Beach and combined with the temperature data from 96 dataloggers placed in the middle of the nests during 2016, 2017, and 2018. Sea turtle nesting season starts in the beginning of the second week of May in Turkey. However, the start of the nesting season of loggerhead turtles markedly shifted towards April ($r^2 = 0.78$; $p < 0.01$) during the last decade, in Dalyan Beach. The number of loggerhead turtle nests were also increased in the same period ($r^2 = 0.50$; $p < 0.05$). The nests were grouped in every 15 days according

to their nesting day. The mean nest temperature was calculated during the middle-third of the incubation period. There was a significant difference between the mean nest temperatures of the groups. The lowest nest temperatures were measured during the first half of May, but the temperature increased within the season progressed. The sex ratio of hatchlings was also calculated from the mean temperature during the middle-third incubation period. The sex ratio was male biased in the beginning of May (highest male ratio 78%) and decreased throughout the season and the sex ratio of female reached to 100% in late June and July nests. The proportion of the clutches laid during May increased significantly in the last 10 years and the breeding season periodicity of loggerhead turtle changed in this period. Combining our nest and temperature data considering the global temperature rise may suggest that the loggerhead turtles may adapt to the environmental changes in a short time, but the future effects of this changes are still unknown.

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SESSION 2: AT SEA DISTRIBUTION AND MOVEMENT

ORAL PRESENTATIONS

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SESSION 2: AT SEA DISTRIBUTION AND MOVEMENT

ARCHELON'S LONG-TERM IN-WATER MONITORING PROJECT AT AMVRAKIKOS GULF, GREECE: AN OVERVIEW OF RESULTS AND FUTURE DIRECTIONS

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Amvrakikos Gulf (39°0 N, 21°0 E) is a virtually enclosed basin covering 405 km² with an opening to the Ionian Sea through the Preveza Channel that is, at its narrowest, 450 m wide. The entire Gulf is an EU protected Natura 2000 site (GR2110001). The northern part is formed from the deltas from two main rivers (Louros in the west and Arachthos in the east) Local knowledge indicated high densities of loggerhead turtles were present in the shallow waters around the Arachthos and Vovos rivers in the north east of the Gulf. An area that is characterised by extensive waters <2 m deep. Due to its shallow depth, known presence of turtles and proximity to a small harbour, this region was selected as the original sampling site in 2002. The first two years' work focused on short field periods (<1 week) to obtain turtles for a satellite telemetry study (N = 6). Subsequently, the research has evolved to encompass a longer field season (~6 weeks) and broadened to investigate other biological and conservation themes, such as turtle residency, growth rates, origins, sex ratio, maturation and evidence of negative impacts of anthropogenic interactions. Turtles are flipper tagged, tissue sampled, measured (carapace and tail lengths) and deformities and injuries noted as part of the on-going capture-mark-recapture study. Additionally, in 2013, we

deployed further satellite tags (N = 7), some of them at a second, more central, site within the Gulf, with similar environmental conditions, that proved to also hold high densities of turtles. In 2018 we completed our 17th field season at Amvrakikos Gulf and we have recorded more than 1,000 individual loggerhead turtles over the course of the project. This paper will present results from the extensive dataset covering the themes mentioned above, namely size distribution, sex ratio, residency and origins and highlight the intended future directions of research in the area that include turtle distribution and density assessments and diet analysis. Acknowledgements: We thank ETANAM for assistance during the 2002/2003 telemetry fieldwork. Local support has been provided by the Kopraina Centre for Environmental Education. ARCHELON's activities in the Gulf are supported by the Management Agency of the Amvrakikos Wetlands National Park and the local Coast Guard stations. Project funding has included EU LIFE projects LIFE99NAT/GR/006475 and LIFE15NAT/HR/000997, PRO. ACT. NATURA 2000 and the British Chelonia Group.

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ORAL PRESENTATIONS

SESSION 2: AT SEA DISTRIBUTION AND MOVEMENT

ARGOS SYSTEM: IMPROVEMENTS AND FUTURE OF THE CONSTELLATION

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Argos is the main satellite telemetry system used by the wildlife research community, since its creation in 1978, for animal tracking and scientific data collection all around the world, to analyze and understand animal migrations and behavior. The sea-turtle biology is one of the major disciplines which had benefited from Argos telemetry, and conversely, sea-turtles biologists' community has contributed a lot to the growth and development of Argos use cases. The Argos constellation with 6 satellites in orbit in 2017 is being extended in the following years with Argos-3 payload on METOP C, and Argos-4 payloads on Oceansat-3, CDARS in December 2021, METOP SG B1 in December 2022, and METOP-SG-B2 in 2029. Argos-4 will allow more frequency bands (600 kHz for Argos4NG, instead of 110 kHz for Argos 3), new modulation dedicated to animal (sea turtle) tracking allowing very low transmission power transmitters (50 to 100 mW), enhancement of high data rates, and downlink performance, at the whole contribution to enhance the system capacity (50,000 active beacons per month instead of 20,000 today). In parallel of this "institutional Argos" constellation, in the context of

a miniaturization trend in spatial industry in order to reduce the costs and multiply the satellites to serve more and more societal needs, the French Space Agency CNES, which designs the Argos payloads, is innovating and launching the Argos ANGELS project (Argos NEO Generic Economic Light Satellites). ANGELS will lead to a nanosatellite prototype with an Argos NEO instrument (30 cm x 30 cm x 20 cm) that will be launched in 2019. In the meantime, the design of the renewal of the Argos constellation, called Argos For Next Generations, is on track and will be operational in 2022. This constellation will allow revisit time between 10 and 20 minutes between two satellite passes. The presentation will also introduce the goniometer, a path finder allowing recovering Argos beacons at sea and new advanced processing allowing to visualize and download contextual environmental data along Argos tracks like surface temperature, current, primary productivity, Kalman-smoother and AIS-SAT AIS vessel traffic data along Argos tracks.

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ORAL PRESENTATIONS

SESSION 2: AT SEA DISTRIBUTION AND MOVEMENT

VALIDATING THE POTENTIAL OF USING A HIGHLY MIGRATORY MARINE SPECIES AS A MEANS TO COLLECT OCEANOGRAPHIC DATA: A PILOT STUDY ON LOGGERHEAD TURTLES IN THE WESTERN MEDITERRANEAN

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Biologging instruments are not only being used to study cryptic aspects of the life history of marine megafauna but the animals themselves have been employed to sample the marine habitats they live in. Such studies provided novel oceanographic data of even remote and difficult to access areas and while the sampling trajectories cannot be programmed, animal movement is often associated with oceanographic features that are important to be investigated. Here we hand-captured 10 (n = 5 in November 2016, n = 5 June 2017) large juvenile loggerhead turtles (CCL 55–75 cm) and equipped them for the first time with Fluoro-CTD-SRDs to obtain detailed depth profiles of temperature, salinity and chlorophyll concentrations of the Tyrrhenian Sea, Western Mediterranean. The tags from the first release group worked for 175-270 days while the 5 tags of the second group transmitted for 23-49 days. A wealth of location (N = 15-178 GPS and N = 136-1896 ARGOS) and behavioural data (total

of 2236 dives, 18-494 per individual) were collected. Turtles used the whole Tyrrhenian Sea and 4 crossed the Strait of Sicily into the Ionian. The average depth range was 16-24 m with maximum daily depths between 90 and 150 m. Over this depth range a total of 475 CTD profiles for temperature, salinity and chlorophyll were recorded. These parameters varied with location and season, as expected. We will show that turtles themselves provided data that characterize the habitats that they use and which can help to identify those features of oceanic habitats to which loggerhead turtles are attracted. Moreover, in our study we employed marine turtles to deliver oceanographic data which are important to understand and to model current and future ocean processes.

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THE EFFECT OF TELEMETRY SYSTEMS ON REPRODUCTION, GROWTH AND SURVIVAL OF ADULT SEA TURTLES

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Telemetry systems have been instrumental in meeting the challenges associated with studying the ecology and behaviour of cryptic, wide-ranging marine mega-vertebrates. Over the recent decades, the use of telemetry systems has increased exponentially, worldwide, across species and life-stages in sea turtles, despite a paucity of studies investigating the effects of such devices on study animals. Indeed, such studies are key to informing whether data collected are unbiased and, whether derived estimates can be considered typical of the population at large. Here, using a 26-year individual-based monitoring dataset on sympatric green (*Chelonia mydas*) and loggerhead (*Caretta caretta*) turtles, we provide the first analysis of the effects of device attachment on reproduction, growth and survival of nesting females. We found no significant difference in growth and reproductive correlates between tracked and non-tracked females

in the years following device attachment. Similarly, when comparing pre- and post-tracking data, we found no significant difference in the reproductive correlates of tracked females for either species or significant carry-over effects of device attachment on reproductive correlates in green turtles. The latter was not investigated for loggerhead turtles due to small sample size. Finally, we found no significant effects of device attachment on return rates or survival of tracked females for either species. While there were no apparent detrimental effects of device attachment on adult sea turtles in this region, our study highlights the need for other similar studies elsewhere and the value of long-term individual-based monitoring.

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ORAL PRESENTATIONS

SESSION 2: AT SEA DISTRIBUTION AND MOVEMENT

OCEANOGRAPHIC TURTLES: A MULTIDISCIPLINARY APPROACH FOR THE INTEGRATION OF SEA TURTLE TRACKING WITH OCEAN OBSERVING SYSTEMS

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Recent advances in biotelemetry allow us to investigate the high resolution space-use of marine animals. The combination of in situ observations, remote sensing and numerical models offers an unprecedented opportunity to investigate the interactions between human activities, environmental factors and sea turtle behaviour. The “Oceanographic Turtles” project addresses the role of operational ecology in dynamic ocean management using the loggerhead turtle (*Caretta caretta*) in the western Mediterranean Sea as case study. The project brings together an international and multidisciplinary team of researchers (e.g. biologists, oceanographers), computer engineers, communication professionals, public administration agencies, conservation organizations and citizen scientists towards a common goal: contributing to the conservation of a threatened species. This work focusses on the integration of satellite tracking of sea turtles with ocean observing systems (OOS) and the synergies that emerged within the framework of the project. On the one hand, OOS can contribute to ecological studies by providing biophysical infor-

mation from numerical models and in situ observations. Real-time multi-platform experiments can offer new opportunities to better understand fine-scale spatial dynamics of sea turtle movements in relation to oceanographic features. Furthermore, OOS can aid conservation organizations in optimizing the identification of sea turtle release locations. On the other hand, sea turtles equipped with animal-borne instruments can provide oceanographic data similar to other platforms such as gliders. For example, juvenile loggerhead turtles can complement OOS by providing temperature profiles on remote locations of the Mediterranean Sea (eg. north Africa). Our case study highlights how integrated approaches offer a win-win situation for multiple stakeholders and provides new insights for further extensions across multiple taxa.

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ORAL PRESENTATIONS

SESSION 2: AT SEA DISTRIBUTION AND MOVEMENT

OFFSHORE BEHAVIOUR OF NESTING LOGGERHEAD TURTLES: PRELIMINARY RESULTS OF DISPLACEMENT EXPERIMENTS IN TURKEY

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Argos satellite telemetry constitutes an efficient way to study sea turtle migrations, but provides little opportunities to collect additional information that would be useful to understand the turtle behaviour during the open sea movements. Data loggers recording detailed data like tri-axis accelerations and depths would be most useful in this respect, but they need to be retrieved to collect the data, and this greatly limits the application opportunities for these instruments. One possible way to study the turtle fine-scale behaviour during their movements is to perform displacement experiments on nesting females, that can be captured after completing an egg-laying event, equipped with data loggers and then translocated offshore. Given their high nesting site fidelity, females are expected to return to their home beach to lay their next nest, and this should permit to recover the loggers. The data collected can then be used to study the turtle behaviour during their homing trip, that can be considered a simulation of the migratory movement. In the present study, we performed a displacement experiment on loggerheads (*Caretta caretta*) nesting on Iztuzu beach, the largest loggerhead nesting area in Turkey. Nine turtles were captured early in the season and equipped with a multi-channel data logger

recording depth, temperature, tri-axis magnetism at 1 Hz, and tri-axis accelerations at 10 Hz. They were then released offshore, 10 km (N = 2) or 30 km (N = 7) South of the beach, and were tracked through Argos PTTs (N = 8) or an Iridium-GPS tag (N = 1). All turtles managed to return to the vicinity of the nesting beach, but two of them then moved away without nesting again on it. The other ones laid a further clutch so that the loggers provided data on the turtle behaviour for 5-30 days during homing and the successive internesting period. All turtles followed similar homing routes, first reaching the coast and then moving NW to reach the home area. One individual moved S instead, remaining in the Gulf of Fethiye for two weeks before returning to Iztuzu. Logger data showed that during the open sea crossing, turtles made short and shallow dives for most of the time, making prolonged and deep dives (depths > 50 m) only during the night. Turtles were generally able to maintain a constant heading while in the open sea, even during the deep dives and at night.

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SESSION 3:
CONSERVATION
AND MONITORING



ORAL PRESENTATIONS



6TH MEDITERRANEAN CONFERENCE
ON MARINE
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SESSION 3: CONSERVATION AND MONITORING

DEVELOPMENT OF AN OCEANOGRAPHIC DRIFT SIMULATION TOOL TO PREDICT LOCATIONS OF AT-SEA MORTALITY OF STRANDED TURTLES

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Stranding events provide a unique opportunity to study drivers of sea turtle mortality, but causes of strandings are poorly understood. A general turtle carcass oceanographic drift model was developed to estimate likely at-sea mortality locations from coastal sea turtle stranding records. First, field experiments were conducted to better parameterize sea turtle carcass drift, including, the probable time turtle carcasses spend drifting at-sea prior to beaching and the amount of direct wind forcing needed to properly estimate carcass drift. Oceanic drift duration of turtle carcasses was estimated based on the duration that tethered, free floating turtle carcasses remained buoyant and was highly dependent on water temperature. The importance of direct wind forcing for turtle carcass drift was assessed based multiple simultaneous deployments of various types of surface drifters, including real turtle carcasses, and was estimated at 1-4% of wind speed. The results from these

studies were integrated into the development of the oceanographic drift model. This drift simulation tool included realistic direct wind forcing on carcasses, temperature driven carcass decomposition and the development of mortality location predictions for individual strandings. Drift simulations were performed on coastal sea turtle stranding records in Virginia, USA, and spatial overlap between potential mortality locations and commercial vessel and fishing activity data were identified and linked to potential anthropogenic causes of mortality. The experimental and modeling methods developed in this study provides a meaningful conservation tool that can be applied to stranding data of sea turtles and other marine megafauna worldwide.

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TURTLES ON THE TRASH TRACK: INSIGHTS FROM THE FIXED LINE TRANSECT MEDITERRANEAN MONITORING NETWORK AND MEDSEALITTER PROJECTS

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Highly migratory animals spend most of their life in remote marine areas occupying a variety of habitats widely separated geographically and temporally. Information on their abundance and distribution are essential to develop sound conservation and management, in particular for marine species listed in the Habitats Directive (HD), though such data are generally difficult to collect. A variety of approaches have been used to monitor spatial and temporal patterns in sea turtles and cetaceans occurrence depending upon the research needs and the resources available. Since 2007 a collaborative program has been operating in the Mediterranean Sea using passenger ferries as platforms of observation for systematic cetacean monitoring along fixed transects. Since 2011 observers start collecting also data on sea turtles and, since 2013, on floating marine litter. Here we present data from systematic surveys on sea turtle and marine litter distribution and abundance along 11 routes connecting France, Greece, Italy, Spain and Tunisia (5 yearly round, 6 June-Sept, 5 surveys

each season). From 2011 to 2017, 962 *Caretta caretta* sightings were recorded, where higher encounter rates were found in the south-western Tyrrhenian Sea along the transects between Sardinia, Sicily and Tunisia and lower in the Ligurian Sea. Turtle encounters varied with season and were higher in the Spring and Summer periods. When overlaying the distribution of sea turtles with that of marine litter it appeared that the Adriatic sea is an area of particular concern for the highest overlap between migrating sea turtles and drifting marine litter, particularly considering the importance of this area as developmental ground for early pelagic stage juveniles. The method represents a sustainable, low cost protocol for marine animal monitoring also in remote areas and during all seasons, and it has also great potential to reveal contemporary distributions of main hazards to those marine animals species listed in the HD.

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ORAL PRESENTATIONS

SESSION 3: CONSERVATION AND MONITORING

ARE MARINE PROTECTED AREAS (MPAS) AN EFFECTIVE CONSERVATION MEASURE FOR THE LOGGERHEAD SEA TURTLE (*Caretta caretta*) IN THE WESTERN MEDITERRANEAN?

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During the last decades several Marine Protected Areas (MPAs) have been declared in the western Mediterranean, added to the previous protection figures. Many of these MPAs included in their management plans the loggerhead sea turtle (*Caretta caretta*) as a focus species to protect. However, the actual use of MPAs in the Mediterranean by this species is unknown. Therefore, it is important to assess whether MPAs' limits are effective or not for loggerhead turtle conservation in the area and, in case, if new forms of MPAs management or MPAs enlargement should be considered in the western Mediterranean. In the present study, we used satellite tracking data of 89 loggerhead turtles tagged in the western Mediterranean over the period 2003-2018. We analyzed the use of MPAs in different phases of the life cycle: 17 post-hatchlings (yearlings), 9 early juveniles (<40 cm SCL), 58 large juveniles (> 40 cm SCL) and 5 adults (>75 cm SCL). As result, 30% of the tracked turtles never visited any MPA (6% post-hatchlings, 11% early

juveniles, 39% large juveniles, and 40% adults). The rest of the turtles used a total of 72 MPAs (381,066 km²); however, the use of these areas was occasional in most cases. For those turtles which used at least once a MPA, only 13 % of time spent was inside these areas. On average, only 10% of monitored turtles that used MPAs spent more than the 50% of time inside (17.6% of post-hatchlings, 11% of early juveniles, 8.6% of large juveniles and 0% of adults). The most frequented MPA by all life stages was the recently declared ZEPIM "Cetacean corridor of the Mediterranean" (6.3% time spent: 2.6% post-hatchlings, 2.4% early juveniles, 1.2% large juveniles, and 0.08% adults), followed by the MPA "Delta de l'Ebre-Illes Columbretes" (1.68% time spent by all stages except post-hatchlings). In conclusion, the use of MPAs by loggerhead turtles in western Mediterranean is low.

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ORAL PRESENTATIONS

SESSION 3: CONSERVATION AND MONITORING

TO RESTRICT OR NOT TO RESTRICT? SMALL-SCALE FISHERMEN'S PERCEPTIONS ON MARINE PROTECTED AREAS (MPAS)

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Marine Protected Areas (MPAs) can be a powerful tool for the conservation of threatened marine species, but their success relies on support generated by local communities and affected stakeholders. Therefore investigating perceptions, opinions and recommendations of stakeholders before any protection measures come into effect is a necessary first step towards generating participation and support. We investigated small-scale fishermen's views and opinions on MPAs on the island of Crete, Greece. The study was part of an effort to uncover information useful for the design and implementation of management policies for Rethymno, an important nesting area for Mediterranean loggerheads that has been included in EU's NATURA 2000 Network. Between May and June 2013, we visited 18 fishing ports around the Crete and conducted 101 interviews using questionnaires. Most of the respondents were in support of the establishment of MPAs (76%), recognizing benefits especially for help in increasing fish stocks. Notably support increased to 87% among respondents when the substitute term "fishing refuges" was provided. MPAs usually include some restrictions for fishermen, and this was a dominant topic in responses received. Firstly, the principal reason provided for opposing MPAs was loss of fishing grounds (15%). Further, compensation

was recommended as a measure to offset loss of income as a result of such restrictions. In contrast, respondents in support of MPAs seemed to be willing to "sacrifice" some of their fishing grounds in order to help restore declining fish stocks, one of the major problems encountered in their profession. Several respondents (N = 17) expressed concern over how these MPAs would be implemented, stating that they would be difficult to supervise and that there would be low compliance with the restrictions. In addition, while some of the respondents (N = 27) suggested MPAs are a good management tool, they commented that these could only succeed if implemented under certain conditions. Some of them stated MPAs should only be established after studies. Others (N = 20) stated that proposed MPAs should be flexible and change over time or be combined with additional measures to restore fish populations (e.g. artificial reefs). Our results show that fishermen may play a vital role in the establishment of MPAs as they can identify core criteria and other considerations that could improve MPA design, implementation, management and long term success.

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30 YEARS OF MEDASSET: A PERSONAL JOURNEY INTO CONSERVATION

Venizelos L.

MEDASSET, Mediterranean Association to Save the Sea Turtles

More than 30 years ago, a storm at sea was the cause of my first experience of Laganas Bay in Zakynthos. The impression made on me has hardly faded in the intervening years, even though at the time I had no idea of the bay's importance as a nesting habitat for sea turtles. That came later. But the unspoiled beauty of the place struck me with such force that it directed my footsteps and changed my life. I shall present some of the stories and encounters that have resulted from my determination initially simply to protect the turtles and nesting beaches of Laganas and later, as my understanding grew, to extend that protection to the wider Mediterranean. MEDASSET was founded 30 years ago this year, and since its humble be-

ginnings has grown into an organisation that is now active on many fronts: Education, public awareness, lobbying and advocacy, as well as scientific research. I shall be honoured to present some of the highs and lows of my personal journey, and to pay tribute to a few of the people who have supported my efforts and those of the team that I have been privileged to be able to form around me, in the hope that my story – our story – may prove to be of interest to the younger generation that we must inspire to take up the baton and continue the struggle for conservation.

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IT'S FUN, IT'S FAB AND IT'S FULLY FUNDED! (BUT IS IT FOR US)? THE CHALLENGES TO CONSERVATION THAT FLOW FROM ALLOWING OURSELVES TO BE OPPORTUNITY-LED

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Existing in a state of permanent anxiety about funding, researchers, and in particular NGOs, can easily be tempted to involve themselves in projects of questionable value. If we agree to use resources on activities that will have limited impact on the sea turtles we exist to conserve, we need to be very clear about what will be achieved instead. I shall present some of the dilemmas MEDASSET has faced and highlight the questions NGOs should keep asking themselves. In Summer 2017, MEDASSET jointly organised and participated in a pilot programme that was developed with a partner organisation that also fully funded it. The programme had a substantial budget and took an admirably holistic approach to community engagement – not without success. So, why, when at the end of it we were invited to join the next phase – also fully funded – was our response, "Thank you, but no"? The internal struggles we have had in occasionally deciding to end successful collaborations throw up questions it is vital to answer: How should an NGO decide whether to participate in an activity

that it might be difficult to justify on grounds either of need or of measurable outcomes? In what circumstances might it be acceptable to divert resources from projects that might be of more direct benefit to sea turtles? Must everything we do be of significant value to the marine environment or is there a place for principally "symbolic" actions? And, if so, how do we evaluate their "worthwhileness"? As NGOs, but equally as academic researchers, we need to make fully-considered choices and find a path through the tangle of motives, intentions and drivers of funders, partners and other collaborators, so that we can be sure to call each element of any project we are considering by its real name. Only then can we hope to make good decisions. There may be no black and white answers to the questions we need to ask ourselves, but at least we should know what they are... and keep asking them!

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TOWARDS THE INTEGRATED MEDITERRANEAN-LEVEL CONSERVATION OF MARINE TURTLES: THE NEED TO DESIGN AND ESTABLISH AN MPA MARINE TURTLES WORKING GROUP WITHIN THE MEDPAN* NETWORKSourbès L.¹, Webster C.², Meola B.², Vignes P.², Neveu R.², Romani M.², Mabari M.², Koutsoubas D.¹, Canals P.²¹ National Marine Park of Zakynthos, El. Venizelou 1, 29100 Zakynthos, Greece² MedPAN Association, 58 quai du Port, 13002 Marseille, France

Marine Turtles in the Mediterranean have received increasing scientific attention over the past 30 years with data collected by different entities across the basin for two species: *Caretta caretta* (Loggerhead turtle) and *Chelonia mydas* (Green turtle). Efficient conservation of migrating marine species is highly complicated since numerous anthropogenic threats must be addressed over a very large geographical area. Global protection of such species is therefore difficult as just one successful protection measure in a given area doesn't mean there is an efficient protection throughout the whole life cycle (Sourbès et. al., 2011, 2015). Marine Protected Areas (MPAs) managers can adopt measures that help decrease pressures on nesting beaches and sometimes in waters around and by collaborating, spanning a given geographical area, they can be increasingly effective at curbing pressures and impacts in mating, migrating, foraging and wintering areas. The network of Marine Protected Areas managers in the Mediterranean, MedPAN, established a Mediterranean MPAs Marine Turtle Working Group (MPATWG) bringing together MPA managers and involving NGOs and researchers working on marine turtles conservation from 10 Mediterranean countries. This group enables exchanges to tackle site-specific issues and allow a real-time exchange of information and thus, the possibility to take adaptive

management decisions at MPA local level. At network level, this group also supports an integrated management strategy for these species. The MPATWG is developing a Cooperation Framework for monitoring marine turtles, which includes a Data Sharing Charter. It intends to consolidate trust and to set the rules whereby data can be shared and borders issues overcome. A Guide is also developed to pull together protocols for monitoring marine turtles for management purposes, including adaptive management principles implementation. The MPATWG will also explore a potential database to store the data collected. To support this effort, MedPAN organises regular exchange visits in the field for MPAs, providing the opportunity for the MPATWG to meet. Maintaining a continuous and active MPAs Marine Turtle Working group, within the MedPAN network, can have a key role in advancing integrated marine turtle conservation and protection in the Mediterranean, through strong commitment and long-term cooperation among MPA managers, NGOs and researchers working towards this common goal.

*The network of Marine Protected Areas managers in the Mediterranean

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SESSION 4:
THREATS

ORAL PRESENTATIONS

ORAL PRESENTATIONS
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SESSION 4: THREATS**REDUCING SEA TURTLES BY-CATCH IN TUNISIA BY TESTING NEW MEASURES OF MITIGATION WITH FISHERMEN**Louhichi M.¹, Girard A.^{2,3}, Jribi I.¹¹ Departement of Biology, Sfax Faculty of Sciences, University of Sfax. BP 1171, Soukra Street, Sfax, Tunisia² Laboratoire Ecologie, Systématique et Evolution, Equipe de Conservation des Populations et des Communautés, CNRS, AgroPariTech et Université Paris-Sud 11, UMR 8079, 91405 Orsay, France³ RASTOMA Réseau des Acteurs de la Sauvegarde des Tortues Marines en Afrique Centrale, Pointe Noire, République du Congo

Three sea turtle species are observed in the Tunisian sea. The loggerhead *Caretta caretta* is common and reproduces on some beaches while the green turtle *Chelonia mydas* and the leatherback turtle *Dermochelys coriacea* are rare. Sea turtles and especially loggerhead turtles strongly interact with fisheries in Tunisian waters and this problem seems to be the main driver of mortality. So far, information on sea turtle by-catch in Tunisia is limited both in space and time due to logistical problems in data collection requiring on board observations. In the present study, sea turtle by-catch level in Tunisian waters was evaluated by collecting fishermen's knowledge on turtle by-catch through an interview-based approach. Until now 400 interviews were conducted in different ports along the coast stretching from Monastir to the Libyan border. Interview results analysis showed a large diversity of fishing gears are causing incidental catch of sea turtles: bottom and surface longlines, trammel nets, Gill nets targeting sharks and rays and trawls. The fishing gears which show the highest rate

of marine turtles by-catch are by decreasing order longlines, shark nets, rays nets and trawls. At a second stage, we refine the impact assessment by on board observations, focusing on the most impacting gears according to the fishermen's interviews. We are now testing mitigation measures on ray and shark nets which are large meshes gillnets. Our action is focusing on the areas of maximum interaction and targeting the most impacting fishing techniques (highest by-catch and mortality rate). We are creating fishing gears prototypes susceptible to reduce sea turtles by-catch. These prototypes are tested in comparison with non-modified gears (case control study) by counting both target species captured and incidental catches of endangered species during paired fishing events. Finally, our ultimate objective being to provide fishermen alternative fishing gears both commercially efficient and turtle friendly.

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TOWARD ESTIMATING SEA TURTLE BYCATCH IN THE SMALL-SCALE FISHERY WITH THE BIG IMPACTSnape R.T.E.^{1,2}, Çiçek, B.A.³, Godley B.J.¹, Savage J.², Broderick A.C.¹¹ Marine Turtle Research Group, Centre for Ecology and Conservation, College of Life and Environmental Sciences, University of Exeter, Penryn, Cornwall, TR10 9FE, United Kingdom² Society for the Protection of Turtles, PK 65 Kyrenia, Mersin 10, Turkey³ Underwater Research and Imaging Centre, Biological Sciences Department, Eastern Mediterranean University, Famagusta, Mersin 10 Turkey

Fisheries bycatch is the most significant threat to large marine vertebrates such as sea turtles. Sea turtle bycatch rates in the Mediterranean are among the highest in the world with tens of thousands dying annually. Small polyvalent vessels have the greatest population level impact, yet, due to challenges faced in establishing onboard observer programmes for these fleet segments, current bycatch estimates are dependent on interviews, a method which is likely to be confounded by individual bias. We report on an onboard observer program established in the Turkish Cypriot fleet (polyvalent vessels <12m). Temporal distribution of observation effort was planned using published anthropological survey data addressing monthly fishing activity of captains. Vessel counts in harbours were made to allocate observer coverage to spatial fishing effort. Observed captures were extrapolated to the total fleet activity according to published estimates of fishing effort (vessel trips made per month). During the first five months of this scheme we observed 0.26% of the total estimated fleet fish-

ing effort. Bycatch of 3126 (95% CI: 1348-6158) green turtles and 781 (94-2821) loggerhead turtles is estimated with mortality rates of 25% and 50% for green and loggerhead turtles respectively. These estimates are of considerably greater magnitude than previously reported for this fleet. As our survey effort was relatively low, results may not be adequately representative. However, they are concerning because surveys were biased to winter months, missing much of the heavy summer bycatch season indicated by interview-based surveys in this fleet. We discuss the challenges to be overcome in establishing onboard observation in Mediterranean small-scale polyvalent fleets and outline plans to expand our observer programme with the support of the MAVA foundation's Mediterranean-wide plan to understand and mitigate bycatch of vulnerable taxa.

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ORAL PRESENTATIONS
SESSION 4: THREATS

ORAL PRESENTATIONS
SESSION 4: THREATS

MONITORING MARINE DEBRIS INGESTION IN LOGGERHEAD SEA TURTLE, *Caretta caretta*, FROM EAST SPAIN (WESTERN MEDITERRANEAN) SINCE 1995 TO 2016

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Anthropogenic marine debris (AMD) is one of the major threats to marine ecosystems. The EU Marine Strategy Framework Directive (MSFD) has established a protocol for data collection on AMD from the gut contents of loggerhead sea turtles (*Caretta caretta*), and for determining assessment values of plastics for Good Environmental Status (GES). Current GES values are calculated as percent turtles having more than average plastic weight per turtle. Here we quantify AMD ingestion in 155 loggerhead turtles (mean CCL \pm SD [Range] = 51.1 \pm 14.9 [11.0-80.0] cm) collected in the period 1995-2016 in Western Mediterranean waters. The aims are to update and standardize data available on from this area to analyse spatio-temporal variation in AMD ingestion by the turtles over 20 years, and to use new data to compare our results with the only GES value available in the Mediterranean. Composition of AMD (FO% [95% CI] = 71.0% [63.2 - 77.8]; mean dry weight \pm SD = 1.3 \pm 2.6 g) was similar to that found in other studies from Western Mediterranean. Model results for the

studied area suggest that (a) FO% of AMD increased from 60% in 1995-2004 to 82% in 2005-2016, but debris dry weight was significantly lower in 2005-2016 and (b) that larger turtles at the north of the study area containing significantly more AMD. The GES value for late juvenile turtles (CCL > 40cm) indicated that 27.8% of turtles had more plastics than average (1.3 g), similarly to the only other GES value available in the Mediterranean. We also provide for the first time a GES value for early juvenile turtles (CCL \leq 40cm): 26.3% of turtles had more plastics than average (0.4 g). The present study encourages the use of the standardized protocols proposed by the MSFD for assessing AMD ingestion by loggerhead sea turtles and the use of the turtles' habitat use (neritic vs oceanic), rather than their size, to obtain GES values due to their flexible ontogenetic habitat shift in the western Mediterranean.

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“BOXING” NESTS: AN “UNORTHODOX” BUT NECESSARY METHOD TO SAVE HATCHLINGS FROM SEVERE LIGHT POLLUTION

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Kyparissia Bay, in western Peloponnese, has a significant ecological value because it hosts one of the largest nesting aggregations of loggerhead turtles in the Mediterranean and contains an extensive dune system with many priority habitats. For this reason, the Bay includes three Natura 2000 sites. Nesting occurs along the 44km beach, from river Alfios in the north to the river Arcadikos in the south, with the majority of it concentrated at the southernmost 9.5km, which is considered the core area. While most of this area features low coastal development, the portion adjacent to the village of Kalo Nero is severely affected by tourism. A major disturbance is light pollution, caused by street lights along a beach-front road and by the bright lights of coastal businesses (bars, tavernas, etc). In previous years it was common to find disorientated hatchlings on this road, frequently run over by cars. Very few were rescued by volunteers. The proximity to the beach and the height of street lights are not conducive to implement the standard method, used by ARCHELON, which prevents hatchling disorientation by “shading” a nest, i.e. placing light barriers around the nest. In order to overcome this problem, ARCHELON resorted to covering nests

at night with a wooden box so that emerged hatchlings would remain inside it. The boxes are checked at hourly intervals and any hatchlings found are transported to a dark beach sector to be released. In recent years 44% of all nests in Kalo Nero have had to be boxed. Another problem in Kalo Nero consists of tourists walking the beach at night with flashlights to see hatchlings, resulting frequently in inadvertent hatchling trampling. “Boxing” helped reduce this problem as well by allowing tourists to see hatchlings in an organized manner during their transportation to the release site. Thousands of hatchlings are rescued through “boxing” each year, but this endeavour remains an “unorthodox” and labour intensive method. The beach of Kalo Nero needs to be sustainably managed to eventually achieve a conservation status suitable for sea turtle nesting. “Boxing” should not be a permanent solution. Instead, the reduction of the light sources is the preferred approach. Many thanks to all ARCHELON volunteers and field assistants for their countless hours of work.

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SESSION 5:
HEALTH AND
REHABILITATION



ORAL PRESENTATIONS

6TH MEDITERRANEAN CONFERENCE
ON MARINE
TURTLES
POREČ/CROATIA 2018

A NOVEL RESUSCITATION PROCEDURE FOR POST DROWNED MARINE TURTLESLevy Y.^{1,2}, King R.^{1,2}, Grundland Y.¹, Aizenberg Y.^{1,3}¹ Israel's Sea Turtle Rescue Centre, Nature & Parks Authority, Michmoret 40297, Israel² The Science & management division, Nature & Parks Authority, Ha'am veolamo 3 st. Jerusalem. Israel³ Veterinary Medicine Teaching Hospital of The Hebrew University of Jerusalem, P.O.Box 12, Rehovot 76100, Israel

Drowning due to incidental capture by fishing seems to be the main cause of death for sea turtles worldwide. Only in the Mediterranean, more than 132,000 captures per year are estimated, of which over 44,000 are lethal. Forced apnea and complications following the trauma are the major cause of death from a turtle's encounter with the common fishing methods. Cardiopulmonary resuscitation can be successful but after a few hours the turtle will often suffer a mortal secondary drowning. The survival rate of drowning sea turtles even if medically treated is very low and prognosis is poor. The sea-water irritates the lungs' lining and fluid builds up, causing pulmonary edema, increased mucus secretion and blockage of gas exchange. Up to day, resuscitation of post drowning turtles had poor prognosis. Lung lavage – a novel medical resuscitation procedure for treating drowning turtles was developed at Israel's sea turtle rescue center (Nature and Parks Authority). Lung lav-

age (commonly used in human medicine as a diagnostic tool) extracts some of the fluids that blocks the alveolus and allows gas exchange for breathing. The procedure was performed on 10 post-drowned loggerhead sea turtles in severe respiratory stress (comatose or breathing intervals of less than a minute). Lung lavage procedure was found to be highly successful even in comatose state. 80% of the severe post-drowning loggerhead turtles were resuscitated successfully. The use of lung lavage procedure as an improved cardiopulmonary resuscitation can be applied on other post drowning marine reptiles worldwide. The new resuscitation technique can be a game changer for post drowning marine turtles, highly elevating survival rates from the most common threat.

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ENTANGLED FLIPPER IN *Caretta caretta*: TO AMPUTATE OR NOT TO AMPUTATE?Franchini D.¹, Valastro C.¹, Ciccarelli S.¹, Ricciardi M.², Lenoci D.³, Assad E.A.², Di Bello A.¹¹ Department of Veterinary Medicine, University of Bari "Aldo Moro", Str. Prov.le per Casamassima km 3, CAP 70010 Valenzano (BA), Bari, Italy² Pingry Veterinary Hospital, via delle Medaglie d'Oro 5, CAP 70100, Bari, Italy³ Private Practitioner, Viale Europa 1, 71042 Cerignola (FG), Italy

Marine turtles caught in fishing gear frequently suffer devastating injuries because the fishing lines and nets tighten around their flippers, and sometimes their neck. Deep lacerations and partially or completely amputated forelimbs are common and turtles unable to dive cannot eat or rest. The aim of the present study was to evaluate with ecodoppler and MDCT the vascularization of 7 entangled flippers, monitoring any new anastomoses and analyzing which vessels are involved in neoangiogenesis. Ultrasound examinations were performed on three turtles using a portable ecography machine (Esaote, Alpha), with ultrasound multifrequency probes (Convex CA 123, 10-14 MHz). The transducer was oriented on the horizontal and vertical plane of the flipper. Colour and pulsed doppler were applied in the vessels. The flow of the brachial artery and part of the radial was clearly visible. The flow in the ulnar artery was not identified. The biceps muscle and extensor carpus were completely dissected. Small subcutaneous vessels presented flow. The follow-up after 2 months showed the presence of neoangiogenesis of superficial collateral vessels in the residual muscle and subcutaneous tissue. Four turtles underwent a total-body MDCT examination with a 16-slice MDCT scanner (Somatom Emotion: Siemens, Forchheim, Germany). In all

patients CT images were acquired before and after the manual injection of iodinate contrast medium. In all patients the CT showed variable degrees of bone damage of the middle part of the humeral diaphysis. In all patients with severe narrowing of the brachial segment of the flipper and humeral fracture, the main trunk of the dorsal brachial vein was interrupted and the two halves appeared connected by small tortuous venous collaterals. These small vessels provided a natural bypass for the venous drainage of the flipper at the level of brachial narrowing. Following surgical curettage of all the entangled flippers, the treatment protocol included exclusive use of the plant-derived dressing (1 Primary Wound Dressing®) applied daily on the wound surface. All the soft tissue defects were completely healed by secondary intention. Understanding by means of imaging diagnostics if the distal portion of an entangled flipper is still vascularized and the extent of this vascularization is a critical point before carrying out a treatment to try to perform a conservative treatment, avoiding amputation as much as possible.

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A 10 YEARS EVALUATION OF SEA TURTLE RESCUE AND REHABILITATION ACTIVITIES IN SEA TURTLE RESEARCH, RESCUE AND REHABILITATION CENTER (DEKAMER), DALYAN-TURKEYKaska Y.^{1,2}, Şahin B.^{1,3}, Başkale E.^{1,2}, Sözbilen D.^{1,4}¹ Pamukkale University, Sea Turtle Research Centre (DEKAMER), Denizli, Turkey² Pamukkale University, Faculty of Arts and Sciences, Department of Biology, Denizli, Turkey³ Pamukkale University, Faculty of Medicine, Denizli, Turkey⁴ Pamukkale University, Acıpayam Vocational High School, Acıpayam, Denizli, Turkey

Sea Turtle Research, Rescue and Rehabilitation Center (DEKAMER) established in 2008 in Dalyan-Muğla-Turkey and continues rescue and rehabilitation activities. Stranded turtles were admitted from all along the Turkish coastline since its establishment. In this study, The recovery process and success rate of the stranded sea turtles which admitted to DEKAMER, the primary cause of injuries were presented. A total of 266 turtles admitted to DEKAMER. Of these, 207 turtles were *Caretta caretta* (78%), 50 turtles were *Chelonia mydas* (19%) and 9 turtles were *Trionyx triunguis* (3%). Of these turtles, 146 (54.8%) were released to the sea after rehabilitation process, 115 (43.2%) died during the rehabilitation, and 5 (2%) turtles are still in rehabilitation process. The number of stranded turtles admitted to DEKAMER increased in the 10 years period ($r^2 = 0.94$). The majority of the stranded turtles (69%) found in Muğla. The rest of the turtles were found in Antalya (17%), Aydın (9%), and the remaining stranded turtles found in Balıkesir, Çanakkale, İzmir and Mersin. A total of 39.47% of the turtles were female, 18.42% were male, and 42.10% were juvenile. Anthropogenic activities were the main

cause of injuries (72.27%). Of these, 107 turtles (40%) were injured from fisheries related activities; 72 turtles (27%) were stranded due to natural causes such as parasite infestation, clod-stunning, diving problems; 52 (20%) turtles were injured from marine vehicle collision, and 35 turtles (13%) were injured from intentional attack by human. We also observed secondary injuries in 56 (22%) turtles. Stranded turtles were found throughout the year, but the peak season is summer, which coincidence with high tourism season. Most injured turtles were admitted from Muğla and Antalya, which are the biggest mass tourism regions. In addition, DEKAMER has strong stranding network in these regions. Strengthening the stranding network in all regions will increase rescuing injured or sick turtles. In addition, fisheries related studies should be started and regulations on marine vehicle use in the shores of nesting beaches should be implemented immediately in Turkey.

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BACTERIOLOGICAL SURVEY OF *Caretta caretta* FROM THE SOUTHWEST ITALIAN COAST: PREVALENCE, ANTIMICROBIAL RESISTANCE AND INFLUENCE OF ENVIRONMENTPace A.^{1,2}, Dipineto L.², Hochscheid S.¹¹ Marine Turtle Research Center, Stazione Zoologica Anton Dohrn, Via Nuova Macello 34, 80055 Portici, Italy² Department of Veterinary Medicine and Animal Production, University Federico II, Via Delpino 1, 80137 Naples, Italy

The monitoring of sentinel species is strongly needed to assess the health of marine ecosystems, which is rapidly deteriorating. Sea turtles served as bio-indicators in different contexts. Nevertheless, sea turtle infectious diseases have not been fully investigated, especially in the wild, making the health assessment of populations still difficult. This study was aimed at performing a bacteriological survey on wild, live *Caretta caretta* from the Tyrrhenian Sea, to address their role as sentinels for their ecosystem and as carriers of potential zoonotic agents. Thirty-five *C. caretta* were classified considering estimated life stage; area, season and cause of recovery; plastic ingestion. Oral and cloacal swabs were collected and processed by culture methods. Isolates were identified and submitted to antimicrobial susceptibility test. Statistical analyses were performed to explore the possible associations between bacterial families and classification factors. Bacterial isolates included: Enterobacteriaceae, *Pseudomonas* spp., *Aeromonas* spp., *Vibrio* spp., *Shewanella* spp. and *Staphylococcus* spp.

Different rates of antimicrobial resistance were detected. *Morganella morganii*, *Citrobacter* spp., *Staphylococcus aureus* and *Pseudomonas aeruginosa* were the most resistant strains. Significant associations were detected between bacterial families and classification factors (i.e. life stage; area; season; plastic ingestion). The majority of bacterial isolates regarded opportunistic pathogens in sea turtles, yet some of them might pose a risk to other marine animals and humans, pointing out sea turtles as carriers of potential zoonotic agents. This survey provides a hint of the bacterial communities found in wild populations, and how the environment could influence them. Moreover, it raises concerns regarding the dissemination of antimicrobial resistance in marine wildlife and it strengthens the link between turtle health and ecosystem health, within the wider concept of One Health.

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ORAL PRESENTATIONS
SESSION 5: HEALTH AND REHABILITATION

SPIRORCHIDIASIS IN SEA TURTLES: AN OVERVIEW AND UPDATE OF DATA FROM MEDITERRANEAN SEA

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Spirorchiid blood flukes (Digenea: Spirorchiidae) are considered major pathogens of sea turtles, associated with stranding and mortality worldwide. These parasites present an indirect life cycle, which include gasteropods as intermediate hosts. High prevalence for spirorchidiasis have been reported in *Chelonia mydas* and *Caretta caretta* from both Atlantic and Pacific Ocean. The severity of the infection can vary from accidental finding during necropsy to fatal disease. Lesions are caused both by adult parasites in heart and vessels and by the embolization of the eggs in the organs. Site-specificity has been described for the different genera and species. Diagnosis is often reached during post mortem investigations (gross lesions, histopathology, parasitological exam of cardiovascular system and spleen), while copromicroscopy and serology have been efficiently used in vivo. As for the Mediterranean, only historical reports were present and recently the disease gained interest after case reports from the Central and Western Mediterranean involving two different spirorchiid species (*Amphiorchis* sp., *Hapalotrema mistroides*). Between 2009 and 2017 spirorchidiasis has been investigated in the North-Western Adriatic Sea, involving 205 stranded dead loggerheads. Necropsy, histopatholo-

gy and copromicroscopic examination, followed by molecular analyses on ITS-2 and 28S fragments of rDNA, revealed the presence of *H. mistroides* (prevalence: 12.2%), *Neospirochis* Neogen-11 (0.97%) and co-infection by both genera (7.3%) (overall prevalence 20.5%). Granulomas due to spirorchiid eggs were widespread in various organs, but only mild lesions and low parasitic burden were observed. Among the infected turtles, genetic analyses of mtDNA on the host revealed the presence of specimens belonging to Greek rookeries, suggesting the existence of a life cycle completely developed inside the Mediterranean basin. In order to clarify the real spread of spirorchiid infection and its impact on stranding and mortality of loggerhead and green turtles, the collection and sharing of data from other Mediterranean areas is encouraged, through the implementation of both in vivo and post-mortem diagnostic protocols.

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NORMAL ULTRASONOGRAPHIC FEATURES OF THE LOGGERHEAD (*Caretta caretta*) EYES

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The aim of the study was to describe the normal ultrasonographic features and dimensions of eyes in loggerhead (*C. caretta*) as obtained with a general purpose ultrasound device equipped with a 12 MHz linear ultrasound probe. Polar axis (PA), equatorial axis (EA), corneal thickness (CT), anterior chamber depth (ACD), lens thickness (LT), and vitreous chamber depth (VCD) were measured on a sample of loggerheads at the Marine Turtle Rescue Centre (Portici, IT). The effects of side, straight carapace length (SCL) and body weight (BW) on each ocular features were calculated. Difference between right and left eye were analysed with 2-sided Student's t-test or Mann Whitney test if normally or not normally distributed respectively. Correlation between SCL or BW and other variables were tested using Pearson's correlation coefficient. Significance was at $p \leq 0.05$. The sample was composed by 11 sub-adults and 4 juveniles. Except for CT (right eye 0.61 ± 0.12 ; left eye 0.52 ± 0.06

mm; $p = 0.01$), no statistical difference was found between right and left eyes. Except for VCD ($p = 0.01$), no correlation was found between SCL and the other eye measurements. Correlation was found between BW and AP ($p < 0.01$), EA ($p < 0.01$), LT ($p = 0.01$) and VCD ($p < 0.01$). Compared to mammalian species, the loggerhead's eye ball has a spheroidal shape, with a shorter PA compared to EA, a lesser pronounced corneal curvature, the presence of scleral ossicles, that does not permit to visualize the lateral border of the lens, a very thin anterior chamber and a relatively small lens. Dimensions of the eyes mainly depend on BW. The use of a general purposed US device is enough to characterize the main anatomical structures of the eye in loggerhead.

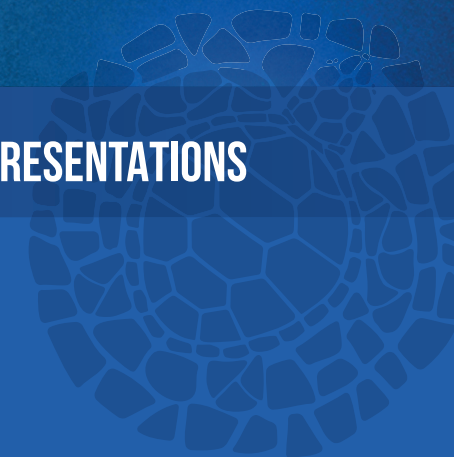
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SESSION 1:
POPULATION BIOLOGY
AND ECOLOGY



POSTER PRESENTATIONS



POSTER PRESENTATIONS

SESSION 1: POPULATION BIOLOGY AND ECOLOGY

MARINE TURTLE NESTING SURVEY AND STRANDING ASSESSMENT FROM TARTUS TO SYRIA'S BORDER WITH LEBANON

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The nesting of sea turtles was studied along the beach south of Tartus (i.e. the Beach of Dreams (35° 35'07 E; 34° 51 '43 N) to the Lebanese border in the south (35° 58 '24.16 E; 34 37 58.48) a total distance of about 40 km. It includes a distance of about 10 km suitable for turtle nesting and this was divided into 7 parts, each of between 0.3 and 3 km in length. The area was surveyed between 20 June to 29 August 2016. Nest numbers were calculated in two ways: 1- from initial track assessment that did not include clutch identification, 2- By summing the number of nest proven by observation of eggs. A total of 36 turtle tracks including 13 nests were recorded. The majority of the nests, 11 (84%), were from the loggerhead turtle *Caretta caretta* and 2 (16%) were from the green turtle *Chelonia mydas*. The nesting success rate was 25% for the loggerhead turtle and 40% for the green turtle. The nesting density at the site of the study was 1.3 nest/km, and the overall nesting success rate was 26.5%. The highest number of nests was recorded in Area A (Al Ahlam Beach and Amrit (35° 54 '06 E; 34° 50'08 N). The results showed that the peak of nesting occurred during the second week of July (7 nests). The results of this study reveal a reversal of species prevalence from the northern part

of the country as a similar study previously undertaken on the beach of Shkaifate, south of Lattakia (Rees et al. 2008, Saad et al. 2010) revealed green turtle nesting was dominant compared to loggerhead turtle nesting. Assessment of marine turtle deaths south of Tartus beach show by direct examination of carcasses and a questionnaire survey of fishermen to confirm their observations about the mortality of sea turtle was undertaken between January 2016 and December 2017. A total of 106 dead marine turtles were observed, including 95 (92%) loggerhead turtles and 11 (8%) green turtles. The results showed that higher numbers of dead green turtles in April (N = 32) with mortality rate 0.25 carcasses/km/month. About 86% of all turtles found were juveniles or sub-adults. Timing of marine turtle mortalities and visible injuries suggest that the gill net and dynamite fishing were responsible for most of the mortalities. This study confirms that south of Tartus is likely to be an important feeding and nursery ground, with the loggerhead turtle being the most common species.

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POSTER PRESENTATIONS

SESSION 1: POPULATION BIOLOGY AND ECOLOGY

NON-MODAL SCUTE PATTERN IN LOGGERHEAD: IS THIS A SIGN OF REDUCED FITNESS?

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The carapacial scutes pattern is a conserved trait in sea turtles that provides taxonomic information, although individuals with aberrant scute numbers are commonly described. Temperature during the mid-development appears to play a central role in scute pattern variation which may also correlate with individual fitness but there is still little information on these abnormalities. Improving our basic knowledge of scute pattern is an important step towards a better understanding of the causes and effects of these irregularities. Here we compared scute patterns in hatchlings, juveniles and adults of loggerhead turtles from the Central Tyrrhenian Sea. 21% of hatchlings naturally emerged from 23 nests laid along the SW

Italian coasts between 2013-2017, exhibited major non-modal scute patterns, i.e. number of vertebral/coastal scutes $\neq 5$ (N = 960, range 0%-52%). Vertebral and coastal variations occurred at comparable frequencies. Hatchlings with the modal scute patterns (N = 618) were heavier than those with major non-modal patterns (N = 159) although they did not differ in size. Nest relocation (N = 4) did not affect the proportion of aberrant scute numbers in hatchlings. 15% of small juveniles (N = 60, SCLst < 35 cm) and only 6% of the larger juveniles and adults (N = 108)

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POSTER PRESENTATIONS

SESSION 1: POPULATION BIOLOGY AND ECOLOGY

THERMAL ECOLOGY OF GREEN TURTLE (*Chelonia mydas*) NESTS IN THE LARGEST ROOKERY OF EASTERN MEDITERRANEANTurkozan O.¹, Yilmaz C.², Godfrey M.³, Mazaris A.⁴¹ Department of Biology Adnan Menderes University, Turkey² Consultant WWF Turkey³ Nicholas School of the Environment, Duke University Marine Lab, 135 Duke MarineLab Road, Beaufort, NC 28516, USA⁴ Department of Ecology, School of Biology, Aristotle University of Thessaloniki, 54124 Thessaloniki, Greece

Global warming is one of the most important issue threatening the natural environment and sea turtles will be highly impacted due to temperature dependent sex determination mechanism of hatchlings. There are many modelling studies providing predictions under climate warming scenarios. It is, therefore, important to collect baseline data for thermal environment of the nests in order to provide ideal nest conditions for the future for the conservation of the species. With this aim, we recorded temperature in 225 nests of green turtles (between 2009-2013) and 12 control sites (15, 30 and 45 m distance from high tide line between 2010-2013) at 75 cm depth at Akyatan beach, Turkey. Mean temperature of the nests ranged

from 28.4°C to 33.5°C with a mean of $31.4 \pm 0.94^\circ\text{C}$ while the mean temperature was between 21.09°C and 34.37°C in control sites. The nest temperature was highly and negatively correlated with incubation duration ($r = -0.7$, $p < 0.001$) and nests experiencing high temperatures exhibited low hatching success ($r = -0.15$, $p < 0.05$). The daily fluctuation of the temperature in the nests was between 0.1°C and 4.7°C with a mean of 0.2°C. The metabolic heating was the highest in the final third of incubation duration.

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POSTER PRESENTATIONS

SESSION 1: POPULATION BIOLOGY AND ECOLOGY

DEFINING THE INTERNESTING HABITAT OF THE MEDITERRANEAN SEA'S LARGEST LOGGERHEAD NESTING AGGREGATION USING THE EO4WILDLIFE PLATFORMRees A.F.^{1,2}, Nestoridou P.¹, Margaritoulis D.¹, Theodorou P.¹, Godley B.J.²¹ ARCHELON, the Sea Turtle Protection Society of Greece, Athens, Greece² Centre for Ecology and Conservation, University of Exeter, Penryn Campus, Penryn, UK

As adults, sea turtles often migrate many hundreds of kilometres from their over wintering locations to their chosen breeding site. Adult females then deposit between one and five clutches of eggs in the nesting beach with approximately a two-week interval between clutches. This means that in the Mediterranean, between May and August, marine habitats around the nesting areas host increased numbers of adult sea turtles. In recent years, Kyparissia Bay in Greece holds the largest nesting aggregation of loggerheads in the Mediterranean. Nests made there are protected against the prevalent threats of inundation and predation and hatchlings are managed to avoid losses due to misorientation caused by artificial lighting as part of ARCHELON's multi-decadal conservation programme. In contrast to our deep knowledge of the biology of turtles breeding at the nearby nesting area of Laganas Bay, on Zakynthos, little is known of the whereabouts of Kyparissia Bay's breeding turtles during the internesting period, nor the environmental conditions in which they inhabit at this time. To address this data-gap, between 13 and

20 June 2018, we deployed Argos 'satellite transmitters' (Wildlife Computers, USA) on nine turtles nesting in southern Kyparissia Bay. Location data were automatically collected and stored in the Wildlife Computers data portal and retrieved for analysis. We used the EO4wildlife platform to extract spatio-temporally relevant environmental Earth Observation and bathymetry data and used the platform to construct home range kernels (both individually and collectively) for the tracked turtles. In this way we were able to describe the environment conditions prevalent in the turtles internesting habitat and define spatially explicit hot-spots for breeding turtle distribution that can inform management. Acknowledgements. The tracking project is funded by the MAVA foundation. We thank Sevi Kapota for her assistance with transmitter deployment and all the ARCHELON personnel and volunteers that helped with this project.

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POSTER PRESENTATIONS

SESSION 1: POPULATION BIOLOGY AND ECOLOGY

SATELLITE TRACKING OF NESTING ACTIVITIES OF THE GREEN SEA TURTLES AT AKYATAN NESTING BEACH

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Akyatan Nesting Beach is located in the Akyatan Wildlife Development Area and is a place between Akuvatur fish farm channel in the west and the Akyatan Lagoon in the east which is exceeding 100 m in width and 22 km in length. The beach is the nesting place for green sea turtle (*Chelonia mydas*) and the loggerhead sea turtle (*Caretta caretta*). We were attached to PTTs (Platform terminal transmitters, Kiwisat PTT 101, Sirtrack, New Zealand) to 10 green sea turtle females and determined the internesting interval. The PTTs were attached to the second vertebral plate after the body measurements (SCL, SCW,

CCL, CCW) of green sea turtle females were taken and the labeling process was done after nesting at the 2018 breeding season at Akyatan Beach. These PTTs were attached at June 5th (ID:57660, 57736), June 8th (ID:57721), June 10th (ID:57649), June 11th (ID:57722, 57720), June 12th (ID:57715, 57647) and June 14th (ID:57644, 57732). Also with this study, it will be determined where they spent their time at internesting interval.

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NESTING ACTIVITY AND REPRODUCTIVE OUTPUT OF THE LOGGERHEAD TURTLE *Caretta caretta* IN CALABRIA (SOUTHERN ITALY) FOR TWO SEASONS (2016-2017)

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The distribution of *Caretta caretta* nesting in Italy ranges from significant numbers in the southern coastline and islands to single nesting records documented along the coast of Tuscany and Abruzzo in the north. In recent years, more detailed fieldwork surveys have demonstrated that the frequency and numbers of nesting events are most significant along the Ionian coast of Calabria. The results of this research place the region high importance for Loggerhead nesting in Italy. A strategic monitoring project aimed to protect the nesting population in Calabria was started in 2016 by the association "Caretta Calabria Conservation". In this work we focused the data collection about the nesting activity of the Loggerhead turtle along the coast of Calabria during the 2016 and 2017 reproductive seasons. In May to August the survey methods are conducted using traditional observation on foot, but also utilizing more innovative technologies including electric fat bike and drone. The monitoring was focused around intensive a key nesting area of some 36 km located in south-

ernmost sector and also occasionally in the other sectors of the region where the magnitude of nesting activity was lower. The total number of nests was 62, of these, the 62.9% were laid along the southernmost Ionian coast and the peak of activity was mid July. Nesting success was 44.3% (N = 140), the mean clutch size was 95 ± 21.7 eggs (range: 54-157 eggs); hatching success was $77.3\% \pm 19.6\%$ (range: 17.6-98.9%) and the mean incubation duration was 49.8 ± 6.1 days (range: 41-68 days). Our results are similar to those reported for the other Mediterranean nesting grounds, which confirm the importance of the southernmost Ionian coast together with new information for northern Calabria. These are most likely to be as a result of the major monitoring effect and awareness of the local population, tourists, stakeholders and regional administration.

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POSTER PRESENTATIONS

SESSION 1: POPULATION BIOLOGY AND ECOLOGY

EXPLORING BEHAVIOR OF LOGGERHEAD TURTLE NESTING FEMALES IN THE SPAIN'S MEDITERRANEAN COASTS THROUGH SATELLITE TRACKING FOR CLUTCH PROTECTION

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Several uncertain evidences of sporadic nesting events of loggerhead sea turtle (*Caretta caretta*) have been recorded in the past century in the Spanish Mediterranean coast. The first certain evidence was recorded in 2001, when a full nesting event and egg laying were recorded. Since then, several nesting events have been recorded in these coasts, and the number of detected nesting events is increasing, particularly since 2014, with several nesting events recorded every year. Most nests recorded in Spain have been found in touristic beaches, and so consequently, egg development and hatchling survival are threatened by human activities. Thus, management measures like nest relocation and other clutch protection actions are required. In order to locate the clutches laid and undertake these management measures we need to answer several questions: (1) where these new nesters come from, and where they go between nesting events and after nesting season; (2) how many clutches do they lay per nesting season; and (3) if they exhibit nest site fidelity. In order to answer these questions, we satellite-tagged 4

females of loggerhead turtle after nesting attempts on Spanish beaches. The first one was tagged in late June 2016 in Barcelona province (North-east Spain), the next two in late June 2018 in the Valencia region (East Spain), and the last one in early July 2018 in Alicante region (East Spain). The last three still transmitting. Females were released immediately after tagging. The satellite-tracking of these females could potentially elucidate new nesting beaches and help to localize new clutches laid by these females in order to protect them, as well as elucidate the behavior and dispersal of loggerhead females after nesting. At the moment of writing this communication, we successfully detected two confirmed nesting attempts and several potential nesting events after tagging, since nesting females had positions during several hours on the beach. Moreover, more turtles can be included in the present study, since at this time nesting season have just begun.

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POSTER PRESENTATIONS

SESSION 1: POPULATION BIOLOGY AND ECOLOGY

HABITAT USE OF THE LOGGERHEAD SEA TURTLE (*Caretta caretta*) IN THE WESTERN MEDITERRANEAN INFERRED FROM LONG-TERM ANALYSES OF DIET AND EPIBIONT BARNACLES

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Investigating patterns of habitat use by loggerhead sea turtles (*Caretta caretta*), particularly the exploitation of oceanic vs. neritic, and pelagic vs. benthic habitats, is important to understand the ontogenetic habitat shift of this species and to evaluate potential associated threats of anthropogenic origin. Traditionally, it has been proposed that post-hatchlings and early juveniles use oceanic waters and late juveniles and adults exploit neritic habitats, respectively. However, recent findings suggest that this habitat shift could be more flexible. Here we address this question based on analysis of gut contents and epibiont barnacle assemblages of juvenile and subadult loggerhead turtles from the Spanish Mediterranean, an important feeding ground for this species. We analysed 200 turtles (mean CCL \pm SD = 53.5 \pm 14.2 [range: 11-80] cm) collected in the period 1995-2017 for epibiont barnacles and a subsample (n = 142; mean CCL = 49.9 \pm 14.7 [11-79] cm) for gut contents. About half of the turtles (56.5%) were found stranded, 16.5% were by-caught in neritic waters, and 27.0% were by-caught in oceanic waters. The turtles captured by oceanic fish-

eries were significantly larger than those captured by neritic fisheries, but their diet was significantly less diverse and included mostly pelagic-oceanic prey. In contrast, small-sized (CCL \leq 40 cm) turtles had a more diverse diet with certain dominance of benthic prey. Also, 'oceanic' turtles harboured barnacle assemblages significantly enriched with generalist species typical from floating objects (*Lepas* spp. and *Concho-derma virgatum*). Estimation of age since settlement suggested frequent prolonged stays (weeks) in the oceanic realm. In contrast, barnacle assemblages of 'neritic' turtles were comparatively enriched with a species specific to marine turtles, *Chelonibia testudinaria*. Overall, the results strongly suggest that both the habitat use and the ontogenetic habitat shift in *C. caretta* are very flexible in the Spanish Mediterranean, with temporary exploitation of oceanic resources regardless of size.

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POSTER PRESENTATIONS

SESSION 1: POPULATION BIOLOGY AND ECOLOGY

VULNERABILITY OF THE LOGGERHEAD TURTLE NESTING POPULATION OF KURIAT ISLANDS (TUNISIA) EVIDENCED BY GENETIC ANALYSIS OF mtDNA CONTROL REGION

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Among the three common marine turtle species observed in the Mediterranean sea, only the loggerhead (*Caretta caretta*) nests in Tunisia (central Mediterranean). This globally vulnerable species was genetically investigated from the main nesting site of Kuriat Islands. Long mtDNA fragment of 815 bp has been sequenced from 60 freshly dead hatchlings collected over a 10-year period (2002 to 2011). Only the widespread Mediterranean haplotype CC-A2.1 has been detected. This very low genetic polymorphism didn't allow a thorough analysis of the geographic distribu-

tion of genetic diversity among the Mediterranean rookeries. Along with the reduced nesting activity reported in the investigated site, our findings suggest a bottleneck effect that could have been resulted from anthropogenic activities. Sporadic nestings observed very recently on some Tunisian beaches need to be genetically characterized and could represent a sign of recovery.

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POSTER PRESENTATIONS

SESSION 1: POPULATION BIOLOGY AND ECOLOGY

DIET OF THE LOGGERHEAD SEA TURTLES (*Caretta caretta*, LINNAEUS, 1758) IN TUNISIA (CENTRAL MEDITERRANEAN SEA)

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The study of the diet of a given species is of paramount importance in bioecological knowledge; it provides insight into the role of the species in its environment from an understanding of these interactions with different types of prey. Digestive tract contents collected from 132 loggerhead sea turtles (*Caretta caretta*) found on the the Gulf of Gabes coasts from 2004 through 2010 were examined. Shallow benthic invertebrates were the predominant prey. Debris were found in 10 turtles. The most ingested preys were arthropods, poriferas, molluscs, tunicates and echi-

noderms. Molluscs, arthropods and poriferas are the preferred preys while tunicates and echinoderms are secondary prey. Molluscs and arthropods are mainly ingested during spring and summer, while tunicates and poriferas are ingested mainly during autumn and winter months. Other epipelagic or pelagic preys included in trawl discards may constitute feeding for turtles.

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POSTER PRESENTATIONS

SESSION 1: POPULATION BIOLOGY AND ECOLOGY

RESOURCE PARTITIONING BETWEEN GREEN TURTLES AND OTHER HERBIVORES IN CYPRUS

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Understanding the structure and functioning of marine ecosystems requires information about the trophic relationships between species. Herbivory is a major determinant of ecosystem dynamics, but little is known about resource partitioning between herbivores in the eastern Mediterranean. Extensive meadows of the seagrass *Posidonia oceanica* develop in moderately exposed locations, whereas beds of the seagrass *Cymodocea nodosa* are found primarily in shallow, sheltered bays. On the other hand, *Cystoseira spinosa* prevails in the infralittoral rocks. Here we use stable isotopes of C and N and the SIAR package to reconstruct the diets of green turtles (*Chelonia mydas*), rabbitfish (*Signus luridus*), saupe (*Sarpa salpa*) and sea urchins (*Paracentrotus lividus*) in Cyprus. The 30 µm innermost layer of carapace scutes from dead stranded individuals were analysed for green turtles, white dorsal muscle was analysed for the two fish species and gonads for the sea urchins. Lipids were removed from tissues prior to analysis and different trophic discrimination factors were used for sea turtles, fishes and sea urchins. The following po-

tential prey were also analysed: the sagrasses *Cymodocea nodosa* and *Posidonia oceanica*, the macroalgae *Halopteris scoparia* and *Cystoseira spinosa* and the sponge *Sarcotragus spinulosus*. The four species of macrophytes had distinct stable isotope ratios, but those of *H. scoparia* were not different from those of the sponge *I. spinulosa*. *Cymodocea nodosa* was the macrophyte with the lowest C:N ratio and hence the highest nutritional quality, but played a minor role in the diet of the four herbivores according to SIAR. Modelling indicated that green turtles and rabbitfish foraged primarily on seagrasses, with *P. oceanica* prevailing over *C. nodosa*. These results are in contrast with unpublished information suggesting that *C. nodosa* is the prevailing species in the stomach contents of green turtles dead strand in Cyprus and may reveal foraging elsewhere. On the other hand, saupe and sea urchins fed mainly on the macroalgae *H. scoparia* but also consumed some *P. oceanica*.

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POSTER PRESENTATIONS

SESSION 1: POPULATION BIOLOGY AND ECOLOGY

PRELIMINARY DATA FOR MITOCHONDRIAL DNA CONTROL REGION 3'-STR ANALYSIS OF GREEN SEA TURTLE (*Chelonia mydas*) NESTING POPULATIONS IN THE MEDITERRANEAN

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Previous work using D-loop region of mtDNA revealed 6 haplotypes in the Mediterranean. However, haplotype CM-A13 accounted for 97.3% of these haplotypes and provided low resolution for determination of genetic structuring. Subsequent studies using STR region of mtDNA provided better resolution for the Mediterranean green turtles but had low sampling from Turkish nesting aggregates, which are the most important nesting grounds for the Mediterranean. In the present work, we aimed to fulfill this data gap and added 96 new samples (Akyatan, N = 24; Alata, N = 14; Davultepe, N = 13; Kazanlı, N = 12; Samandağ, N = 27; Yumurtalık, N = 6) and two additional nesting

sites (Davultepe and Yumurtalık) to previous studies. We combined our data with previous studies and re-analyzed the data, thereby revealing 17 haplotypes (2 new) for the Mediterranean. Haplotype diversity was the highest (0.93) in the Israeli population while lowest in Anamur and Goksu Delta (0.00).

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POSTER PRESENTATIONS

SESSION 1: POPULATION BIOLOGY AND ECOLOGY

AN EVALUATION OF 16 YEARS MONITORING AND CONSERVATION STUDIES OF SEA TURTLES ON DALAMAN, DALYAN AND FETHIYE BEACHES, TURKEY

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Fethiye, Dalaman and Dalyan beaches are important nesting beaches that are located on western Mediterranean coasts of Turkey. Sea turtle monitoring and conservation studies were carried out in these three nesting beaches in the last 25 years, but Dalaman beach was monitored regularly since 2002. In this study, we evaluated nesting population in the last 16 years in three important beaches of Turkey. A total of 1,483, 1,245 and 5,495 loggerhead turtle nests were found in Fethiye, Dalaman and Dalyan beaches, respectively. In the study period, the number of nests were dramatically increased in Dalyan beach ($r^2 = 0.62$) while Fethiye showing a stable trend ($r^2 = 0.20$) and Dalaman showing stable trend with a slight decrease ($r^2 = 0.17$). The nesting trend in these beaches are stable in these beaches while Dalyan nesting population is growing. The number of hatchlings reached to the sea was increased to 92% in Dalyan beach in 2017. This ratio is lower in Fethiye and Dalaman beaches due to light pollution. In addition, predation rate is lowest in Fethiye beaches (4.4%) in 2017 and highest at Dalaman beach (22.0%) in 2017. The predation rate was 11.5% in Dalyan beach in the same year. Among these three beaches, Dalyan is the best protected nesting beach. Coastal development or light pollution

is prohibited around the nesting beach. On the other hand, coastal development and light pollution is high in Fethiye and Dalaman beaches. A well protected area with less human pressure on the beach increases the predatory activities but carrying out all conservation activities during the night increased the nest protection and hatching success rate. On the other hand, beach development and beach usage were increased in the same period in Fethiye and Dalaman beaches. In addition to the development in these beaches, the fishing activities, light pollution, water sport activities and boat traffic were also increased. Therefore, the nesting and hatchling success were affected negatively. Despite observing an overall increase in the number of loggerhead turtle nests in the Mediterranean, we observed a stable trend in Fethiye and a slight decrease in Dalaman beaches. It can be foreseen that the existing conservation measures will be inadequate to protect the population and that the population of sea turtles nesting in Fethiye and Dalaman beaches will decrease in the region with the increase of activities such as tourism and fishing.

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POSTER PRESENTATIONS

SESSION 1: POPULATION BIOLOGY AND ECOLOGY

CLIMATIC CONDITIONS OF SPANISH BEACHES FOR NESTING OF SEA TURTLES

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The incubation of sea turtle nests is affected by sand temperature in the nesting beaches. Temperatures higher than 34°C or lower than 25°C can be lethal for loggerhead turtle embryos. Furthermore, individuals of both sexes are only produced if the sand temperature is between 28.5°C and 30°C. The global warming is affecting the temperature in most of sea turtle rookeries, increasing the embryonic mortality and feminization the offspring. The colonization of beaches in colder zones is becoming important for an adaptive response to this global impact. The goal of the present work is to study the temperature of the sand of Spanish beaches and to evaluate its impact on the survival and sex-ratio production in loggerhead nests. This study was conducted in the Spanish warm coast throughout three years, from 2015 to 2017. 52 beaches were selected from the provinces of Girona in the northeast and Huelva in the southwest, including the Balearic Islands. Temperature data loggers (Onset HOBO Tidbit v2) with an accuracy of $\pm 0.2^\circ\text{C}$ have been used. The loggers were programmed to record data every 30 minutes and were buried at a depth of 40 cm. Data was recorded from June 1st to November 15th. The beaches were grouped in 13 geographic zones, which were compared using the daily or biweekly average of the temperature and estimates

of viable periods for the incubation of the species. The analysis of the data indicates viable conditions for the incubation of loggerhead turtle eggs in all the different zones. In 87% (N = 45) of beaches, temperatures greater than 25°C were detected for at least 60 consecutive days, which guarantees a minimum of an annual hatch per female, as long as the nesting had taken place at the beginning of the warm period. Moreover, 40% (N = 21) of beaches enables four viable consecutive nesting events per adult female. The percentage of beaches which would produce females, considering a minimum temperature of 29°C, is equal to 21% (N = 11) and it is distributed all along the autonomous communities of Andalusia, Murcia, Valencia, Catalonia and Balearic Islands. There is spatial and temporal variability in the incubation conditions among the years and the months of the same year. In the same beach, there may be years with viable laying while others are not, or years with production of both sexes while others are not. These results will be relevant for the management of turtle nests found in Spain in the future years.

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POSTER PRESENTATIONS

SESSION 1: POPULATION BIOLOGY AND ECOLOGY

EPIZOIC DIATOMS ASSOCIATED WITH THE NECK SKIN OF ADRIATIC LOGGERHEAD SEATURTLE

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Epibiotic communities of sea turtles have been subjected to growing scientific interest in the recent years. A variety of animals and photosynthetic organisms, such as crustaceans, annelids, molluscs or macroalgae, are well known to live as macro-epibionts on the sea turtle body surfaces. Some of these organisms require animal substrate to live and develop and their survival is intricately linked to the survival of the host species. However, as has recently been shown, sea turtles also host unique communities of diatoms – siliceous unicellular algae with several taxa, including newly described genera (e.g. *Chelonicola*, *Medlinella*, *Poulinea*) and species (e.g. *Achnanthes elongata*, *A. squaliformis*, *Labellicula lecohuiana*, *Tursiocola denysii*), known exclusively from the carapaces and skin of different marine turtle species, such as olive ridley, green turtle, and loggerhead. The scope of our study was to confirm or refute the presence of the epizoic diatom flora on the skin of loggerhead sea turtles found in the Adriatic Sea. We collected skin samples from the frozen necks and heads of 14 different loggerheads obtained between 1995 and 2002. The scrapings were processed with strong acids (sulfuric and nitric), which allowed to re-

move the organic matter and revealed the inorganic components of the samples, such as silica frustules of diatoms. The light (LM) and scanning electron microscopy (SEM) observations confirmed that 50% of the samples contained diatoms. In LM 25 morphologically different taxa were recognized. The majority of them occurred in low abundances. The SEM analysis revealed that the dominating diatom species were epizoic *Achnanthes elongata* and *Poulinea* cf. *lepidochelicola* with the later species representing ca. 70% of diatoms in five samples. *Poulinea* species have been often recorded from skin and carapace samples of five other sea turtle species collected from various locations across the world. Detailed investigations on both morphological and molecular characteristics of different populations of *Poulinea* and other “so-called “marine gomphonemoids” (including *Chelonicola* and *Tripterion*) may indicate an evolutionary relationship among these epizoic microalgae and shed some light on dispersal modes and colonization strategies used by marine microbes.

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POPULATION GENOMICS OF MARINE SPECIES: A PILOT STUDY TO IMPROVE LABORATORY PROTOCOLS

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Genomic 2b-RAD libraries represent a powerful tool to identify SNPs across the whole genome and to perform population genomic studies even for species without reference genome. However, its effectiveness is highly dependent on the selection of the restriction enzyme and depth sequencing and thus adequate pilot studies are crucial to optimize the laboratory protocols. In this study, we tested the efficiency of 2b-RAD on two different non-model species with different genome sizes, *Caretta caretta* (2.4 Gb) and *Diplodus puntazzo* (0.9 Gb). We designed a pilot study including 15 samples from Libya and 9 samples from Valencia for *C. caretta* and 12 samples from Blanes and 12 samples from Javea for *D. puntazzo*. All samples were analysed following a 2b-RAD protocol using both Alfl and CspCl restriction enzymes. Furthermore, we used bioinformatics tools to simulate a selective base selection to predict the number of loci that would be obtained and their impact on genetic differentiation. The number of loci found after filtering was very variable (71,000 – 16,886), being

higher in *D. puntazzo* than *C. caretta*, and higher in Alfl than CspCl. *C. caretta* not only showed less loci, but also lower mean depth due to its larger genome. The percentage of retained loci by applying the base selection simulation was very variable, indicating that bioinformatic simulations are beneficial prior to laboratory base selections. Genetic distances among individuals calculated using all data were highly correlated with those computed with AT and GC base selection simulations. Overall, the 2b-RAD technique produced good results in both species and provided data to adjust the protocol to obtain the desired number of loci but maintaining enough mean depth not to compromise loci quality. This is a case study to use pilot studies to improve laboratory protocols for genomic projects on non-model organisms with different genome sizes.

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POSTER PRESENTATIONS

SESSION 1: POPULATION BIOLOGY AND ECOLOGY

IS IT REALLY ANOTHER EXCEPTIONAL SEA TURTLE NESTING RECORD FOLLOWING THE 2012 AND 2016 NESTING CASES IN MALTA

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We report another ad-hoc nesting event by a loggerhead sea turtle in Gnejna (Malta), which happened on the 25th June 2018. This follows the previously reported ones in 2012 in the same bay and 2016 in a nearby beach of Ghajn Tuffieha, both in the NW of Malta. Before the 2012 record, scientifically recorded turtle nesting in Malta had only been reported by Despott, dating back some 100 years, although in one paper, it is reported that turtles may have been nesting up till some 50-60 years ago. Noting that loggerheads have a remigration interval of 2.6 years, it may be possible that the same turtle which had nested in 2012 in Gnejna came back in 2018 to nest again in Gnejna, potentially even the one which nested in 2016, since both beaches are in quite close proximity. Any nesting that may have happened in 2014/5 may have either been missed or it may have nested elsewhere, noting that Malta only has 2% of its beaches which are sandy. This will be confirmed through DNA analysis following hatching and/or the exhumation of the latest nesting. Campaigns are currently ongoing to solicit greater reporting of nesting and such that beaches in Malta are monitored more carefully to check for such sporadic nesting before such beaches are cleaned in the early mornings. From the unsuccessful

hatching of the 2012 nesting event, it was suggested that the high amounts of clay material present in this sandy beaches may have presented problems to the development of the embryos together with a huge rainfall event during the last weeks prior to the expected hatching. Hence Gnejna beach may not be optimal for development of the embryos, resulting in either low emergence success or none at all. Nonetheless, a decision was taken to keep the eggs where they were found since this time round the nest was so close to the waterline, as the case of 2012 where relocation in the same beach had to be done in the 12 hour period. In this paper we also describe the conservation measures that were set-up in this bay as well as the related measures we prepared for the eventuality of hatching. An emergency conservation order was issued to protect this beach from any major and potentially harmful activity. The site was surrounded and physically protected with a 24 hour monitoring scheme being set-up through the help of volunteers from NTM and government officials.

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NESTING OF LOGGERHEAD TURTLE (*Caretta caretta*) IN SOUTHEAST ADRIATIC CONFIRMED

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Nesting of sea turtles in Eastern Adriatic has not been reported yet, even though possible nesting in Albania has been hypothesized. Data, for nesting activities, have been collected since 2002 along the Albanian coastline. The evidences collected by these surveys provided important information for the possibility of nesting of loggerhead turtle in Albania. Reporting of matured eggs found in the oviduct of a turtle killed for meat, hatchlings seen crawling toward the sea and turtles being seen moving toward the dunes, has been reported over the years. These reporting consist on a distribution of possible nesting almost along the entire country, from Drini bay to Vlora bay. They were reported by citizens and fishermen, but no photograph of any of these possible nesting does exist, and the genuineness of them could not be evaluated. The very first undoubted evidence of the possibility of nesting occurring in Albania, and documented by the researchers, was some eggs found in a tank in 2010. The fully matured eggs, laid under stress by a turtle bycaught on set nets (stavniks) in Drini bay and kept overnight in a tank at Patoku lagoon, would possibly be laid somewhere in the Albanian coastline since the nearest nesting beaches are in Greece, hun-

dreds of kilometers away. In 2017 pictures of some hatchlings of loggerhead turtle were provided to the survey team. About fifteen hatchlings were reported of being found moving around at a small beach at Kepi i Rodonit. This area is just few kilometers from the place where the turtle laying the eggs in the tank was bycaught and where the bycatch of adult female turtles has been recorded each year. The location of the nest was impossible to be located due to the gap of time between the hatchlings seen crawling toward the sea and the reporting of them to the survey team. In June 2018 some tracks were reported to have been found at Divjaka beach which after the examination resulted on the presence of a nest. The nest was laid by a loggerhead turtle and is the first one to be monitored throughout the entire incubation time in Albania. These evidences definitely confirm that nesting of loggerhead turtle in Albania does happen, even though as a sporadic event, shifting the border of nesting known so far from northeast Ionian (Greece) to southeast Adriatic (Albania).

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SESSION 2:
AT SEA
DISTRIBUTION
AND MOVEMENT



POSTER PRESENTATIONS

6TH MEDITERRANEAN CONFERENCE
ON MARINE
TURTLES
POREČ/CROATIA 2018

POSTER PRESENTATIONS

SESSION 2: AT SEA DISTRIBUTION AND MOVEMENT

OCEANIC GIANTS IN THE MEDITERRANEAN: FIRST MITOCHONDRIAL ANALYSIS OF LEATHERBACK TURTLES (*Dermochelys coriacea*) IN THE ADRIATIC AND TYRRHENIAN SEAS

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The leatherback turtle, *Dermochelys coriacea* (Vandelli, 1761), is sighted in Mediterranean and Italian waters occasionally during feeding migrations, although no nesting within the basin has ever been confirmed by direct observations so far. Very few individuals have been previously genotyped from this sea but never from Italy, that is a central crossroad in Mediterranean migration routes and an important foraging area for several marine animals. Three individuals of *D. coriacea* found in recent years (2009-2014), two stranded along North-Adriatic shores and one by-caught in fishing nets in the Tyrrhenian waters of Calabria, were genetically analysed. They were females, at threshold between juvenile and adult stages (mean Curved Carapace Length: 142.7 ± 4.5 cm). Causes of death for the three animals are attributable to the main threats for sea turtles in Mediterranean waters,

all directly and indirectly related to human activities (collisions with boats, entanglement in fishing nets and plastic debris ingestion). A mitochondrial DNA fragment encompassing the Control Region was amplified and a 763 bp sequence was obtained for each individual. Two different haplotypes were observed, with the two North-Adriatic turtles carrying the same haplotype. Compared to known *Dermochelys* haplotypes and previous genetic characterization of rookeries, both haplotypes suggested a western Atlantic origin of the turtles, but they cannot be ascribed to a single colony due to their common presence in most of the rookeries.

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POSTER PRESENTATIONS

SESSION 2: AT SEA DISTRIBUTION AND MOVEMENT

UAV OFF-SHORE AERIAL SURVEY FOR ABUNDANCE ESTIMATES OF SEA TURTLES: A CASE STUDY IN LAMPEDUSA ISLAND, ITALY

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Estimating population abundance and trends is key for threatened species and has always been challenging for sea turtles. Nest counts have been mostly used for this purpose worldwide, although they are an indirect proxy of the adults' number only and the bulk of a sea turtles population is made by juveniles. Indices of abundance at sea are more promising, however classic capture-mark-recapture approaches require intensive work while aerial surveys with aircrafts may be limited by the cost. We aimed to set up an off-shore monitoring station- based on Unmanned Autonomous Vehicle (UAV) aerial surveys- at foraging grounds where abundance can be assumed to be independent from breeding activity. Our study area is the Pelagian Islands Archipelago (Italy) located in

one of the most important oceanic and neritic foraging areas for loggerhead sea turtles in the Mediterranean. During september and october 2017 we started aerial surveys at a station 10 km off-shore Lampedusa island, by means of an UAV covering an area of 1 squared kilometer per flight. 4k videos were obtained and analyzed a posteriori to detect the presence of sea turtles at surface. A total of 51 flights have been conducted with 20 loggerhead sea turtles detected. Protocols and limitations related to wind and Beaufort sea state are presented and potential for monitoring population abundance and trends is discussed.

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POSTER PRESENTATIONS

SESSION 2: AT SEA DISTRIBUTION AND MOVEMENT

STRANDING RECORDS OF SEA TURTLES (*Caretta caretta* AND *Chelonia mydas*) FROM THE AEGEAN COAST OF TURKEYSurucu B.¹, Taşçı A.¹, Yavaş Y.¹, Cinbaş Y.¹, İnanç S.¹, Turkozan O.²¹ Ekodost Kusadası, Turkey² Adnan Menderes University, Faculty of Science and Arts, Department of Biology, Merkez Kampüsü Aytepe Mevkii PK:09100, Aydın, Turkey

This study represents the results of citizen science carried out by the volunteers of a local NGO in Kusadası (EKODOST). The members of the NGO were collected data on the stranding of sea turtles in Kusadası and surrounding area between 2007 and 2018. A total of 160 stranding turtles were reported with 141 loggerheads (88.1%) and 19 green sea turtles (11.9%). Of these turtles, the gender data were available after 2017. The females were 21.3% while males were 6.3%. The mean CCL for the loggerhead turtles was 60.7 ± 12.1 cm and 41.3 ± 14.6 cm for the green

turtles. Without taking into consideration the species most of the stranding turtles were at the range of 31-69 cm (68.8%) CCL length while only 5% were smaller than 30 cm CCL. The adults comprised 14.4% of the stranding. The current preliminary results are the first evidence showing the importance of marine area near Kusadası.

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POSTER PRESENTATIONS

SESSION 2: AT SEA DISTRIBUTION AND MOVEMENT

ESTIMATING 3D HOME RANGES OF SEA TURTLES USING TIME-DEPTH-RECORDERSRuff J.¹, Revuelta O.^{2,3}, Sagarminaga R.⁴, March D.²¹ Department of Biology, University of Konstanz, Universitaetstr 10, 78464 Konstanz, Germany² SOCIB Balearic Islands Coastal Observing and Forecasting System, Parc Bit Naorte, Bloc A, 07121 Palma Spain³ Unidad de Zoología, Instituto Cavanilles de Biodiversidad y Biología Evolutiva, Universidad de Valencia, Carrer del Catedratic José Beltrán Martínez 2, 46980 Valencia, Spain⁴ Alnitak, C/Nalon 16, 28240 Madrid, Spain

Home ranges have long been an important tool for biologists to describe and quantify the habitat of animals and provide information on the spatial ecology of a species which can be used to delineate conservation areas and contribute to management decisions. However, many marine animals, such as sea turtles, live in a three dimensional environment and to fully understand their behavior and space use, it is essential to take the vertical component into account. Recent advances in both biotelemetry technology and computing abilities have made it possible to extend home range analysis to the third dimension, allowing researchers to gain more insight into the movement of individual animals through their 3D surroundings. This study assesses the potential use of time-depth-recorders (TDR) to estimate 3D home ranges of loggerhead turtles (*Caretta caretta*) for the first time. Ten juvenile loggerheads were equipped with TDRs (SPLASH tags, Wildlife Computers) and ARGOS platform terminal transmitters (PTT) in the

Western Mediterranean from 2015 to 2018. Time-depth data were relayed via satellite at 5-min intervals, corrected for sensor drift and coupled with location estimates from a state-space model. We used a movement-based kernel density estimator (MKDE) to construct 3D home ranges and calculate the corresponding volumes. Preliminary results provide evidence that 3D estimators are more accurate and biologically realistic for loggerhead turtles than their 2D counterparts. These findings call for further assessment of the spatial and temporal overlap of marine turtle 3D foraging habitats with anthropogenic threats such as various fishing methods and exposure to pollutants and plastic debris. 3D home ranges advance our knowledge about the movement of juvenile loggerheads and contribute new ecological information about this elusive life stage of the species.

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POSTER PRESENTATIONS

SESSION 2: AT SEA DISTRIBUTION AND MOVEMENT

ASSESSING THE EFFECT OF SEA TURTLE DIVING BEHAVIOUR AND ENVIRONMENTAL DRIVERS ON THE ACCURACY OF SATELLITE TELEMETRY LOCATIONS USING FASTLOC GPS DATA

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Argos Satellite telemetry is widespread used to describe free ranging animal movements. However, animal behaviour, technological barriers and environmental variations can cause uncertainties on location estimates. In this work, we assess the potential impact of multiple factors into location error estimates. Specifically, we focus on the effect of sea turtle diving behaviour and oceanographic drivers. We attached time-temperature-depth recorders (TTDR) linked to Fastloc GPS (SPLASH tags, Wildlife Computers) to 3 juvenile loggerheads in the Mediterranean Sea. First, time-depth data were relayed via satellite at 5-min intervals, corrected for sensor drift and used to calculate several diving metrics. Then, post-processed GPS data were used to calculate error position among different positioning algorithms (i.e. Argos locations, State Space Model, Least square, Kalman filter, Mul-

tiple-model smoothing). Finally, diving metrics and oceanographic data were linked to locations and used to quantify their effect on location error estimates. Preliminary results show that the CLS smoother generates the lower location error (1.13 ± 1.13 km, mean \pm sd) and diving behaviour has a potential role on location error. In addition, our findings provide evidence that intra-individual variability, illustrated with one turtle shifting between pelagic and neritic phases, should be taken into account when considering location errors. In overall, our work shows that integrating both environmental drivers and diving behaviour can provide a better understanding of location error in satellite tracking studies.

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TESTING INEXPENSIVE TRACKING SYSTEMS FOR TURTLES: A CASE STUDY WITH GPS-GSM TAGS

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In spite of the latest technological improvements in animal tracking systems, sea turtles are mostly tracked using Argos with its many drawbacks (e.g. low resolution of localizations, significant costs). A possible alternative could be to obtain frequent and highly precise GPS locations and relay them through the GSM international mobile phone networks at limited costs. The aim of this project was to test on turtles the feasibility of such a system, regularly used to track terrestrial animals, by modifying existing GPS-GSM loggers used in birds to make them suitable for deployments in marine environment. Six GPS-GSM loggers have been deployed in 2016 and 2017 on rehabilitated and free-living adult loggerheads (*Caretta caretta*) in Italy and Greece. Two turtles were additionally equipped with an Argos PTT. Overall, we received data only from two loggers. One sent 11 text messages in 75 days, also when the turtle was far from the coast (> 55 km), providing a total of 45 GPS locations. This performance cannot be considered satisfactory, especially if compared to the Argos tag, which provided 105 fixes during the same period. The second logger was able to send 4 messages during a 3-week period collecting 9 GPS locations. The remaining four loggers did not send any text message

so it is difficult to assess if GPS fixes were collected or not. Nevertheless, data from PTT sensors and direct turtle observations showed that one turtle spent more than 90% of its time underwater, while two other individuals surfaced to breathe for short time and just with their heads. It is probable that this peculiar diving behaviour prevented the loggers from connecting with GPS satellites and GSM networks. We conclude that these tags, at least as are now configured, cannot work on turtles. The main flaw detected is the GPS system used, which was unable to properly collect locations, indicating that the standard GPS system used on terrestrial animals, does not have the same performances in sea turtles. On the other hand, GSM transmissions to the mobile phone networks worked quite fine and could then be used as an information channel, also when turtles are far from the coast, to obtain non-positional information from the animal, like accelerometer data, or from the environment, like sea temperatures. The project was founded by Save Our Seas Foundation (Small Grant n. 354).

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POSTER PRESENTATIONS

SESSION 2: AT SEA DISTRIBUTION AND MOVEMENT

FROM WEST TO EAST: SURVIVAL AND DISPERSAL ROUTES OF LOGGERHEAD SEA TURTLE POST-HATCHLINGS IN THE MEDITERRANEAN SEA

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During last years, loggerhead sea turtle (*Caretta caretta*) nesting events are increasing in the Western Mediterranean basin. Management measures like translocation, monitoring and protection of nests, and head-starting programs for several hatchlings were taken in Spain. Post-hatchling monitoring allow us to evaluate the success of the management measures taken and to assess their dispersal pattern and developmental areas. In this study, we satellite tracked 10 post-hatchlings from a nest laid in Sueca (Valencia). Five were incubated on a protected beach and another 5 were incubated in an electric incubator. All hatchlings were reared in a head-starting program for 1 year to increase postnatal survival, after which were released in October 2017. Seven post-hatchlings continuing transmitting after 8 months of monitoring. Minimum annual survival probability estimated was 65%, which suggests that the head-starting program was successful when considered in terms of short-term survival. There were no differences in the mean speed of displacement between both groups of incubation (t-test, $p > 0.05$). Both groups used preferably oceanic areas (>87% locations), and moved through areas with surface temperatures between 13-25°C, with 74.5% of the locations between 15-20°C. So

apparently post-hatchlings avoided low-temperature zones. No differences were observed in orientation between groups when considering the whole monitoring period. Dispersal movement was consistently directional eastwards (Rayleigh test, $p < 0.01$). However, when analyzing weekly data, we observed that turtles incubated on the beach had a directional movement during the first 2 weeks after release (Rayleigh test, $p < 0.05$), while turtles from incubator did not show a directional movement. This lack of directional movement could be due to the alteration of the magnetic field that these turtles experienced during their embryonic development. Turtles showed active swimming phases, since vectors of oceanic currents and those of turtles' movement were not always correlated. Turtles moved with average orientations between 42-144° regarding the orientation of the sea surface currents. However, the greater the magnitude of the surface current, the smaller was the divergence between turtle's orientation and the direction of oceanic currents.

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POSTER PRESENTATIONS

SESSION 2: AT SEA DISTRIBUTION AND MOVEMENT

SEA TURTLES PRESENCE AND DISTRIBUTION INSIDE THE GULF OF CORINTH (IONIAN SEA, GREECE)

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The Gulf of Corinth (Ionian Sea, Greece) has been lately included among the Natura 2000 Areas of Greece due to the presence, among others, of 2 species of sea turtle: *Caretta caretta* and *Chelonia mydas*. In 2009 the researchers of the Gaia Research Institute Onlus and of the Marine Biology Laboratory (Life and System Biology Department) of the University of Torino started a biodiversity monitoring project of the Gulf of Corinth (GOC) thanks to the involvement of citizen scientists on board of sailing vessels. The monitored species included sea turtles and cetaceans. The position of the sighting of each species was recorded while navigating across the Gulf. 540 hours of monitoring activity and 26 sightings of sea turtles were recorded from May 2009 to June 2018. The most sighted species of sea turtle resulted *Caretta caretta*. During the first year of monitoring activity, the mean sighting frequency (sighting/hour) of all sea turtles species together was 0.013. None sighting was recorded during the years 2010, 2011, 2012 and 2013. The mean sighting frequency of the following years regularly significantly increased from 0.011 of 2014 to 0.113 of 2017 ($p < 0.005$). The first 2 months of research activity of 2018 shows the highest sighting frequency of the whole monitoring peri-

od: 0.890. The increase of sea turtles presence into the GOC could be related to an increase of jellyfish in the area. In fact, the last 2 years (2016 and 2017) the GOC faced massive blooms of *Pelagia noctiluca*. The distribution model performed employing MaxEnt on turtle sightings' position highlights how "distance from canyons" may affect turtle distribution more than "depth" and "slope" (AUC = 0.956). The contribution of the variable "distance from canyon" to the whole model is 66%, while the ones of "depth" and "slope" are respectively 33% and 1%. The results of the present study are in agreement with the hypothesis that the sea turtles distribution is influenced by the jellyfish one, since during the summer the jellyfish are reported to migrate down to cooler mid-water depths, possibly along canyon corridors. Future dedicated studies investigating the seasonal and spatial distribution of sea turtle together with jellyfish aggregation and floating litter would allow to study sea turtle response to jellyfish presence, and to identify risky areas and periods to design appropriate measures for their conservation inside this protected area.

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POSTER PRESENTATIONS

SESSION 2: AT SEA DISTRIBUTION AND MOVEMENT

THE GLOBAL MALE SEA TURTLE INITIATIVE

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Most of what we know of the ecology and biology of sea turtles is based on nesting females, and to a lesser extent on juveniles and sub-adults in foraging and developmental habitats. These studies have sought mainly to understand natal homing, nest site fidelity, migratory movements, nesting trends, somatic growth rates, survival rates, and population structure. Comparatively, little effort has been invested in understanding male sea turtle ecology, and even less has focused on the management and conservation of male turtles. Unlike females, males do not come ashore and therefore they are seldom observed by beach-bound researchers or included in tag-recapture studies. The difficulties posed by capturing males at sea have made locating their feeding, courtship, and mating areas a challenge. Nonetheless, studying males is critically important. For example, climate change is expected to increase the proportion of females in most populations due to temperature-dependent sex determination. Thus, understanding the role of male sea turtles in population viability will be crucial to formulating appropriate conservation strategies; in fact, the proportion of males to females needed to maintain a healthy sea turtle population was recently identified as one of the key "Unsolved Mysteries of Sea Turtles." Studying male sea turtles in

foraging and mating areas across the globe is vital to better understand male reproductive strategies, contributions to genetic stocks, operational sex ratios, population dynamics and habitat needs. To improve global knowledge of male sea turtles, we are working with existing data to create a global distribution map of courtship, mating, feeding, and basking sites for males of each species, and to identify links with nesting populations. We are also characterizing male mating and migration patterns, operational sex ratios, and effective population sizes in the Caribbean using genetic analyses. Management actions to conserve sea turtle populations in the future will need to address the roles of male turtles more effectively and to consider how the impacts of regional climatic cycles, primary threats, and conditions in foraging areas apply to both females and males. To ensure that these concerns are addressed, we have created the Global Male Sea Turtle Initiative to promote the study of male sea turtles worldwide. We invite our colleagues from around the world and particularly those from the Mediterranean to join us.

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POSTER PRESENTATIONS

SESSION 2: AT SEA DISTRIBUTION AND MOVEMENT

EVIDENCE OF NESTING AREA OF *Caretta caretta* AND POTENTIAL FORAGING AREAS OF *Caretta caretta* AND *Chelonia mydas* IN SAMOS AND LIPSI ISLANDS, NORTH-EASTERN AEGEAN SEA

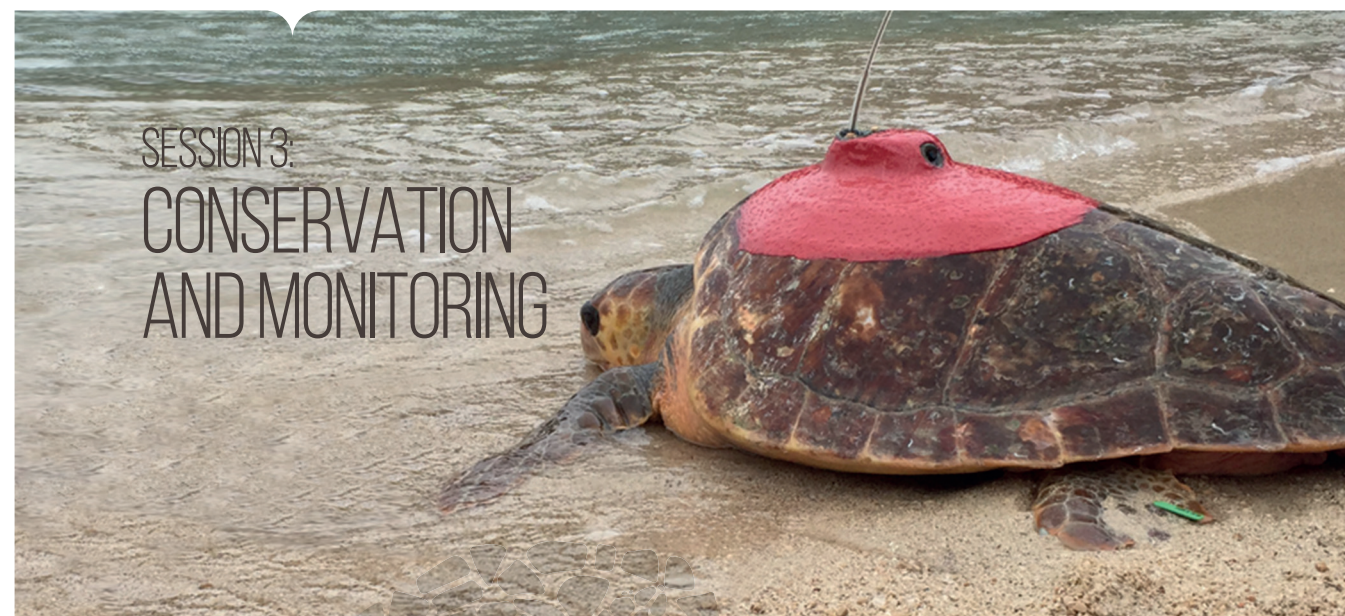
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The regular presence of two species of sea turtles, *Caretta caretta* and *Chelonia mydas* is recorded in the Greek seas, as well as in the Mediterranean basin. The loggerhead turtle, common species in the whole Mediterranean, mainly nests in the eastern basin and on the Italian coastline, with major nesting areas in Greece, Turkey, Cyprus and Libya. The green turtle, more abundant in the eastern part of the basin, nests only in the easternmost region of the Levantine basin, mostly in south-eastern Turkey, Cyprus and Syria. Greece and Turkey alone represent more than 75% of the nesting effort in the Mediterranean. Despite significant advances in recent years, the Aegean area is considered data-deficient or data-absent. The present study is focused mostly on the presence of foraging and nesting areas on the islands of Samos and Lipsi. Using sighting data collected between 2016 and 2018 from boat-based surveys, ferry-based fixed transect surveys and citizen science reports, a database was created. Potential foraging and nesting areas were predicted using satellite mapping, kayak mapping and in situ parameters evaluation in order to confirm the predictions made previously. A literature

review, a stranding events review and an interview survey were conducted in order to collect historical data. The results have shown potential foraging areas for both species around Samos and Lipsi islands. The stranding response in the last 5 years has shown the presence of both species in the area, with an unusual stranding event recorded in the winter 2017/2018 involving 25 individuals of both species. Historical data has shown the presence of nest on both islands and three *C. caretta* nests were identified, patrolled and excavated during the nesting season of 2018, with collection of all the parameters for the beaches. This study reports the evidence of foraging and nesting areas in the Eastern Aegean Sea, highlighting significant knowledge gaps that preclude effective conservation measures at a regional scale, for two protected sea turtle species that are considered reliable indicators of the status of biodiversity across the Mediterranean Sea.

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SESSION 3:
CONSERVATION
AND MONITORING

POSTER PRESENTATIONS

6TH MEDITERRANEAN CONFERENCE
ON MARINE
TURTLES
POREČ/CROATIA 2018

POSTER PRESENTATIONS
SESSION 3: CONSERVATION AND MONITORING

TURTLES OF THE ADRIATIC ORGANIZATION (T.A.O.) PROJECT: OVERVIEW AND PRELIMINARY RESULTS OF A NEW MARINE CONSERVATION PROJECT IN THE NORTHWESTERN ADRIATIC SEA

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The Adriatic Sea represents an important ecological area for large marine vertebrate species. Particularly, the shallow waters of the northern Adriatic Sea host one of the two main neritic feeding grounds for the endangered loggerhead sea turtles *Caretta caretta* (Linnaeus, 1758). Turtles of the Adriatic Organization (T.A.O.) is a newly founded non-profit environmental organization which aims to establish and develop a conservation project to protect and study large marine vertebrates and their natural habitats in the Northern Adriatic, with a special focus on the loggerhead sea turtles *Caretta caretta*. The program consists of three main pillars: scientific research, conservation activities and environmental education. Developing "Citizen Science" represents one of the main aims of such actions through an active involvement of citizens in collecting data during field activities and raising environmental awareness by means of classes and events throughout the year. Interestingly, the organization will be partnering up with tourist accommodation facilities of the study area in order to integrate activities aimed at explaining the biology of large marine vertebrates and en-

vironmental issues which affect the marine-coastal zone with their seasonal recreational programs. The project is currently managed and coordinated from the field base located at Lido di Spina, Comacchio, on the northwestern Italian coast of the Adriatic Sea. Fieldwork is carried out through the 25 kilometers of sandy coasts which connect the seven Lidos of Comacchio and the national coastal waters off this area by beach and sea surveys, focused on monitoring large marine vertebrates population and their threats. Preliminary results along with previous research findings published by the Network for the Conservation of Cetaceans and Sea Turtles in the Adriatic (NETCET) support the important role of the project area for the ecology of large marine vertebrates and the need to connect, share and integrate the organization work with a wider conservation plan in order to broaden the knowledge and awareness about the marine environment of the Adriatic Sea.

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POSTER PRESENTATIONS
SESSION 3: CONSERVATION AND MONITORING

EXPERIMENTAL LESSONS ON THE BEACH

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Perhaps its name is misleading, but sea turtles' survival depends on both the sea and the coast, and the interaction between them. An educational program that studies and reflects the state of the coast and the sea, is a unique opportunity for students to understand the impact of human activities on the marine environment and hence on turtles. Through group activities of observations, field studies and analysis, the students of 4 islands became for a while little scientists. They investigated the state of the coast and marine environment of their area, which included analysing the composition and erosion of the coast, the sources of pollution and studying the physical

characteristics of seawater. Finally, in groups they queried, debated and made their own conclusions. Away from school halls and books, the practical research provided the students with personal observed realisations that the protection of sea turtles relies on a multiple of conservation actions and is everyone's responsibility. The program was implemented in September 2017 at the islands of Sikinos, Folegandros, Serifos and Kimolos in co-organization with the Athanasios C. Laskaridis Charitable Foundation.

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POSTER PRESENTATIONS
SESSION 3: CONSERVATION AND MONITORING

NATIONAL ACTION PLAN FOR THE CONSERVATION OF MARINE TURTLES IN THE EGYPTIAN MEDITERRANEAN COAST

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For more than 100 million years, marine turtles have covered vast distances across the world's oceans. The turtle is an important symbol in the mythologies of many indigenous cultures, usually representing creation, longevity, and wisdom in these beliefs. Turtles are thus truly ancient beings-both in geological and mythological terms. The commitment of Egypt to the conservation of marine turtles in its national waters was underlined with many of national legislations (Environmental, Biodiversity and Fisheries Laws) and ratification of many related conventions such as Convention of Biological Diversity (CBD), Convention Migratory Species (CMS), RAMSAR, Barcelona Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean and its Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean (1995) and its annexes. Egypt also adopted the updated Action Plan for the Conservation of Sea turtles

in the Mediterranean (UNEP-MAP RAC/SPA 2007). In this regards, the presented national Action Plan for the conservation of marine turtles was prepared in elaboration with the Regional Activity Centre for Specially Protected Area (SPA/RAC) in the context of the implementation national, regional and international commitment. The main Goal of this Action Plan is to promote the favorable conservation status of marine turtle species and their habitats in the Mediterranean Sea, and enhancing their protection in the Egyptian Mediterranean Coast. This goal will be implemented through many of specific 20 actions and 49 sub-actions. This action plan is adopted at national level in consultation with all relevant stakeholders at the validation workshop that hold in Cairo, October 2017.

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AWARENESS IN THE PRESERVATION OF MARINE TURTLES IN THE BAY OF MONASTIR AND KURIAT ISLANDS

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Monastir is located on the East coast of Tunisia in the Mediterranean Sea, to which belong the Kuriat Islands, situated at 18 km from the mainland. These islands, soon to be declared marine and coastal protected areas (MCPAs), include two islets, a small one (Quria Essaghira) of about 0.7 km² and a large one (Quria El Kebira) of about 2.7 km². The MCPA Kuriat is considered as an important area as it is the only stable nesting site for *Caretta caretta* sea turtles in Tunisia. Since 1997, loggerhead turtle monitoring has become regular (Bradai and Jribi, 1997) to determine the nesting parameters of this species. A conservation strategy targeting the public through awareness raising has been carried out in parallel of the monitoring of the sea turtles incidental fishing. The purpose of the study is to present the impact and importance of awareness on mainly fishermen, young students, schoolchildren in the conservation of the sea turtle *C. caretta*. The monitoring and data collection work was therefore carried out in 2016-2018: (i) on the small

Kuriat, during the summer season (ii) and in the Monastir region, including the sea turtles health center and schools all the year. In parallel, the monitoring of the incidental fishing of sea turtles was carried in 2016 through the study of the interaction of sea turtles with longlines. First, during the study a survey was directed with twelve fishermen, working on boats attached to the various ports of Monastir. Secondly, a pilot study was conducted with a fisherman using the circle hooks, in order to replace conventional hooks in the swordfish fishery. Thanks to this method, as a result no accidental fishing of sea turtles was observed. This study is recent, therefore it requires several years of regular monitoring of the measurement parameters about awareness and accidental fishing impact to help reduce threats to sea turtles biodiversity.

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POSTER PRESENTATIONS
SESSION 3: CONSERVATION AND MONITORING

SEA TURTLES AND ECOSYSTEM SERVICES: TARTALIFE PROJECT EXPERIENCE

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Loggerhead sea turtle *Caretta caretta* can be defined as a “cultural ecosystem service” and its conservation has become a strategic issue for the Mediterranean basin, where bycatch is considered as the main threat. TartaLife project (LIFE12 NAT/IT/000937) promotes a series of conservation activities (trainings for fishermen and tourists, Bycatch Reducer Devices development, etc.) aiming at reducing sea turtle mortality. These activities on the one hand undoubtedly contribute to the protection of the species on the

other hand can be a real driver of development for the local population, both for the extraordinary role of “keystone species” of sea turtles, both for the induced income that can produce. The active involvement of fishermen in conservation projects can help steer the fishing towards more sustainable management models.

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PROGRESS OF WORK FOR MONITORING MARINE TURTLES ALONG EGYPTIAN MEDITERRANEAN COAST

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Along Egyptian Mediterranean coast, monitoring and conservation of marine turtles always focused on Zaranik Protected area neglecting the other possible nesting sites; along with tourism development on Egyptian Mediterranean coast and based on an old data, low nesting activity occurs. Through the past 10 years, there was significant increase in water pollution along Egyptian Mediterranean coast line that might affect both species and habitat; in addition to massive interaction with fisheries. Survey was established in 2016 to report possible locations for nesting areas from Port Said to El-Salum, by the end of this survey the National Action Plan for the Conservation of Marine Turtles in the Egyptian Mediterranean Coast was established. National Team was selected representing different stakeholders (government, research centers, universities, NGOs, fishermen, and Scouts). Samples collection started through the past 2 years for both the Loggerhead turtle (*Caretta caretta*) and the Green turtle (*Chelonia mydas*) towards establish-

ing tissue bank for marine turtles in Egypt, a system was established for tagging, and protocols were prepared for genetic analyses. Two training programmes were conducted: a regional training in Turkey and national one in Egypt. Forty turtles were released by scouts, NGOs and EEAA (Egyptian Environmental Affairs Agency) in the last 2 years in cooperation with National Institute of Oceanography and Fisheries. Furthermore, fishermen indicate tremendous interaction with fisheries and many turtles were observed (loggerhead and green turtles) from Marsa Matroh and El-Salum, besides Stranded turtles were reported along the Mediterranean coast of Egypt. For this, National Programmes are processing for monitoring marine turtles, in addition to programmes for necropsies and samples analyses (medical, microbiological and genetic analyses).

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POSTER PRESENTATIONS
SESSION 3: CONSERVATION AND MONITORING

DEVELOPMENT OF MARINE TURTLE RESEARCH IN MOROCCO

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Research on marine turtles in Morocco began in the 1960s by Pasteur and Bons in the white beach in the Tarfaya South Morocco region and indicated the presence of nesting sites. In the 1980s, researchers at the Rabat Scientific Institute showed observations of marine turtles at sea. From 2000, the National Institute of Fisheries Research and the Moroccan University began to take an interest in several aspects of research marine turtles, including strandings on beaches, stomach contents of stranded turtles and interactions with fisheries. The most common spe-

cies in Morocco is loggerhead with sub-adults, its diet is carnivorous and it interacts with fisheries including the Seine and the trawl. The importance of marine turtles in the marine ecosystem is evident recently and clearly with the abundance of *Pelagia* and the appearance of *Physalia* respectively old and new species of jellyfish on Moroccan beaches.

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COMPETING WITH FOXES AND BADGERS: A NEW CAGING TECHNIQUE TO PROTECT SEA TURTLE NEST ON DALYAN IZTUZU BEACH

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Sea turtles play significant ecological roles in the marine ecosystem. Hence, it is necessary to conduct any kind of conservation efforts to prevent this wildlife from extinction. The loggerheads (*Caretta caretta*), one of sea turtle species listed as a vulnerable and under IUCN protection, and nest regularly at Mediterranean coasts of Turkey. Loggerhead turtles have been threatened by various factors, ranging from human-induced factors to natural factors. In Dalyan nesting ground, anthropogenic disturbances which may affect the nesting success are limited since the beach is a protected area. Nevertheless, natural threats such as predation by mammals is one of the main threats in Dalyan Beach. Therefore, it is important to protect the nests from predators. In Dalyan beach, foxes and badgers are two main predators for the nests. In this study, we aimed to examine the effectiveness of caging and different caging techniques in reducing predation intensity. Dekamer has initiated a continuous field monitoring and study since 2008 to the present time on the beach during the nesting season from April to August. We initially protected the nests using a 70x70 cm flat grid during 2010 and during 2011 to present the nests were protected using a larger flat grid which is 1 m² with side cages on each side and sticks at each corner to fix the cages. We cat-

egorized nest predation into fully and partly predated and the number of predated nests were recorded. The results firstly indicate that caging has declined predation intensity significantly from 53% in 2010 to 19% in 2017 with rate 25% predation year⁻¹ and has reached the lowest level in 2016 with 13% predation. Moreover, a new technique has lower predation rate (21% predation year⁻¹) compared to the previously used technique (53% predation year⁻¹). In addition, a new technique has also lower fully predated nest rate (5% predation year⁻¹) than previously used one (18% predation year⁻¹). As a consequence, a new caging technique significantly saves 87% of eggs from being predated. In conclusion, caging is effective to reduce predation intensity and the new caging methodology with 1 m² flat grid top cage with side cages and sticks at each corner has better protection than the previous technique. More specifically, this technique is also effective in preventing predators completely predated the nest. Therefore, caging need to be continuously implemented and its effectiveness need to be updated annually.

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POSTER PRESENTATIONS
SESSION 3: CONSERVATION AND MONITORING

ARE THE RELOCATED NESTS PROVIDING BENEFITS TO THE SEA TURTLE POPULATION?

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Relocating of nests in risks such as inundation, predation, coastal erosion takes an important part in sea turtle conservation studies. Determining the nests to be relocated in the light of existing data, increases the number of protected nests and hatchling success and contributes to population growth. The annual nest numbers increased in the last five years (2013-2017) on Dalyan İztuzu Beach. A considerable number of nests were relocated. Nests were relocated according to the beach structure and previous data. Nest that located under 25 m from the sea in the first 1.0 km at the westernmost part of the beach were in inundation risk. Nests that located under 10 m from the sea were in inundation risk in the next 3.0 km part of the beach (middle section). The nest that located under 15 m from the sea were also under inundation risk in the last 0.5 km part of the beach. These nests

were relocated in safer locations within eight hours after nesting. We also compared the annual number of relocated nests, the nest and hatchling success, carapace length of nesting females, and the distance from the sea of different nests of a same individual. Of the total nests, an average of 26.8% of the nests were relocated during the study period. The hatching success was calculated as 74.8% in the same period. The success of the relocated nests was not affected from the relocation and 26.8% nests were protected from possible inundation risk. The potential risk of sea level rise, loosing of nesting sites, and therefore the location of sea turtle nests would be a compulsory conservation technique to be used in most of the Mediterranean beaches and elsewhere.

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POSTER PRESENTATIONS
SESSION 3: CONSERVATION AND MONITORING

A BRIDGE BETWEEN PEOPLE AND SEA TURTLES: OVER 25 YEARS OF ACTIVITY WITH LAMPEDUSA TURTLE GROUP

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Lampedusa, thanks to its strategic location, separates the Western portion of the Mediterranean Sea from the East one, and the Northern part from the Southern one: the role of a small platform in the middle of the sea has motivated our activities on Sea Turtle Conservation during the past 30 years, in collaboration with WWF Italy and various research Institutes. The main interest of the project is focused on fishery interaction with sea turtles, mainly trawlings and longlines, which often stop in the harbor. Between 1990 and 2018, in the hospital over 4800 turtles were admitted, and more than 2500 surgeries were carried by the Vet Team. From the Vet Dept of Bari University, Prof. A. Di Bello developed new surgical techniques, and thanks to his precious collaboration, we have improved medical care and convalescence techniques. We organize several vet seminars since 2009 in order to develop a close cooperation among the Mediterranean Rehab Centers and Associations. Together

with Submon (Spain), Dekamer (Turkey) and Pula Aquarium (Croatia), we have lead a project, TurtleVet, supported by the European Community, for training young vet generation with the aim to standardize medical procedures for emergencies. Since 2010 supported by Mediterranean colleagues, we coordinate the Medicine and Health Workshops during the ISTS Annual Symposia, with the goal to expand the Rescue Centers network, actually considered an opportunity for conservation, thanks to awareness and research activities. Finally, we compare the contribution and value to the activities offered by hundreds of volunteers, making the difference at any level! By-passing the borders, marine turtles represent a way of communication: they are the reason for making relations from people from different countries.

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POSTER PRESENTATIONS
SESSION 3: CONSERVATION AND MONITORING

MARINE TURTLES CONSERVATION: ENVIRONMENTAL EDUCATION AS A STARTING POINT

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"In the end we will conserve only what we love; we will love only what we understand; and we will understand only what we are taught". For kids, like for us all, to see a marine turtle coming back to the sea is extremely exciting; but that experience takes a total new dimension when one really understands what they are seeing. As part of the Marine Protected Area of Punta Campanella we do regular educational activities with kids, both in schools and outdoors. We consider environmental education a powerful tool and try to take advantage of every opportunity to show others (kids in particular) the beauty and the importance of underwater life. Injured marine turtles (*Caretta caretta*) are often found along the coast of Campania (a Region located in SW Italian coasts). Often, wounded turtles undertake a recovery process at the Marine Turtle Research and Recovery Center of the Zoological Station "Anton Dohrn", before they can be released back to the sea. To aid the work of the Zoological Station with a stronger social impact, the Marine Protected Area of Punta Campanella (SW Italy) has a long-running collaboration in which our group is involved. Our aim is to organize educational

activities through quizzes, games, outdoor and indoor workshops, we teach kids about marine turtle biology, life cycle, ecology and threats they are subjected to. Our aim is to raise awareness about the importance of changing our daily routines and living in a more ecological way so that we help to alleviate the plastic and marine litter situation and to conserve the habitat of marine turtles. We give the kids the opportunity of seeing the world from a turtle's perspective. In that context, the marine turtle release carried out by the Zoological Station "Anton Dohrn" becomes the closing point of our educational journey. The students often realize that this environmental problem is happening close to them and that it is in their hands to make a difference. We consider that the Mediterranean Conference on Marine Turtle is a perfect place to share, learn and exchange experiences and activities regarding the topic of marine turtle environmental education.

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ABRUZZO REGIONAL SEA TURTLES NETWORK: EVALUATION OF EXPERIENCE AND PRELIMINARY RESULT OF THE FIRST THREE YEARS OF ACTIVITY

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The Regional Stranding Network had been instituted by Abruzzo Regional Government (Italy) starting from 2015. It is based on National and European legal framework. The Network intervenes for alive or dead sea turtles both stranded or by caught. The main objectives of the Network are: protected species conservation, environmental status indirect control and public health protection. The Regional Network is composed by the following six actors including public authorities, law enforcement and NGO: IZSAM, ASL, CSC, CP, CITES office, Municipalities. There are different procedures according to whether turtles are alive or dead. Alive sea turtles, stranded or by caught, are reported by CP to CSC, ASL and CITES office and transferred to the CSC managed Marine Turtles Recovery Centre (CRTM) "Luigi Cagnolaro" of Pescara. Likewise, CP reports dead sea turtles findings also to IZSAM and Municipality. According to its conditions, the carcass is delivered to IZAM for diagnostic examination, otherwise it is disposed of by Municipality according to law. In the first three years of activity 113

alive turtles and 271 carcasses have been recovered. 92 (82.3% alive turtles) sea turtles have been rehabilitated and released in the wild and 91 (33.5% dead turtles) necropsies have been performed. In the total of 384 interventions biometrical data, species and sex identification have been collected. Furthermore clinical, necropsies, toxicological, parasitological, and epidemiological investigation data have been carried out. Data collected have been published through Geocetus, CSC's free GIS-based online database. Moreover collected tissue samples have been preserved for any retrospective examination. Regional Network has raised awareness among citizens and fisherman on sea turtles conservation and has improved interventions number and quality if compared to the period before its birth, providing an accurate monitoring of sea turtles population.

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POSTER PRESENTATIONS
SESSION 3: CONSERVATION AND MONITORING

THE AGA SEA TURTLE EXHIBITION: BUILDING ECOLOGICAL AWARENESS AND FORMING RESPONSIBLE BEHAVIOR IN TOURISTS' HOME COUNTRIES AND ON SITE

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Environmental education and awareness building are crucial activities that impact the effectiveness of marine turtle conservation and restoration measures. Many turtle nesting sites in the Mediterranean Sea and elsewhere are also important tourist destinations, especially during the summer months when nesting occurs. Therefore, local residents and tourists alike are important groups to be reached by environmental education programs. In order to address both groups, Aktionsgemeinschaft Artenschutz (AGA) e.V. has developed an easy-to-use sea turtle exhibition with an accompanying environmental education program that centers not only on marine turtles, their habitat and their threats, but also puts emphasis on activities that each one of us can do to protect the marine environment. On the one hand, the exhibition is used in schools, during action days and on trade fairs in tourists' home countries in order to raise awareness and

foster the idea of environmental responsible behavior at tourist locations and at home. On the other hand, the exhibition is presented in different turtle nesting areas directly in order to address local stakeholders and visitors alike. For those reasons, the exhibition has been translated and adjusted to different target groups and locations. It is available in German, English, Turkish, Spanish, Portuguese and Sinhalese. Teachers and multipliers can lend the exhibition and use the accompanying game material free of charge to design their own education event while projects can adjust the content to their local circumstances. Here, we would like to present the exhibition, build synergies with other educators and present the existing possibilities to extend the exhibition's reach.

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SEA TURTLES MONITORING AND CONSERVATION ACTIVITIES IN THE TYRE COAST NATURE RESERVE (LEBANON)

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Tyre Coast Nature Reserve (TCNR) was created in 1998 by law 708 and is one of the two marine reserves in Lebanon. TCNR, located in the South of the city of Tyre, is one of the last remaining sandy beaches in Lebanon with an area of 3.8 km². Due its position along the southern coastline of Lebanon, Tyre is populated by a high number of sea turtles visiting the area not only for nesting but also for feeding and for wintering. To assess and protect the local population of sea turtles, TCNR personnel undertook numerous activities. These include: a) beach monitoring with the aim of finding and assess the number of nests; b) the analysis of stranded sea turtles and c) the dissemination of information material for tourists crowding the kiosks of the area. Since 2012, within the implementation of the UNEP/MAP Action Plan for the conservation of marine turtles in the Mediterra-

nean, SPA/RAC has supported two creative projects proposed by TCNR in Tyre, which has been improving the situation of TCNR in dealing institutionally with the Lebanese Ministry of Environment for the protection of sea turtles, as follows: "Satellite Tracking of Two Sea Turtles in Southern Lebanon", to assess the movements of sea turtles populating the area; and "Creation of a First Aid Center for marine turtles in TCNR", to rehabilitate injured animals and analyze stranded sea turtles. Recently, the National training session on marine turtles monitoring techniques organized within the EcAp-MED II and MAVA marine Turtles projects in TCNR aimed to implement a capacity building activity in Lebanon.

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LIFE EUROTURTLES: COLLECTIVE ACTIONS FOR IMPROVING THE CONSERVATION STATUS OF THE EU SEA TURTLE POPULATIONS

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Two sea turtle species that reproduce in the Mediterranean (*Caretta caretta* and *Chelonia mydas*) have important nesting and foraging grounds located in the EU, and are listed as species of conservation importance by EU and national legislations. At the same time, anthropogenic threats are particularly intensive in the EU, with high coastal development, fishing activities and tourism, which combined affect sea turtles at all life stages, in both terrestrial and marine habitats. Due to their migratory behaviour, an efficient sea turtle conservation requires transboundary approach and close international collaboration of countries hosting their critical habitats. In order to enhance conservation of the EU sea turtle populations, six EU countries (Croatia, Cyprus, Greece, Italy, Malta and Slovenia) implement LIFE EUROTURTLES project. The project focuses on specific areas where conservation measures are considered important

and urgent, and could make a difference for the sea turtle status at EU and national levels. Through the implementation of innovative techniques and coordinated, international approach, the project aim to reduce anthropogenic impacts at nesting sites and fishery-related threats at foraging grounds; extend the marine Natura 2000 network for sea turtles; develop a common approach for sea turtle conservation in the EU and contribute to the fulfillment of the Marine Strategy Framework Directive by developing common methods and providing baseline data for monitoring; promote sea turtles as a common and shared natural heritage of all EU citizens, and set up a network of relevant stakeholders for sea turtle conservation.

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SESSION 4: THREATS

POSTER PRESENTATIONS

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SESSION 4: THREATS

MONITORING AND CONSERVATION OF LOGGERHEAD TURTLE (*Caretta caretta*) IN THE AEOLIAN ARCHIPELAGO (SICILY, ITALY)

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The Aeolian Archipelago (Southern Italy) is a volcanic area with extensive neritic and oceanic habitat within short distances. Dedicated boat surveys (1335) were performed from 2009-2017 for monitoring important feeding and over-wintering habitats for loggerhead turtles in this area. A total of 988 loggerhead observations were recorded and 680 captures for assessing size (CCL) and health status of individuals. We found from immature to reproductive individuals (mean CCL = 48.7 ± 12.2 cm from 16 cm to 80 cm), mainly late juveniles (66.0%; CCL = 40-60 cm) and, in minor part, early juveniles (27.1%; CCL < 40 cm) and adults (6.6%; CCL > 70 cm). The encounter rate was higher in autumn/winter than in the other seasons ($p < 0.01$). Causes of rescue or death were assigned only if clear injuries were evident on the body of the turtle (hooks, fishing lines, injuries or debris in feces, etc.). If more injuries, the most severe was assigned as primary cause, and the less severe as secondary cause. Debris ingestion was the main cause of threat (43%) followed by longlines bycatch (36%) and boat collision (14%). However bycatch in longlines was the first cause of mortality. Few rescues showed direct bycatch in ghost fishing gears, fishing aggregating devices (FADs) and marine debris (7.5%) (2.2% directly entanglement in anchored FADs and 5.3% in ghost

FADs). However, 19.4% of other causes of rescue also showed bycatch in FADs as secondary cause. In particular, 33.3% of longlines turtles were also entangled in floating debris of FAD origin. The distribution of turtles was related to FADs during the fishing season while in the spring turtles were found more close to coast while in summer around the sea mounts in open water suggesting preferences for benthic prey in neritic habitats or pelagic food transported by the local currents. Individuals with problems or dead were larger than the healthy ones ($p < 0.05$) suggesting that adults may be more affected by anthropogenic threats with the exception of boat collisions. Only small juveniles were found directly entangled in FADs (mean CCL = 38.2 ± 9.5 cm) but FADs found as secondary cause. FADs have the potential to affect all life stages. Urgent management actions are needed for the conservation of loggerhead turtles in the Aeolian Archipelago such as the institution of a Marine Protected Area and the implementation of stricter regulations and controls that ban the use of illegal FADs and pelagic longlines.

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POSTER PRESENTATIONS

SESSION 4: THREATS

SPATIO-TEMPORAL PATTERN OF SEA TURTLE PRESENCE AND HUMAN INTERACTION ON THE SOUTHWEST ITALIAN COAST: AN UPDATE FROM THE CAMPANIAN STRANDING AND SALVAGE NETWORK 2007 - 2017

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Monitoring strategies of endangered marine species must combine ecological significance, statistical credibility and cost-effectiveness for long term sustainability. Stranding and salvage networks provide excellent results in cost-effectiveness, and here we report on an update of the activities conducted in the period 2007-2017 by the Sea Turtle Network operating in the Campania Region along the SW Italian coasts (from 41.22°N, 13.76°E to 40.04°N, 15.64°E) since 1991. A total of 868 loggerhead turtles were recorded of which 269 were alive and 599 were dead. Temporal patterns were different with dead turtles occurring mostly in late spring/early summer while alive individuals were regularly found all year round. Spatial analysis using kernel density estimation indicates that turtles tend to concentrate along the sandy coasts of the region where the continental shelf is wider. These are also the most productive areas with ample prey availability in the rich benthic communities. All live sea turtles were taken to the regional rehabilitation centre for veterinary treatments and

were released back into the sea with a success rate of 90%. The vast majority of live individuals presented traces of interaction with fishing gear, boat collisions, or ingestion of marine litter. Complete post mortem examinations of dead animals were also conducted, and confirmed the principle evidence of interactions with fisheries (hooks and fishing lines), maritime traffic and marine litter. Zoonotic agents and parasites were also identified. The data presented here demonstrate that systematic data collection from stranded sea turtles can provide useful biological information, such as seasonal and spatial patterns in their occurrence and mortality, age structure, sex ratio and diet, as well as possible mortality causes, but the use of standardized approaches, the adequate training of the personnel and the efficient coordination of network activities among partners are critical for its success.

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POSTER PRESENTATIONS

SESSION 4: THREATS

STRANDINGS OF MARINE TURTLES IN SOUTHEASTERN DODECANESE ISLANDS WITH EMPHASIS ON ENTANGLEMENT

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In the six-year period 2012-2017, the Hydrobiological Station of Rhodes (HSR) recorded a total of 104 marine turtle strandings in Rhodes and adjacent islands; *Caretta caretta*: 71 dead, 15 live, *Chelonia mydas*: 11 dead, 3 live, Unidentified-dead specimens: 4. Eleven specimens showed evident entanglement or injuries caused by entanglement which corresponds to the 10% of the total strandings recorded during that period. Among these, 6 were found dead, 5 alive (1 was immediately released, 3 rehabilitated and released, 1 died during rehabilitation efforts). The number of stranded entangled animals is probably significantly lower than the real number at sea. Factors which could have favored the entanglement of individuals are suspected to be the 1) increase of fishing gears set and left in the sea to fish (static nets and long lines), as the coastal fishing activities (professional and non professional) seem to be carried out everywhere and with very limited control by authorities, 2) litter, especially the plastics, that are accidentally or in

purpose discharged into the sea. The municipalities show insufficient effectiveness in the collection and elaboration of litter, while the recycling systems have only recently started up. There has been an at least 20 years evidence of entanglement of stranded sea turtles mainly on fishing lines in Rhodes and vicinity. However, the cause of death for many specimens (old and recent) is unknown. An observation network on strandings should be extended to a higher number of islands, monitoring should be performed regularly also in places difficult to be reached and during all 4 seasons. Improving cooperation with local port authorities, professional and non-professional fishermen, citizen scientists, NGOs, divers and diving clubs and common people is desirable. HSR will be participating in an effort to clear out the cause of death of sea turtles that do not bear external evidence.

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FISHERMEN APPROACH TO SEA TURTLES BYCATCH. RESULTS FROM A SURVEY WITH SPANISH SURFACE LONGLINE FLEET IN THE ALBORAN SEACamiñas J.A.^{1,2}, Aguilera R.², Báez J.C.³¹ Centro Oceanográfico de Málaga. Instituto Español de Oceanografía. Puerto Pesquero. 29640 Fuengirola (España)² Asociación Herpetológica Española (AHE). C/ José Gutierrez Abascal, 2. 28006 Madrid (España)³ Centro Oceanográfico de Canarias. Instituto Español de Oceanografía. Vía Espaldón, dársena pesquera, Parcela 8 38180 Santa Cruz de Tenerife (España)

Surveys offer the opportunity to actively involve fishers, seamen, etc., into data collection and make use of their local knowledge, as additional source of information to scientific research. Surveys facilitates transparency and communication between scientists and fishers which can be expected to translate into more effective local management. Short surveys (<30 min) have been recommended to reduce non-response rates and since many fishermen are time-limited. We interviewed from December 2017 to July 2018 professionals working with the surface longline fishery targeting swordfish (*Xyphias gladius*) working in the Alboran Sea. Interviews provide information on different aspects of fishing activities, fishing changes with time, ecological changes of marine ecosystems, different types of interactions with sea turtles and the species most involved and to quantify these interactions. In addition, the suitability of different mitigation strategies to reduce bycatch was evaluated. The fishers were all professionally active skippers and crew of the fishing fleet. Approximately 10% of the total fleet (longline) was interviewed. The experience as skipper of the interviewees' ranged from 11 to 33 years. Main results obtained from the surveys are: Of

the three mainly species of sea turtles present in the Mediterranean Sea, Loggerhead is the most common captured as bycatch by surface longlines. About 90% didn't know any regulations about protected species. All the fishermen agreed that due to the changes operated in the surface fishing gear bycatch of sea turtles has decreased. All of them released the sea turtles when are incidentally bycatch. 20% of respondents thought that is important to have information on the temperature of water in the fishing area, to reduce the bycatch (turtles). Referring to the species that are a problem to the fishery, the turtles don't appear in the list: 90 % mentioned bluefin tuna (due to the quota); 80% referred to common stingray (*Dasyatis pastinaca*) and 10 % mentioned squids because loss of baits and money by bitted swordfish. The fishermen try to remove the hook of the turtle (20%) and if this is not possible they cut the line. The 20% said that they always cut the line, without trying to free them from the hook. To reduce the bycatch of sea turtles 10% fishermen propose the use plastic baits.

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POSTER PRESENTATIONS

SESSION 4: THREATS

UNDERSTANDING MEDITERRANEAN MULTI-TAXA 'BYCATCH' OF VULNERABLE SPECIES & TESTING MITIGATION- A COLLABORATIVE APPROACH

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Numerous research have been conducted on the subject relating to bycatch, but there is still great uncertainty on the scale of the issue throughout the Mediterranean. Previous studies have typically been confined spatially, related to a single taxa and have applied different methodologies of data collection. Additionally fishing communities are subject to variation across and within countries, dependent on fishing related practices and management measures. Furthermore, mitigation measures implemented are generally focused on reducing bycatch of a specific taxa and the effects on other vulnerable species is poorly understood or unknown. All these variations present a complex issue when trying to gain a Mediterranean regional wide understanding of the bycatch and effective solutions. The MAVA funded project aims to tackle these issues bringing together multi-national organisations, to implement activities spanning the Mediterranean, using standardised methodologies to collect bycatch data on multi-taxa vulnerable species. The standardised protocol is being

developed for data collection from the Alboran Sea, Strait of Sicily/Tunisian Plateau and the Central Aegean Sea/ Cypriot Basin. Observer teams from each region will collect bycatch data from small-scale fisheries operating trawls, longlines and static nets, using three different methodologies, on-board observation, port-based questionnaires and fishermen self-sampling for vulnerable species of elasmobranchs, sea birds, marine mammals and sea turtles. Initially data will be collected to assess the scale of the issue, with mitigations trials implemented during 2019 to monitor their effectiveness on reducing bycatch on all vulnerable species. MEDASSET's focus is primarily in Turkey, working with local partners implementing the observer programme. Data collection is planned to start August 2018 for port-based questionnaires and September for on-board observations.

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POSTER PRESENTATIONS

SESSION 4: THREATS

FISHERS, SEA TURTLES AND SHARKS: ALLIANCE FOR SURVIVAL

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The aim of the project is to study and mitigate the impacts of bycatch and ghostfishing on the sea turtle and shark populations in Greece, through awareness, capacity building and cooperation with stakeholders in the fisheries sector. It is the first known project launched in Greece with a multi-taxa approach regarding sea turtles and sharks and furthermore within the Mediterranean basin. The project focuses on five important ports of Greece, which cover a major part of the country's fishing activity. Besides, fishing activity in the wider area of these ports coincides with five significantly protected areas that are under high pressure and are in need of research to assist in their conservation. Monitoring of fishing activities and gradual disengagement from unsustainable fishing practices is expected to have long-term positive impacts on the condition in fishing reserves, target-species and hence for biodiversity and the local

economy. A common harmonized strategy is being implemented through two lines of actions: (1) the enhancement of existing knowledge on the status of the target species, fish stocks and relevant perceptions of stakeholders, and (2) to raise awareness among fishers and relevant control authorities on the impacts of non-selective fishing methods and gears, as well as to train fishers in handling and releasing entangled species. The main expected result of the project is to increase the number of people in the fishing industry and the control authorities that can identify shark and sea turtle species, increase awareness of the need and legal obligations to protect them, in addition to increasing the use of best practices for safe release from different fishing equipment.

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MEDSEALITTER – INTERREG MED

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MEDSEALITTER is a project implemented on the Mediterranean basin, aiming at enhancing MPAs by developing innovative marine litter monitoring protocols intended for systematic monitoring of marine waste and their potential impact on key biodiversity species. Furthermore, the project will create a network of MPAs for the implementation of integrated and shared interventions. Five work streams are being implemented through a consortium of 10 partners from four Mediterranean countries. These include the collection of data on two different spatial scales, basin-wide & within MPAs, testing different methodologies effectiveness for monitoring macro litter with the use of vessels, aircraft & drone to collect data. The impacts of macro and microlitter will be evaluated on fishes and large Polychaeta through the use of bio-indicators and on key marine species through the identification of hotspot areas for sensitive species and quantification of ingestion of litter by sea turtles. The project includes pilot activities where project

partners will test the new protocol for monitoring marine litter abundance and its impact in order to enhance and evaluate the shared protocol as defined in the studying module. The project works towards the enhancement of MPAs established networks, collaborating for marine litter management and solutions, by the designing of common approaches, improvement of common strategies and models at transnational level. The finalized protocols will be promoted and made freely available to other MPAs, scientific entities and Regions. In Greece, MEDASSET has created a network among port authorities, veterinarians and the Hellenic Centre for Marine Research that contributes valuable data on marine litter, through the collection of dead sea turtles, conducting necropsies and the analysis of their stomach's content.

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**PRESENCE OF MICROPLASTICS IN THE DIGESTIVE TRACTS OF STRANDED
LOGGERHEAD TURTLES (*Caretta caretta*) IN THE VALENCIAN COMMUNITY
COASTS**

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Plastic input to the sea has increased steadily over the past three decades; likewise the interaction between marine turtles and plastic. Among these turtles, loggerhead turtles (*Caretta caretta*) are especially prone to ingest plastics due to their opportunistic and generalist diet, as well as due to their migratory nature. In the present study we analyse de visu in the western Mediterranean the abundance of microplastics in the digestive tracts of stranded or by-caught dead loggerhead turtles along the Valencian Community coast (East Spain). We also analyze the relationship between the amount of microplastics and macroplastics found in the digestive contents. We analysed microplastics in 12 turtles dead in 2017 and 2018. In total, 9 loggerheads had microplastics in their digestive tracts, 8 of which presented macroplastics as well. Concerning microplastics' characteristics, 44.4% of them were fibres and 55.5 % were

irregular fragments. Most of the fibres were black (59%), followed by degraded colours (36.4%), translucent and red (2.3% each). By the contrary, most of the fragments found were blue (30.9%), followed by white (27.7%), translucent (20%), degraded colours (16.4%) and green (3.6%). Microplastic size varied in between 0.5 and 5 mm. Concerning these results, presence of microplastics in loggerhead turtles' from the western Mediterranean seems to be frequent. Therefore, these species look a good candidate to be bioindicator for monitoring microplastics' presence at marine ecosystems. It is necessary to continue with these analyses, with a greater temporal and spatial scale in order to detect trends in the amount of plastic in our seas and their impact on marine fauna.

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POSTER PRESENTATIONS

SESSION 4: THREATS

BRIDGING THE GAP: REVIEWING CLASSIFICATION OF PLASTIC DEBRIS INGESTED BY SEA TURTLES

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The ubiquity and persistence of plastic across the oceans have a negative impact on marine biota. Among the most affected marine taxa are sea turtles. In the last two decades documentation of plastic ingestion by sea turtles has been increasing exponentially and it is expected to rise as the quantity of plastic entering the ocean continues to grow. However, there is little consistency in the methods used to classify ingested plastic debris, hindering spatial and temporal comparisons of sea turtle studies across the world. Most of the methods used for classifying plastic debris are based solely on the physical appearance of debris, hampering the available information on the type of plastic debris ingested by sea turtles. It is important to also examine non-morphological characteristics, such as density and polymer composition because this information will help understand the ecological and health effects of plastic debris ingestion on sea turtles and to identify the factors that increase their vulnerability to plastic pollution. The objective of this study is to identify gaps in classification methods of ingested plastic debris through a literature survey. We analysed 81 scientific articles studying sea turtle diet from 1998 to 2018 and assessed the most common classification methods. Particularly, we examined whether the authors

measured basic parameters (abundance, colour) and whether they categorised ingested plastic debris based on either texture (soft/hard) or morphological type (rope, foam, plastic bag). In the surveyed literature we found that 13.5% of the reviewed studies do not mention plastic debris and 85.7% of the 56 studies analysing ingested plastic debris do not use a standard protocol and therefore require a more precise categorisation. Moreover, the most used categorisation in publications that analyse ingested plastic debris is based on plastic texture (44.1%), while 32.3% classify by morphological type and 23.5% use both. Based on the results of this literature review, we created a decision-making tree for use by researchers studying plastic debris ingestion by sea turtles to choose the most appropriate method according to the main objective of their study. Finally, we discuss and recommend standardised techniques to classify plastic debris based on non-morphological characteristics. The ultimate aim is to improve plastic debris classification and understanding of the effects and causes that lead ingestion of plastic by sea turtles.

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SPANISH MEDITERRANEAN COLLABORATIVE NETWORK FOR DATA SHARING AND STANDARDIZATION OF METHODOLOGIES FOR MONITORING DEBRIS IMPACT ON SEA TURTLES IN THE FRAME OF THE INDICIT PROJECT

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INDICIT is a collaborative project supported by the European Commission. It focuses on the Descriptor 10 of the MSFD (“Marine Litter”), which aims to maintain or achieve the Good Environmental Status (GES) of the marine environment by 2020 with respect to marine litter. The overarching aim is to develop a set of standardized tools and protocols for monitoring the impacts of litter on marine fauna as bio-indicators. INDICIT Project proposed sea turtles as indicator species due to the high interaction of these species with marine debris. This project is based on a consortium of 10 partners from 5 EU countries (France, Italy, Spain, Portugal and Greece) and 2 contractors of the Barcelona Convention (Turkey and Tunisia). The Spanish partners are the University of Valencia (UVEG) and University of Las Palmas de Gran Canaria (ULPGC). In order to achieve a proper monitoring of GES, collaboration of main members involved in the rescue and attendance of marine wildlife, such as stranding networks, local and national authorities or recovery centres, is crucial. The UVEG is responsible for coordinating the collection of data from all the rescue centres that necropsies dead sea turtles

or recover live ones in the Spanish Mediterranean, in order to provide data for the Indicator 1 “macro-litter ingested by sea turtle” and Indicator 2 “Marine wildlife entanglement in debris”. A collaborative network involving eight rescue centres from five different administrative regions has been established in the Spanish Mediterranean. To date, we have recorded data on a total of 173 loggerhead turtles for ingestion analysis and we have also gathered data about entanglement of sea turtles and other taxa from all the rescue centres. We have also shared with all the partners involved a standardized protocol for the extraction, identification and quantification of ingested debris that will allow carrying out accurate estimates of sea turtles debris burdens in the near future. In the present work we present the great effort developed to standardise and improve sea turtle recovery, conservation and research and to recognize the exceptional work of all collaborators.

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POSTER PRESENTATIONS

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SPATIAL OVERLAP OF LARGE MARINE VERTEBRATES WITH FLOATING MACRO-LITTER IN THE SPANISH MEDITERRANEAN SEA

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In the Mediterranean Sea, marine litter has become a major threat for living marine organisms, with several taxa showing different impacts ranging from litter ingestion to entanglement in floating litter items, such as plastic, monofilament lines and fishing ropes. Despite aerial surveys are valuable to locate major aggregations of floating marine macro-litter, scant information is available from monitoring programs designed to census marine litter and its relationship with the main affected taxa. The present study aims to investigate the composition and spatial distribution of floating marine macro-litter and its overlap with three large marine vertebrate species (loggerhead sea turtles, striped dolphins and sunfish) from aerial surveys carried out in waters off eastern central Spain (western Mediterranean). Four seasonal surveys were conducted in 1-year survey program (from

February to December 2013). We surveyed an area of 23,078 km², accounting for 58 turtle, 75 dolphin, 189 sunfish and 168 marine litter sightings. Aerial surveys allowed us to identify main sources and composition of floating macro-litter. Preliminary results show high exposures of the three targeted species to the marine litter observed in the surveyed waters (probability debris within vertebrates ~ 0.8). Our values of probability of overlap between litter and loggerhead sea turtles were similar to the ones estimated in other areas in the Mediterranean. Our results show that aerial surveys are valuable tools to assess large marine vertebrate's exposure to floating macro-litter.

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BYCATCH AND STRANDINGS OF MARINE TURTLES ALONG THE EASTERN MEDITERRANEAN OF MOROCCO

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In Morocco, three species are known: the Loggerhead (*Caretta caretta*) which is the most common, the leatherback turtle (*Dermochelys coriacea*) is regularly observed and the turtle green (*Chelonia mydas*) is rare. This study examines the bycatch and strandings of marine turtles along the eastern Mediterranean of Morocco from Al Hoceima in the west to Cape de l'Eau in the east between November 2013 and December 2015. The maritime district of our study concerns the ports and villages of fishing: port Al Hoceima which has a maritime district which extends over a length of 100 km (132 coastal fishing boats, 631 artisanal fishing), port Beni Ansar (115 coastal fishing boats), port Cap-de-l'Water (86 artisanal boats), and Saïdia fishing village (18 artisanal boats). The coastal fishing boats have a size of 12m to 22m and the artisanal boats a size of 4m to 6m. Coastal fisheries include seine, trawl and longline. Artisanal fishing includes small boats about 5m in length and can use hooks or nets. The information analyzed in this study (2013-2015) was collected by two methods: direct interview and / or filling of questionnaire forms by qualified fishermen, who are trained in the Marine Fisheries Technology Institute, on board fishing gear. The data relate to the fishing periods between November 2013 and De-

cember 2015. Twenty-seven inshore and ten artisanal fishermen collaborated with us throughout this study. The information provided by the fishermen is: location, date of sighting, turtle species, carapace length and width, and condition of the animal. Thirty-seven fishermen (10 seines, 6 trawlers, 11 longliners and 10 artisanal boats) were interviewed and followed. The most frequently caught species is the loggerhead, followed by the green turtle and the leatherback. The interaction with seines and longlines is higher than with trawls. Capture season is from March to September. Stranding may be caused mainly by fishing gear or accidents with ships. Sometimes traces of turtle violence (head injuries, buccal injuries, shell trauma) are present. The tracking of sea turtle strandings along the Mediterranean coast of Morocco reveals that the loggerhead and leatherback fail in different seasons. The awareness of fishermen on the protection of sea turtles, can reduce and mitigate the mortality of these endangered species in the Mediterranean. Finally, the implementation of conservation requires the integration of social, economic, cultural and political issues.

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INSIGHTS ON DELIBERATE HEAD TRAUMAS ON SEA TURTLES IN GREECE

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The Sea Turtle Rescue Centre (STRC) of ARCHELON in Glyfada, a suburb of Athens, was established in 1994. Since then, every year, it hosts sick and injured sea turtles (*Caretta caretta* and *Chelonia mydas*) from all over Greece that are collected through a nationwide Sea Turtle Rescue Network. The Rescue Network consists of the local Coast Guards, cooperative fishermen, ARCHELON members and volunteers, local or national environmental organizations, and concerned citizens. An average of 70 turtles are admitted per year to the STRC, 44 % of which are eventually released after rehabilitation. Main causes of injuries are deliberate (e.g. blunt force traumas) and incidental (e.g. fishing gear entanglement, boat strikes) human actions. We analyse herein data from all cases admitted to the STRC during the period 2015-2017 (N = 209) focusing on head traumas caused by deliberate human actions (33% of all cases). The overwhelming majority of cases relating to deliberate human actions include head traumas (98.6%). Head injuries, which reflect a retaliatory action mostly inflicted by fishermen, usually affect a wide area on the head and thus it is almost impossible to categorize them according to a specific cranial location. The rehabilitation procedure of those injured animals, is a challenging

process that needs special and continuous handling as often we encounter severe lesions on the skull exposing the brain. Head wounds have to be rigorously treated and necrotic tissues, bone fragments and other external material have to be very carefully removed so that an infection is avoided and healthy tissue develops. In contrast to existing studies, we found no correlation between turtle size and survival in head traumas. The importance of the deliberate human actions that involve head injuries is highlighted because these actions constitute the most frequent cause of injury and also because of the dramatic decrease of the survival rates (36 % for head injuries vs 70% for other injury types). ARCHELON has set a priority to address the key issue of the deliberate head injuries through educational programmes, improving the existing rescue network, introducing fishing gear modifications, and engaging fishermen into collecting data and tagging turtles (LIFE EUROTURTLES – Collective actions for improving the conservation status of the EU sea turtle populations).

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ASSESSMENT OF LITTER INGESTION IN THE LOGGERHEAD SEA TURTLE (*Caretta caretta*) IN THE MEDITERRANEAN SEA, AN INDICIT OUTCOME

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Marine anthropogenic litter is considered a pollutant that affects marine environments causing harm to marine fauna and particularly to sea turtles. The European Commission issued the 2008/56/EC Marine Strategy Framework Directive (MSFD) with the objective of achieving the Good Environmental Status (GES). The loggerhead sea turtle (*Caretta caretta*, Linnaeus 1758) was selected as indicator of the amount and composition of litter ingested by marine animals. The present study contributes to the development of a definition of the GES for "Trends in the amount and composition of litter ingested by marine animals". The project INDICIT (Implementation of the Indicator of Marine Litter on Sea Turtles and Biota In RSCs and MSFD Areas) collected standard data to monitor the litter ingested by sea turtles in both the Mediterranean and the Atlantic areas from the standard protocols established by the consortium of partners in partnerships with stakeholders (e.g. rescue centres and stranding networks) and an advisory board (representatives of authorities). Up to 2018, a total of

688 loggerhead turtles were collected. Of these, 239 individuals were found alive, while 449 individuals were dead. Anthropogenic items collected in the turtles' gut were subdivided into three main categories: IND-Industrial plastic, USE-User plastic and Other non plastic-litter and 7 subcategories. Among the collected turtles, 53.78% of the individuals presented plastic, with a mean \pm SD= 1.387 ± 0.254 g of litter (dry mass) and 9.516 ± 1.191 items. These results are critical to confirm *Caretta caretta* as a target indicator species for monitoring the impact of marine litter on biota. Ongoing analyses will help in determining the best criteria to obtain GES values. Mediterranean facing countries, involved in the MSFD and the Barcelona Convention process, are invited to join the network and participate in the collection of data using a homogenized approach.

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MORE THAN A MEDITERRANEAN NESTING ROOKERY: FEEDING GROUNDS AND ANTHROPOGENIC IMPACT ON MARINE TURTLES IN CYPRUS REVEALED BY STRANDING ANALYSIS

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Strandings can provide valuable information on marine turtle biology and anthropogenic threats affecting them. Here we present a preliminary analysis of data from marine turtle strandings from Cyprus, one of the main nesting rookeries in the Mediterranean Sea. We collected information from 642 turtles found mainly stranded or floating at sea, from 1999 until 2017, with occasional older records. Three species were recorded: *Caretta caretta* (N = 258), *Chelonia mydas* (N = 320), *Dermochelys coriacea* (N = 3). Cyprus, like other areas in the Levantine basin is frequented mainly by juvenile green turtles (mean CCLn-t 47±18 cm SD, range 14.2-97 cm) and adult or probable adult loggerheads (mean CCLn-t 66±9 cm SD, range 16-87 cm). Observations by the Turtle Conservation Project staff over 40 years indicate though that fewer juvenile greens were present in the past, especially before the late nineties. Seasonal patterns show that marine turtles frequent all coasts of Cyprus all year round, not just during the nesting season. Therefore Cyprus

hosts feeding areas for both juvenile greens and adult loggerheads. Chrysochou Bay, for which the monitoring effort has been constant for several years, shows different seasonal stranding patterns for probable adult loggerheads and juvenile green turtles, possibly related to the use of this area by loggerheads as a corridor during reproductive migrations, although more information is needed to support this. Marine turtles in Cyprus waters are highly affected by human activities. We have estimated the most probable cause of death as follows: interaction with fisheries (longline 4%; gillnets and trammel nets, 38%), boat strikes (3%) and intentional killing (10%). The latter is now lower than in the past near the main nesting areas (west coast and Chrysochou Bay), possibly thanks to the positive impact of the Turtle Conservation Project.

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PLASTIC INGESTION BY SEA TURTLES IN GREECE

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Plastic pollution is a worldwide phenomenon, which has invaded all compartments of the marine environment and poses a threat to marine wildlife. More and more marine organisms are being detected as having ingested plastic particles, including sea turtles. Loggerhead turtles (*Caretta caretta*), have been proposed, by the Marine Strategy Framework Directive (MSFD), as an indicator species for monitoring the ingestion of macrolitter in the Mediterranean. However information on micro (<5 mm) and macroplastic ingestion by sea turtles in Greece is absent. Here we present the first results of the study designed to investigate the plastic ingestion of sea turtles along the Greek waters. The gastro-intestinal tracts (esophagus, intestine and stomach) of recently necropsied sea turtles (2017-2018) were analysed and their content was thoroughly checked for plastic presence, according to the proposed MSFD protocols. All plastic items detected were sorted by shape, size, color, and polymer type, and were confirmed via the use of Fourier-Transform Infrared Spectroscopy (FTIR). Preliminary results reveal that approximately 80% of the sea turtles examined were detected with ingested plastic particles, 70% of which was microplastics.

The average number of microplastics and macroplastics found in the sea turtles examined was 3.5 items/individual and 1.5 items/individual, respectively. Fragments (62.5%) were the most common shape among all plastics, followed by sheets (16%), threads (15.5%), foams (7.1%) and other plastics (1.8%). The size of plastics ranged from 0.04 cm to 25 cm and the colors varied: black, blue, white, transparent, yellow, pink, green, red, grey and brown. Polyethylene (36.5%) and polypropylene (34.5%) were the dominant polymer types both in micro and macroplastic items, while nylon (11.5%), PS (7.5%), PVA (6%) and PET (2%) were also identified. Pieces of plastic bags and fishing nets were the most common macroplastics found. These results provide initial information about micro and macroplastic ingestion of sea turtles and their characteristics in Greek seas and can be useful for the monitoring program and implementation of the MSFD. The above work is funded by the INTEREG-MED project MEDSEALITTER (2017-2020).

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RESULTS SYNTHESIS OF THE MONITORING SEA TURTLES STRANDED IN NORTHERN TUNISIA

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This is a descriptive analysis study of data on strandings of marine turtles conducted on the north coast of Tunisia as part of the activities of the National Stranding Network. The analysis includes all stages of monitoring the signaling of strandings to the fate of stranded animals. The results showed that the National Marine Guard is the main source of signaling the cases stranded. Two species have been recorded, *Caretta caretta*, which is the most representative, and *Dermochelys coriacea*. Concerning the fate of the stranded animals, the living individuals were transported to the sea turtle care center, the dead individ-

uals presenting a fresh or slightly altered condition were autopsied. The results of the necropsies mentioned the importance of the frequency of signs of interaction with longliners and showed the presence in some individuals of plastic and cardboard debris in their digestive tract. In addition, confirmation of sex, particularly in medium and small size turtles, was based on histological analysis of the gonads.

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IS THE LOGGERHEAD *Caretta caretta* A GOOD INDICATOR OF PLASTIC INGESTION ALSO AT LOCAL SCALE?

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The European Commission drafted the 2008/56/EC Marine Strategy Framework Directive with the aim to achieve a Good Environmental Status (GES). In 2011 Italy promoted the loggerhead sea turtle (*Caretta caretta*, Linnaeus 1758) as target specie for monitoring the amount and composition of litter ingested by marine animals and then it has been accepted among MSFD Indicators and under the UNEP/MAP Barcelona Convention ecological objective, at sub-regional level. 120 death loggerhead CCL ranging from 21 to 80 cm (average = 54.9 cm) have been collected stranded or by-catch along Latium and Sardinian coasts, Italy (Western Mediterranean sub-Region). Plastic ingestion has been detected with a frequency of occurrence FO=54.2%. In total, 106.138 g (dry mass) and 1103 items (abundance) of marine litter were collected with an average value of 0.892 ± 0.196

g and 9.27 ± 1.95 items. Among the impacted turtles, parts of plastic bags and other sheet fragments (USE she) were the main categories in terms of abundance (17.23 ± 3.35 items). At local level, FO%, dry mass and number of items between the two areas (Latium: FO = 79.0%, average g= 1.553 ± 0.354 , average n Items = 14.76 ± 3.53 ; Sardinia: FO = 27.6% average g= 0.173 ± 0.059 , average n Items= 3.30 ± 0.95) showed significant differences and groups structure was confirmed by nonhierarchical cluster analysis. This study shows that, even if sea turtles are migratory species and marine litter move according to the current and tide, the loggerhead can give information on plastic pollution also at local scale.

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THE EVALUATION OF THE FISHERIES INTERACTION BETWEEN THE SEA TURTLES AND THE FISHERMEN IN MEDITERRANEAN COAST OF TURKEY

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Fisheries interactions are one of the most important threats to sea turtle populations. The conservation measures are well implemented at the important nesting beaches in Turkey, the studies on fisheries interactions with sea turtles are inadequate. In this study, we made field surveys and used questionnaire to assess the reciprocal interactions between sea turtles and fisheries in the Mediterranean coast of Turkey from Muğla to Mersin during 2017. A total of 176 interview made with fishermen and asked 52 questions. Surveys were conducted at 18 fisheries ports. The main income of 156 fishermen (88.6%) was fishing. The mean age of fishermen was 54.1 (± 10.42). All fishermen were male. The average fishing time is 35.8 (± 10.50) years. A total of 34.1% of the fishermen identify themselves as fishermen, 58.0% of them identify as retired from different occupation, 5.1% identify as tourism professional, and 2.8% are actively works in other occupations. A total of 112 fishermen (63.6%) declares economic loss as a result of damages to the fishing gears from sea turtle entanglement.

The most common fishing gear is gillnet (61.9%). Other fishing gears are pelagic longlines (19.3%), demersal longlines (19.3%), seine net (17.6%), trawl (16.5%), hooked lines (1.1%), and others (3.4%). The level of knowledge on sea turtles and the number of turtles caught in the fishing gears were also investigated by surveys. Considering the all coastline in Turkey and the limited interviewed individuals, the results show that fishermen often observe sea turtles and entanglement rate is high, especially during the nesting season. A total of 131 fishermen that 1.4 (min: 1; max: 25) sea turtle per set is entangled to their fishing gear. Most of the fishermen are ready to modify their fishing gear to reduce bycatch due to the economic loss from sea turtle entanglement. Therefore, a larger scale study in the Turkish coastline to assess the actual effects of fisheries and determine the hotspot areas for sea turtles is required.

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SEA TURTLE MORTALITY ASSESSMENT IN VALENCIA REGION (SPAIN) FROM 2010 TO 2018

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Valencian Community Coast, on the western Mediterranean, has been established as a feeding area for mainly juvenile and subadult loggerhead turtles (*Caretta caretta*), additionally it has been reported that Valencia waters hold individuals from Atlantic and Mediterranean rookeries. On this study, we focus on the establishment of the cause of death of stranded or by-caught turtles from this area. A complete post-mortem analysis was performed in 80 individuals in good preservation condition been admitted through the local stranding network from 2010 to 2018. In this period, the main mortality cause was associated to incidental capture, being decompression sickness, the most common by-catch consequence pathology followed or combined with drowning. Intestinal blockage, sepsis, entanglement or boat strikes

were also reported but in very low numbers. During the late years important efforts had been made to improve the relationship with the fisherman communities. This has led as to an increase of the number of calls reporting incidental captures and carcasses examined. These results provide valuable information to take into consideration in sea turtles conservation programs and could serve as an orientation when dealing with death stranded turtles in poor preservation condition. It is also highlighted the needed of global conservation measures, as local threats could affect different sea turtle populations.

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ACCUMULATION OF ANTHROPOGENIC PLASTIC DEBRIS ALONG THE MEDITERRANEAN SHORELINE

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Anthropogenic marine debris (AMD) has recently become an important subject of coastal habitats. After arrival in the sea wind, tides, waves and ocean currents transport these debris over 100's of kilometres, eventually becoming deposited along the sea shore. A large number of marine species are known to be harmed and/or killed by plastic debris either through ingestion or entanglement. In this study, plastic marine debris accumulation research has been conducted at 8 different beach locations along the coast of north Cyprus. Each month between January 2017 and December 2017 all selected beaches were surveyed. All items were collected monthly within the same 250 m² plot from each beach. Samples were carried to the laboratory and then identified and categorised according to OPSPAR. A total number of 43373 (mean 2409.6 items/month) different plastic

items were collected which equalled a mass of 418.3 kg (mean 23.3 kg/month). This amounts to 96% of all anthropogenic debris items collected. The highest amount of plastic litter was found at Ronnas beach. The three most common plastic items were Plastic/Polystyrene 2.5><50 cm (9612 pieces), Plastic Bags (6942), Bottle Tops (5294). In terms of total mass the three top items are Plastic Bags (105.3 kg), Plastic/Polystyrene 2.5><50 cm (57.7 kg) and Drinks Bottles (32.9 kg). This research is the first comprehensive survey regarding this subject in Cyprus and together with further analysis will provide valuable information on how to target this global problem.

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POSTER PRESENTATIONS

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MICROPLASTIC AND MACROPLASTIC ABUNDANCE IN MARINE TURTLES STRANDED ON SAMOS ISLAND COASTLINE (NORTH-EASTERN AEGEAN SEA): PROPOSAL OF A STANDARDIZED SAMPLING PROTOCOL

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The increase of marine plastic pollution is a global threat to biodiversity and it represents a concerning issue in the Mediterranean Sea. The Eastern Aegean Sea is characterized by the presence of a unique marine biodiversity. To date, very few studies have been carried out for microplastic in marine turtles, although previous studies have reported the presence of marine debris in different marine species. Marine turtles feed in the water column and at the seafloor. Based on the species-specific feeding behaviour, these two marine compartments are addressed when quantifying litter in the digestive system of live and dead stranded turtles. According to the Marine Strategy Framework Directive of EU, the North-Eastern Aegean can be considered a trend-based model of the amount of litter ingested by marine herpetofauna. Dead and alive stranded specimens of *Caretta caretta* and *Chelonia mydas* have been seasonally recorded in the sub-region of Samos Island. A preliminary analysis of the presence of microplastics and macroplastic was conducted on a 40 animals of different ages and sexes found stranded on Samos Island coastline between 2016 and 2018. Necropsies were conducted *in situ* or in the laboratory when possible, for standard

diagnosis analysis of samples from the fresh carcass and the isolation of the digestive system for all the stranded animals. The methodology applied for microplastic analysis consists in collecting the entire digestive tract. After dissolving the organic matter, samples were filtrated. The filters are read using a dissection microscope in order to identify and categorize the microplastics (sources, type, shape, colour and size). A "needle test" is conducted to distinguish between plastic pieces and organic matter. A test for external contamination is conducted randomly. The totality of the samples from the digestive system has shown abundance and prevalence of different types of litter throughout each section of the digestive tract. This provided an evaluation of the plastic pollution and have confirmed wide spread of plastics affecting the top predators. This study proposes an innovative, cost-efficient and targeted method, that allows to maximize the results of a complete assessment of microplastic content in the digestive tracts of marine megafauna.

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DO TURTLES INGEST PLASTIC INADVERTENTLY? INNOVATIVE METHODS FOR THE STUDY OF DIET AND PLASTIC SELECTIVITY BY LOGGERHEADS IN THE NORTHWESTERN MEDITERRANEAN SEA

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Loggerhead turtles (*Caretta caretta*) use several marine zones during their ontogenetic cycle. Their diet varies whether they frequent the pelagic or benthic area. Loggerheads are known to ingest different types of debris including plastics. One common hypothesis is that they could confuse the debris with prey. Plastic items may also occur in the prey or the surroundings and be inadvertently ingested by sea turtles. The probability of plastic ingestion and other types of ingested debris are likely to be highly related to the diet of sea turtles. Acquiring a deeper knowledge of the diet and feeding behaviour (*i.e.* the causes of debris ingestion) is important because sea turtles are considered as indicators for litter impact (*e.g.* for the Marine Strategy Framework Directive or the Barcelona Convention). The knowledge on sea turtle diet is mostly based on visual identification of items found in digestive tracks. We tested the meth-

od of meta-barcoding environmental DNA (*i.e.* the identification of items thanks to the remaining DNA fragments) from samples found in the digestive tract of stranded and bycaught individuals during necropsies. We evaluated the results of eDNA compared to visual identification of diet. We also recorded the occurrence and characteristics of ingested debris to evaluate the possible relation between debris ingestion and diet. To better understand the reasons for debris ingestion by sea turtles, we performed choice experiments (*e.g.* natural *versus* artificial preys, plastic of different sizes, shapes and colours, etc.) with turtles in a rescue centre. We presented standard methodologies and results on both diet and feeding selectivity.

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EVALUATING POST-RELEASE SURVIVAL OF LOGGERHEAD SEA TURTLES BYCAUGHT IN BOTTOM TRAWLS: ASSESSING THE EFFECTIVENESS OF A LOW-COST CONSERVATION METHOD

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Fisheries bycatch is considered the primary threat to sea turtles worldwide. Different methods are applied for bycatch reduction, from technological innovations and changes in fishing gear and practices, to reduction of fishing effort by spatio-temporal closures and banning some fisheries. All these approaches incur substantial costs and have resulted in different levels of acceptance and compliance by the fishery industry. Recently, education of fishermen on recovery techniques for bycaught turtles has been introduced as an alternative conservation tool. This low-cost method based upon a simple recovery procedure for comatose turtles is widely used throughout the Mediterranean, but no study to date has evaluated its conservation success. We assessed post-release survival of wintering loggerhead turtles by-caught in a comatose state in bottom trawls off the island of

Lošinj (northern Adriatic Sea) in February 2015. After successful application of the recovery protocol, 10 juvenile loggerheads (47-70 cm CCL) were equipped with PTT ARGOS-linked satellite transmitters and released alive. One transmitter failed to send any information, while the remaining nine successfully transmitted location data for 94 to 512 days (mean = 222 days, SD = 155), resulting in a minimum post-release survival rate of 90%. Our results suggest that the application of a simple and inexpensive recovery method is highly efficient in reducing sea turtle mortality in bottom trawls. This emphasizes the potential of educational programmes directed on fishermen as a valuable tool for sea turtle conservation.

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SESSION 5:
HEALTH AND
REHABILITATION



POSTER PRESENTATIONS

6TH MEDITERRANEAN CONFERENCE
ON MARINE
TURTLES
POREČ/CROATIA 2018

MODULATION OF PLASMA BIOCHEMICAL PROFILES IN LOGGERHEAD SEA TURTLE (*Caretta caretta*) DURING RECOVERYJakšić Ž.^{1,2}, Belić M.³, Gobić Medica K.^{2,4}, Mičić M.^{2,4}¹ Ruđer Bošković Institute, Center for Marine Research, G. Paliage 5, HR - 52210 Rovinj, Croatia² Marine Educational Center Pula, A. Negri 10, HR - 52100 Pula, Croatia³ Maja Belić, University of Zagreb, Faculty of Veterinary Medicine, Department of Pathophysiology, Heinzelova 55, HR - 10000 Zagreb, Croatia⁴ Aquarium Pula, Verudela bb, HR - 52105 Pula, Croatia

Plasma biochemical profiles were periodically analysed in 39 loggerhead sea turtles (*Caretta caretta*) during their recovery periods in Marine Turtles Rescue Centre of Aquarium Pula and Marine Education Center - Pula, Croatia, from 2014 to 2018. Selected plasma biochemical analysis (of albumin, total protein, glucose, uric acid, urea, Ca and LDH) carried out during the 2014 and 2015 were later extended to total of 13 analytical parameters (including PO3, ALT, AST, AP, GGT and CK) as reliable indicators of sea turtle health status. The blood from the dorsal cervical sinus was taken multiple times during animals' stay in the Centre. First time the blood was taken shortly upon the arrival to the Center, then again 60 to 90 days during the stay, and finally before the turtles was released to the nature. Blood was collected into microtainer tubes containing lithium heparin and centri-

fuged. Plasma was harvested and processed within 24 hours. The aim of the study was to monitor and analyse biochemical parameters of sea turtles during recovery period and determine possible biochemical pattern that can be used in diagnostic purpose. The results were compared with the values obtained in other similar studies, and the differences of biochemical values depending on sex, age, season, health status were discussed. Particular biochemical parameters are highlighted and proved to be important in assessing and monitoring the turtle's health status and condition, thereby the combined use of battery parameters for future research is recommended.

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HAEMATOLOGICAL AND BIOCHEMICAL PANELS IN TYRRHENIAN LOGGERHEAD SEA TURTLES (*Caretta caretta*) RESCUED BY THE CRTM: A COMPARATIVE ANALYSIS ACCORDING TO DIFFERENT CLINICAL FINDINGS AND SPECIFIC PATHOLOGIESDonadio A.^{1,2}, Affuso A.¹, Santoro P.³, Ciampa M.¹, Treglia G.¹, Hochscheid S.¹¹ Marine Turtle Research Center, Stazione Zoologica Anton Dohrn, Via Nuovo Macello 34, 80055 Portici, Italy² Department of Biology, University of Naples Federico II, Naples, Italy³ Diagnostica di Laboratorio S.r.l., via Enzo Tortora 11, 80125 Napoli, Italy

This study aims to show the different biochemical and hematologic assets of Loggerhead marine turtles hospitalized at the Marine Turtles Research Centre (CRTM) of the Zoological Station Anton Dohrn in Naples, Italy between 2016 and 2018. They were rescued, stranded, floating or after accidental capture fishing related, in Southern Tyrrhenian coastal waters and on beaches of Lazio and Campania. At the arrival, according to the internal policies, the turtles were subjected to clinical examination, involving the blood work. Biochemical and Hematologic parameters have been analysed for most of the rescued subjects (35) and, as described, the intervals resulted generally wide, because of different conditions such as age, season, and sex. Since the turtles had different body condition indexes (BCI), general health conditions and in some cases showed clinical signs of specific pathologies, we grouped the haematological findings on the basis of the above considerations, to verify if a correlation between the above specific conditions and similar haematological panels exists. In some cases,

blood work was repeated before release and the values were compared with the previous ones to assess the recovery conditions. The results showed statistically significant differences in RBC, haemoglobin and haematocrit between the groups based on BCI values; significant difference in cholesterol between the groups based on health conditions and no significant difference for the other parameters. As expected, after the recovery period the WBC generally decreased. In addition BUN, sodium, chlorine, phosphorus and albumin generally increased, otherwise bilirubin, GOT, LDH, CPK, gamma GT, ALP and potassium generally decreased. Our findings confirmed that a comprehensive assessment of absolute blood parameters, their variation during the recovery period and clinical conditions is necessary to improve the patient management. Keywords: Loggerhead turtle, haematology, biochemistry, rehabilitation, parameters.

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DATABASE & ONLINE MAP OF SEA TURTLE RESCUE & FIRST AID CENTRES IN THE MEDITERRANEANBoura L.¹, Touloupaki E.¹, Rae V.¹, Ullmann J.²¹ MEDASSET-Mediterranean Association to Save the Sea Turtles, 1c Licavitou St., 106 72 Athens, Greece² Department of Arctic and Marine Biology, Faculty of Biosciences, Fisheries and Economics, UiT The Arctic University of Norway, Framstredet 41–43, 9037 Tromsø, Norway

The "Database & Online Map of Sea Turtle Rescue & First Aid Centres in the Mediterranean" (www.medasset.org/our-projects/sea-turtle-rescue-map) is a project by MEDASSET, aiming to bridge information, communication, and collaboration gaps in sea turtle conservation. Launched in 2016, this open-access tool provides both professionals and citizens with comprehensive information about all known sea turtle rescue facilities in the Mediterranean. We aim at increasing collaborative networking among specialists and raising public awareness of the rescue centre network. Providing easy information access is one crucial step toward increased public involvement (volunteering, donations, etc.). MEDASSET's up-to-date, visual tool is also useful for identifying gaps in the distribution of rescue and rehabilitation facilities on the Mediterranean scale and can potentially assist in conservation planning and policy-making. The project is an excellent "science to society" example, answering Ullmann & Stachowitsch's (2015, *Nature Conservation* 10: 45–69) call for action and bringing their findings to both the public's and the decision makers' attention. The above study provided the conceptual framework and baseline data for

MEDASSET's database. Facility data have since been updated and completed through an online survey targeting rescue centres and national authorities (the latter was facilitated by RAC/SPA). The map currently comprises 59 facilities in 17 countries across the Mediterranean. The alpha versions of the database and map were purposefully developed using freely available software to ensure the tool's sustainability in an NGO context. Organisations are free to embed the map into their websites; thus, multiplying the initiative's impact. Through the current presentation, we seek to share our lessons learnt and advance our ideas regarding further development of the map and database (interactive and/or multilingual user surface, forum, integration into other GIS databases). Striving to maximise our tool's benefits to the conservation effort, we seek feedback from rescue centres, scientists, conservationists, and policy makers.

Acknowledgement: MEDASSET warmly thanks the volunteers who helped create the database and map: J.Judge, E.Sun, H.Tzortzakis, and E.Bountouraki.

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MULTIDRUG RESISTANCE IN CLINICAL ISOLATES FROM LOGGERHEAD SEA TURTLES (*Caretta caretta*) LIVING IN THE MEDITERRANEAN SEACirilli M.¹, Trotta A.¹, Sposato A.¹, Marinaro M.², Valastro C.¹, Franchini D.¹, Corrente M.¹¹ Department of Veterinary Medicine, University of Bari, s.p. Casamassima km 3, 70010, Valenzano, Italy.² Department of Infectious, Parasitic and Immune-Mediated Diseases, Istituto Superiore di Sanità, Viale Regina Elena 299, 00161, Rome, Italy

Marine animal species may act as reservoirs of antimicrobial resistant (AMR) microorganisms. Extended-spectrum- β -lactamases (ESBLs) producers are an important category of AMR bacteria. ESBLs are enzymes that hydrolyze all beta-lactams drugs, resulting in limitation of therapeutic options. Between 2016 and 2018, 52 loggerhead sea turtles (*Caretta caretta*), hospitalized at the Sea Turtle Clinic (Department of Veterinary Medicine, University of Bari, Italy), were sampled for bacteriological investigation. Forty Gram-negative bacteria were isolated from cutaneous lesions (55%), bronchoalveolar lavages (32.5%) and internal lesions (12.5%). Strains were biochemically identified as *Aeromonas* spp. (22.5%), *Vibrio* spp. (20%), *Citrobacter* spp. (20%), *Pseudomonas* spp. (15%), *Acinetobacter* spp. (5%), *Morganella* spp. (5%), *Proteus* spp. (5%), *Klebsiella* spp. (2.5%), *Enterobacter* spp. (2.5%), *Alcaligenes* spp. (2.5%). Resistance against 13 antibiotics was determined by disk diffusion methods according to EUCAST guidelines³. Seventy-four isolates were multidrug resistant. The

isolates exhibited highest resistance to β -lactam antibiotics (87.9%), followed by quinolones, such as ciprofloxacin (67%), tetracycline (58%) Interestingly, all the isolates were resistant to Imipenem (100%), a drug for human use. Nine strains (22.5%) were resistant to all antibiotics tested. ESBLs genes of most common families (CTX, AmpC, TEM, and SHV) were screened by PCR. The most frequently detected genes were blaAmp-C (45%), blaCTX-M (17.5%) and blaTEM (12.5%), followed by blaSHV (2.5%). Five isolates (5%) simultaneously harboured 3 genes and 6 isolates (15%) 2 genes. Antimicrobial susceptibility patterns of bacterial isolates are an important information for appropriate treatment of sea turtles in rehabilitation centres. In addition, they could help tracing the origin and spread of multidrug resistant bacteria in turtles, which have a significant ecological impact on the marine environment.

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POSTER PRESENTATIONS
SESSION 5: HEALTH AND REHABILITATION

POSTER PRESENTATIONS
SESSION 5: HEALTH AND REHABILITATION

CLINICAL EXPERIENCE IN THE TREATMENT OF DISEASES CAUSED BY INTERACTION WITH HUMAN ACTIVITIES IN 822 SEA TURTLES

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Turtles are seriously threatened by man, as they are sensitive to many human activities, including especially accidental fishing. The impact of fishing on sea fauna is a very serious problem which represents a serious challenge to those who work for the conservation of sea turtles. The aim of this study was to report the cases observed at the Sea Turtle Clinic of the Department of Veterinary Medicine, University of Bari, from June 2015 to June 2018. In this period the authors observed 822 marine turtles referred by rescue centers in Apulia and other regions of Southern Italy. The turtles showed damages of various severity, almost all caused by the interaction with human activities. Most of the turtles were accidentally trapped and given by the fishermen to the rescue centers of the territory. The remaining subjects had been found

adrift or stranded and, in some cases, drawn with the line. All animals underwent clinical investigations and complete radiographic examinations. When it was considered worthwhile, haematological, biochemical and microbiological tests were performed; in some cases CT and MRI investigations were performed. The data collected were analyzed using descriptive statistics regarding the lesions at the time of clinical presentation and the type of treatment performed. The results of the therapies and the success percentages are also reported in relation to the type and severity of the pathologies.

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INTRAVENOUS TRAMADOL FOR SURGICAL PAIN RELIEF IN GENERAL ANESTHESIA WITH PROPOFOL IN LOGGERHEAD (*Caretta caretta*)

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A variety of anesthetic protocols have been used for surgery in sea turtle. Anesthesia in chelonians can be challenging, mainly due to the prolonged induction and recovery times observed with both inhalational and injectable protocols. Adequate monitoring of anesthetic quality is also difficult. Critically ill chelonians are painful and benefit from analgesics. Tramadol-dependent analgesia in reptiles would be expected to last for only a few hours after administration. Tramadol, unlike morphine, seems to cause minimal respiratory depression in turtles but the effects of tramadol in turtles have been demonstrated only through oral administration. The aim of this study was to evaluate the intravenous administration of tramadol associated with propofol, comparing the results with the standard protocol based on propofol. Twenty turtles scheduled with different types of surgery were randomly divided into 2 groups to receive the following anesthetic protocols: tramadol 5 mg/kg IV + propofol 7 mg/kg IV (Group A, 10 turtles); propofol 7 mg/kg IV (Group B, 10 turtles). Each patient underwent evaluation of neurological reflexes, heart rate, respiration and cloacal temperature before induction and every 5 minutes during anesthesia. Tramadol was administered intravenously and then further monitored to assess the sedative status of

the animal. Propofol administration was performed 10 minutes after tramadol administration. After induction, all patients were intubated, without being connected to anesthetic gases. Blood gas analysis was performed at time 0 and 30 minutes after induction with propofol. Turtles in the group A had variable weight from 2.4 kg to 43.5 (mean 25.49 kg), and a median temperature as high as 26.2° C. Turtles in group B had body weight ranging between 1.5 kg and 40 kg (mean of 15.48 kg), and median temperature of 25°C. Anesthesia duration was 35' in group A and 33' in group B. The heart rate frequency ranged between 24 and 33 bpm in group A, and between 24 and 44 bpm in group B. After administration of tramadol in all patients apnea was not observed. Blood gas analysis did not show significant alterations. After propofol apnea correlated period, the respiratory rate in the animals under treatment was similar to the resting and pre-procedural frequencies. Overall, we showed that intravenous administration of tramadol at 5mg/kg is able to induce mild sedation. This could be useful for short and uncomplicated surgical procedures.

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ASSESSING HAEMATOLOGICAL AND BIOCHEMICAL PARAMETERS AND THEIR EFFECTIVENESS AS A HEALTH ASSESSMENT IN RESCUED LOGGERHEAD SEA TURTLES (*Caretta caretta*) IN LAMPEDUSA, SOUTH MEDITERRANEAN

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The South Mediterranean is a common foraging and nesting site for loggerhead sea turtles, but they often come into conflict with anthropogenic factors like fishing gears and pollution. Lampedusa Sea Turtle Rescue Centre admits around 100 annually in variable health conditions, which are provided with any necessary veterinary treatment and then released when physical fitness is deemed normal. Haematological assessments have been performed on many admissions over the last six years and the data for some parameters recorded: glucose (mg/dL), microhaematocrit (%), total protein (g/dL) and erythrocyte count (/ μ L of blood). As part of a preliminary study, 2017, the data collected to date was statistically analysed against the health condition; method of capture; age; sex and morphometric data (curved carapace length (CCL); curved carapace width (CCW); straight carapace length (SCL) and straight carapace width (SCW)). Compared to physiological parame-

ters, around 30% of animals had high glucose levels, 20% low microhaematocrit readings and 38% low erythrocyte counts. Turtles that were caught by manual methods were also found to have significantly lower erythrocyte counts ($p \leq 0.05$). Our new study aims to build on this research by an intensive period of data collection, August - October, 2018, with weekly repeats for each animal whilst they are housed in the rescue centre. Additional information for each turtle will include a body condition score (BCS), quantified by a body condition index (BCI), as well as an assessment of the epibiota. Haematological testing will also include additional total and differential white cell counts and biochemical analysis, and this new collection of data will undergo statistical analysis.

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PATHOLOGICAL FINDINGS IN SEA TURTLES STRANDED ALONG THE NORTH WESTERN COAST OF THE ADRIATIC SEA

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The Northern Adriatic Sea is one of most critical areas in the Mediterranean for fishery-turtles interaction. Only sparse studies are present for this area on postmortem findings in loggerheads describing bycatch impact. A total of 339 sea turtles, stranded dead along the Veneto coast, were collected between 2013 and 2017, thanks to a collaboration between Institutions in the framework of the European IPA Project NETCET. Complete post-mortem examinations were performed at Padova University according to standard protocols. Pictures and tissue samples were collected, allowing retrospective studies of the cases. Most part of the carcasses (N = 245, 72%) were in advanced decomposition status or mummified but persisting evidence of human interaction was anyway registered. Lesions referable to anthropic interaction (7%) included acute, fatal boat strikes, and necrotizing enteritis due to ingestion of lines. Signs of previous, not lethal human interactions were also reported, such as amputated limbs, presence of hooks in the esophagus, scarred fractures of carapace. Lesions referable to hydrodynamic imbalance were found in the majority of the animals (75%). Such lesions included mild to severe multifocal hemorrhagic edemas, particularly frequent in perirenal and subcutaneous districts and among muscular fasciae, se-

vere sero-hematic effusions in celoma and pericardium, moderate to severe multi-organ congestion. Gas was often present in mesenteric vessels, sinus venosum and in the atrium walls of the affected turtles. After the description of decompression sickness (DS) in sea turtles due to capture by gillnets and bottom trawlers, all cases were reconsidered for occurrence of this disease. Effects of gas embolism include endothelial damage, capillary leakage and plasma extravasation, which result in multi-organ congestion, perivascular hemorrhages and edemas; gas bubbles typically accumulate in renal and mesenteric vessels, sinus venosum and right atrium. Even though post mortem bacterial fermentations cannot be ruled out, a suspect of death due to DS is formulated for the carcasses in good conservation status. Further investigations are needed to assess the impact of DS in loggerheads in the area, starting from in vivo diagnosis. A forensic approach based on the research of diatom algae in selected districts will be useful to assess the contemporary presence of drowning to gain support to bycatch-linked death.

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POSTER PRESENTATIONS
SESSION 5: HEALTH AND REHABILITATION

**AN UNUSUAL LESION OBSERVED IN A LOGGERHEAD SEA TURTLES
(*Caretta caretta*) REFERRED TO THE CENTRO RICERCA TARTARUGHE
MARINE – STAZIONE ZOOLOGICA ANTON DHORN – NAPOLI (CRTM)**

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Rescued sea turtles often show injuries due to anthropic impact. At the arrival to the CRTM a loggerhead, 65.5 cm CCLst and 29.6 kg BW, presented an abnormal fissure, 1 cm large and 5.5 cm deep, ventrally on the right forelimb, close to the cranial limit of the humeral scute of the plastron. The inverted edges and the normal aspect of the surrounding skin suggested it to be a chronic lesion, compatible with the entry hole of a stab wound. Abundant necrotic material was present inside. After 8 weeks of daily disinfection and antibiotic-therapy the lesion recovered. 4 months later necrotic material reappeared inside the lesion and was analysed. Histologically the material and the tissue obtained by slicing up the internal wall of the lesion, showed an epithelial layer with hydropic degeneration, activated macrophages, bacterial colonies (consistent with the microbiological findings) and degenerated heterophils. Ultrasonographically, the lesion showed a thick hypoechoic wall and a lumen filled by hyperechoic, not vascularized material associated to an intense shadowing. The CT study,

after intralesional contrast administration, demonstrated the presence of a pathologic tract, ventral to the scapula-humeral joint, lateral to medial directed and dorsally bended. A diagnosis of a fistula with uncertain origin was made. After 4 weeks of intralesional treatment with ONE VET® (*Hypericum perforatum* oil and Neem oil) the lesion healed. CT, US, cytology and histology were repeated 6 month later, showing respectively: a channel reduced in length and in size, particularly of the lumen; a virtual lumen with very few hyperechoic material and a wall, thinner compared to the first exam; lamellae of mature keratin; only a few amount of necrotic material. A fissure with similar shape and position was described previously in healthy turtles (data not published), and this finding suggests that the lesion observed might not be a fistula or a pointy wound, but an inflamed ectopic or vestigial glandular structure.

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**NEWS FROM THE SEA: HOW TO EVALUATE THE EFFECTS OF REHABILITATION
ON MARINE TURTLE LONG TERM SURVIVAL?**

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Sea turtles are considered an endangered species in the world and in the Mediterranean too. In the last 30 years, conservation programs were developed in the 3 continents with a Mediterranean seaside, and generally European, Asian and African conservation programs develop same issues. In that area, many rescue centers were set up, but often poor communication is made among them. In the last 10 years some medical workshops give the opportunity to exchange medical procedures, in order to analyse the influence of rehabilitation in conservation plan. Still, sea turtle medicine remains a very complex and poorly investigated field. Most of operators have not a complete experience in the medical specific domain, and for professionals too is complex to evaluate the effect of their therapies and surgeries. In the Lampedusa Sea Turtle Rescue Center, since 2000 we had experience on more than 2000 patients. In order to evaluate the effect of medical procedures on marine turtles wild life, we planned the release of 2 "special" patients: with the support of Octopus Foundation, we have tracked Homeros, a female loggerhead with a massive injury limiting the use of 3 flippers and Hope,

a young loggerhead rescued in very poor conditions with a line crossing the digestive tube and ematocrit value of 4! Along 4 years, Homeros undertook weekly sessions of physiotherapy in the open sea using a jacket connected to a line of 70 m, in order to improve her swimming ability; Hope underwent on a complex surgery, including esophagus and inguinal access and the implantation of a tube feeding. The aim of the present work is to better understand what is the impact of medical procedures on the long-term survival of sea turtles and to evaluate if the efforts of rehabilitation really improve chances for the animal to perform the natural behaviour in the wild again. To further comprehend the movement of Homeros and Hope, factors such as Mediterranean's currents, water temperature, diving depth and wind patterns were considered. Lastly, the 2 heroines were projected as ambassadors of turtles of the Mediterranean Sea, and the impact of the consciousness was estimated in view of social media platforms.

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**THE IMPACT OF ARTIFICIAL UVB LIGHT ON WOUND HEALING OF INJURED
LOGGERHEAD SEA TURTLE (*Caretta caretta*)**Lukač M.¹, Baines F.², Gobić K.³, Belić M.⁴, Mičić M.³¹ Department of Poultry Diseases, Faculty of Veterinary Medicine, University of Zagreb, Heinzelova 55, 10000 Zagreb, Croatia² UV Guide UK, Greenfield, School Lane, Govilon, Abergavenny NP7 9NT, Wales, UK³ Marine Turtle Rescue Centre Pula, Verudela bb, Croatia⁴ Department of Pathophysiology, Faculty of Veterinary Medicine, University of Zagreb, Heinzelova 55, 10000 Zagreb, Croatia

Vitamin D is essential for maintenance of calcium homeostasis and therefore critically important for development, growth, and maintenance of a healthy skeleton in vertebrates. To check whether the artificial uvb light provided by UVB tubes can promote wound healing and general health status of indoor kept marine turtles, a project on such an influence started in the Marine Turtle Rescue Centre Pula. In September 2015, a semi-adult loggerhead sea turtle (*Caretta caretta*) arrived to the Centre. The animal was debilitated, anorexic and dehydrated, with severe injury of the caudal part of the body, with loss of the bone structures and soft tissue. The wound was old and infected, with opened coleomic cavity. The animal was placed in a tank with the warm shallow water. Supportive therapy by warm fluids, non-steroidal anti-inflammatory drug and antimicrobial therapy was administered and the wound was treated with chlorhexidine 0.4%, Leucase N kegel and Calcium-sodium alginate dressing on a daily basis. The uvb lamp (Arcadia Zoo bar) was placed 60 cm above the water surface and was switched on eight hours a day. The

impact of uvb light was assessed by measurements of Ca, P and vitamin 25(OH)D3 blood levels every two months until the full rehabilitation. The UV index and UVB output of UVB tube were measured in three-month intervals by a Solarmeters (Model 6.5 and 6.2, Solarmeter company inc.) to ensure an adequate UVB spectrum. The level of vitamin 25(OH)D3 increased from 41.8 nmol/L at the beginning of exposure to 98.4 nmol/L at the end of exposure. The wound healing and general health condition improvement assessed by visual inspection seemed to be much faster than in non-exposed animals. Ca and P values varied during the healing period but stayed within the normal range for Loggerhead sea turtles. In conclusion, UVB exposure accelerated wound healing and improved general health condition in injured, indoor kept marine turtle so that its use seems plausible in such cases.

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HEMATOLOGICAL PARAMETERS OF LOGGERHEAD SEA TURTLES (*Caretta caretta*) ADMITTED AND RECOVERED IN MARINE TURTLE RESCUE CENTRE PULABelić M.¹, Jakšić Ž.², Gobić K.³, Mičić M.³, Turk R.¹, Lukač M.⁴¹ Department of Pathophysiology, Faculty of Veterinary Medicine, University of Zagreb, Heinzelova 55, 10000 Zagreb, Croatia² Ruđer Bošković Institute, Centre for Marine Research, G. Paliage 5, 52210 Rovinj, Croatia³ Marine Turtle Rescue Centre Pula, Verudela bb, 52100 Pula, Croatia⁴ Department of Poultry Diseases with Clinic, Faculty of Veterinary Medicine, University of Zagreb, Heinzelova 55, 10000 Zagreb, Croatia

Sea turtles which are brought to the Marine Turtle Rescue Centre Pula are being treated until full recovery and release back into the wild. Knowing turtles' anatomy and physiology is essential for proper treating of sick animals, and one of the useful tool in assessing physiological and healthily condition of the animal is hematology. Because of the differences in hematological parameters between various species of marine turtles as well as the great impact of many intrinsic and extrinsic factors on reptilian hemogram every information on hematology of this species is valuable. Eleven Loggerhead turtles (nine adults and two juveniles) were admitted at Centre at the beginning of 2017 and 2018, because of cold stunning and entanglement in fishing nets. All animals underwent clinical examination and blood sample collection for hematological and biochemical evaluation. All animals stayed in the Centre from 2-7 months. The blood was taken two times: upon the arrival to the Centre and one day before the release into the sea. The blood analysis included: packed cell volume

(PCV), red blood cell count (RBC), differential white blood cell count and morphological assessment of blood cells. Results showed higher mean (\pm SD) PCV 37.2% (\pm 7.1) upon the arrival then before releasing 34.3% (\pm 5.3), although the difference was not statistically significant. Heterophils were significantly higher at first sampling 67.5% (\pm 12.0) comparing to the second one 55% (\pm 7.7). There were no signs of left shift. There was a large number of polychromatophils in two juvenile turtles. Slightly higher, but not significantly, PCV values at the acceptance to the Centre were most likely because of the dehydration. Heterophils relative count decreased after rehabilitation which confirmed the correct treatment of the animals. These results will benefit further researchers in better understanding of physiological and pathophysiological variations of hematological parameters in Loggerhead turtles.

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DETERMINATION OF THE FACTORS THAT CAN INFLUENCE REHABILITATION OF *Caretta caretta* IN THE LAMPEDUSA SEA TURTLE RESCUE CENTER BETWEEN 2001-2016

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Over the last decades, the status of sea turtles and the need for their protection have increasingly captured the interest of citizens, and the number of sea turtle rescue centers is generally increasing in all the world, especially in Italy, where we count more than 25 first aid stations. The Lampedusa Sea Turtle Rescue Center started its activity since 1990, and in this paper we analyse data from 2812 *Caretta caretta*, rescued until 2016. Here we analyse which factors may affect the rehabilitation success of injured sea turtles hosted in our Center. We underline the following factors: type of clinical case, animal's health condition and the presence of a qualified surgeon. For the first factor we estimated the percentage of survival animals with the following clinical cases (N = 928): infections, fin/carapace/head fractures, fin/carapace/head wounds, hook in esophagus/intestine/stomach/mouth, fishing line from mouth/cloaca, fishing line from mouth and cloaca; 5 of the analysed clinical cases show a % of rehab success inferior to the 50% (head fracture, fishing line from cloaca/mouth/mouth and cloaca, hook in intestine). For the second factor

we estimated the outcome of therapies (recovery achieved/death) and health condition (good health condition/depressed/comatose) using Fisher exact test. The Fisher's test confirmed how health condition can significantly affect sea turtles rehabilitation success (Fisher test = 369,894; d.f. = 2; $p < 0.001$; N = 967). For the last factor, we divided the study period in five subperiods (2001-2003, 2004-2006, 2007-2009, 2010-2012, 2013-2016) based on the evolution of surgical techniques and the presence of an expert surgeon with direct experience on sea turtle surgery; with ANOVA investigation, we confirm significantly the value of the experience of professionals involved (univariate ANOVA = 4.953; d.f. = 4; $p = 0.016$; N = 1011). Bycatch and health condition appear to be significantly influencing the rehab success and the presence of a competent surgeon radically determine an increase in the survival of sea turtles, as expected.

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SYMBLEPHARON AND SALT GLAND DYSFUNCTION IN A LOGGERHEAD SEA TURTLE (*Caretta caretta*)

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Salt glands are the largest organs in the head of sea turtles. Each gland extends caudally and medially to the eye and drains in a duct that opens in the caudodorsal conjunctiva. The drainage may be impaired by adhesions involving the bulbar and palpebral conjunctiva (symblepharon). The present case describes a bilateral symblepharon associated with salt gland dysfunction in a subadult *C. caretta* (CCLst 59.2 cm; BW 20.6 kg), presenting both the eyelids swollen, ulcerated, and not separable. Eye examination was not possible. According to antibiogram, following bacteriological analyses on swabs from both eyelid fissures, Ceftazidime was administered for 4 weeks, associated with fluid therapy, Vit. A, and topical treatment. Despite the treatment, ulceration of the ventro-lateral right orbit widened, along with the formation of a large dacryolith, promptly removed. Bilateral ultrasonographic study showed a normal right eye, whereas the left one was smaller, with adhesion between eyelids and cornea, and a fluid collection in the dorsal conjunctival space. Hyperechoic

structures were visible ventrolaterally to both eyes. Surgery was performed under a surgical microscope. After separating the eyelids, blunt dissection of the fibrous adhesions between the palpebral and bulbar conjunctiva, cornea, and third eyelid was performed. In the right eye, the intraocular structures appeared to be normal, after dissection of the nictitans. In the left eye it was not possible to dissect all the fibrous tissue infiltrating the cornea and the globe appeared smaller and hypotonic. The left ocular cornea appeared opacified. The topical treatment was continued for 8 weeks after surgery. Eyelids healed without complications and vision was restored on the right eye. There were no recurrences after 24 months of follow-up. To the authors' knowledge, this is the first report of symblepharon associated with salt gland dysfunction in *C. caretta*.

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POSTER PRESENTATIONS
SESSION 5: HEALTH AND REHABILITATION

COMPARISON OF INTRAOCULAR PRESSURE MEASUREMENTS USING REBOUND AND APPLANATION TONOMETRY IN LOGGERHEAD (*Caretta caretta*) SEA TURTLES RESCUED AT THE CENTRO RICERCA TARTARUGHE MARINE – STAZIONE ZOOLOGICA ANTON DHORN – NAPOLI (CRTM)

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The clinical examination of stranded sea turtles transferred to a rescue centre should include a careful ophthalmic examination especially when traumatic and/or infectious lesions in the cephalic region are observed. Measurement of Intraocular pressure (IOP) helps to diagnose intraocular diseases which may severely impair vision and lead to blindness. IOP values in Loggerheads have been reported using applanation tonometry. However, it was concluded that the low intraocular pressures made it difficult to collect readings and the specific tonometer used had limits of accuracy in these animals. To the authors' knowledge, results from rebound tonometry testing in *Caretta caretta* have not been published. The aim of this study is to evaluate IOP estimates in healthy eyes of *Caretta caretta* using rebound in comparison with applanation tonometry. Fifteen healthy *Caretta caretta* (mean±SD body mass = 18.8 ± 12.6 kg; straight-line standard carapace length = 47.2 ± 10.2 cm) housed at the CRTM were used. IOP measurements were obtained in the dorsoventral position between 2.30 p.m.

and 4.30 p.m. by the same ophthalmologist, by using a rebound tonometer (TonoVet®) (RT) in dog calibration mode, and, after topical anesthesia, an applanation tonometer (Tono-Pen®) (AT) in both eyes. The average of three readings per instrument was used for analysis purposes. Differences in IOP between the two tonometers were analyzed using a Mann-Whitney test. The median IOP obtained with AT (6.3 mmHg, range 4-17 mmHg) were significantly ($p = 0.003$) lower than the median IOP obtained with RT (9.7 mmHg, range 6.7-15.7 mmHg). Using AT, due to the retracting of the globe by the animals, it was not possible to obtain the instrument automatically generated mean value for 4 values; in 7 eyes the IOP measurement was unsuccessful. In conclusion IOP readings from the RT were statistically higher than those from the AT. RT proved to be more feasible, due to the light, short-lasting contact with the cornea.

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EFFECTS OF ENVIRONMENTAL ENRICHMENT ON BEHAVIOUR AND DIVING CONDITION OF SEA TURTLES IN REHABILITATION

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Environmental enrichment (EE) is a dynamic process that aims to enhance animals' welfare when kept in captivity. Behavioural, physiological and neurological evidence proves the benefits of EE to the psychological and physical well-being of the animals. The detailed recording of EE's effects started at ARCHELON's Sea Turtle Rescue Centre in August 2016. The study aims to compare sea turtles' behaviour with and without enrichment props. In addition, the level of interest and potential habituation to the enrichment devices is assessed. Furthermore, the use of EE as a potential encouragement for the sea turtles to dive is examined. The study is focused on the sea turtles that are candidates for release back into the wild. Each studied turtle is placed in tanks containing one of three different enrichment devices and recorded using a camera for five repetitions of 20-minute recording periods per item. An equal amount of time without enrichment is recorded before each enrichment session. Each item (a wooden platform, a ball tied to a rock and a PVC pipe in which food is placed) is presented for five consecutive days and remains at a different layer of the water column. We have defined specific behavioural categories and determined the diving attempts depending on the sections of the turtles' carapace that are underwater

during the attempt. Our analyses have shown so far that turtles spent almost half of the total time studied (45%) on interacting with the EE items. When EE was present, resting and repetitive behaviour were not recorded while pattern swimming was considerably low (0.05%) compared to when EE was not present (5.45%). The total number of diving attempts when the EE was present (N=455) was more than double compared to when EE was absent (N=195), while the duration of the diving attempts was almost double during the sessions with the EE (4.04%). The information obtained about individuals' diving condition is incorporated into decisions regarding their readiness for release. Furthermore, this study will provide further recommendations regarding the design and implementation of additional enrichment programs contributing to the promotion of species' welfare as well as help improve husbandry practices at the Rescue Centre. Finally, the information derived from the idea of using the EE as a potential motive for diving attempts can be helpful for similar rehabilitation centres worldwide.

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POSTER PRESENTATIONS
SESSION 5: HEALTH AND REHABILITATION

LOGGERHEAD SEA TURTLE MICROBIOME – TURTLEBIOME PROJECT: INSIGHT INTO ENDOZOIC AND EPIZOIC COMMUNITIES

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The animal/plant associated microbiota play a key role in the survival and fitness of their hosts. The microbial communities associated with the host's body, both on the external surfaces and inside the guts, support their host's immune system and provide protection from pathogens. Although sea turtles have been studied by marine biologists over the last decades and even centuries, many aspects of their biology and ecology remain poorly understood. In spite of the presumed importance and essential role of micro-symbionts in their host's physiology and wellbeing, there are major knowledge gaps on the sea turtle associated microbiota. Very little is known about microbes inhabiting the sea turtle intestines, whereas, to our knowledge, no reports exist on the sea turtle epibiotic bacteria. Novel findings show that sea turtles harbor unique and abundant communities of microscopic algae called diatoms. Sea turtle-associated diatoms colonize the surface of tissues, both skin and carapace and new taxa have been described worldwide from all sea turtle species. Recently, we launched the "TurtleBIOME project", a study that would allow us to obtain the very first complete description of sea turtle microbial biodiversity. "TurtleBIOME project" is the Installation Grant Research project funded by

Croatian Science Fund that will operate over a 5-year period, from 2018 – 2023. A detailed investigation of microbial composition of the surface biofilm and the gut microbiome of Mediterranean population of loggerhead sea turtles will be performed using a combination of the culture-independent molecular characterization of prokaryotic and eukaryotic microorganisms, a classical approach of microbial cultivation, and morphological observations of the biofilm. Our research team is a group of scientists with extensive experience in various subjects, including turtle biology, diatom taxonomy and microbial ecology. We believe, the proposed study will provide baseline information on the loggerhead microbiome that can then be integrated with the existing knowledge on sea turtle biology, eco-physiology, and behavior. Furthermore, our research may open many new avenues for future investigations focused on co-evolution and biogeography of microbial epi- and endo-bionts and their hosts, as well as the capacity of the sea turtle-associated microbes to function as bioindicators of their host's behavior and health.

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POSTER PRESENTATIONS
SESSION 5: HEALTH AND REHABILITATION

NEW DEVELOPMENTS AT THE MARINE TURTLE RESCUE CENTRE PULA, CROATIA

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Aquarium Pula d.o.o., a private enterprise, and the Marine Educational Centre Pula, an NGO, opened the first Sea Turtle Rescue Centre in Croatia back in 2006. The main objectives of the Centre are to rehabilitate injured sea turtles, to educate the public about the importance of nature conservation and to assist with research concerning sea turtle biology. As an institution dealing with protected animals, the Centre collaborates with the government as well as the Croatian Agency for Environment and Nature (CAEN) on a regular basis. One of the outcomes of this partnership has been the establishment of a procedure for alerting, reporting and action in the event of dead, sick or injured protected marine species being discovered at sea (marine mammals, sea turtles and cartilaginous fish). Over 130 turtles have been recovered and released back into the wild since the start of rescue operations. The recovered turtles ranged in size as did their individualised periods of rehabilitation. The most common ailment encountered was hypothermia (cold stunning). However, different forms of injury inflicted by fishing tools, boats and other deleterious human activity were commonly observed. The original capacity of the rescue facility was limited, however, it is being continually upgraded and can nowadays accommodate nine or more animals, housed in individu-

al water tanks equipped with a dedicated life-support system (LSS). Over the years, the latter LSS technology, the experience and know-how of the Centre's sea turtle expert staff in cooperation with a specialist team composed of vets and biologists, as well as contributions from other stakeholders, all saw significant improvements. Several successful projects have now been taken through to completion (NETCET, TurtleVet). There are also two ongoing projects, one of which is educational (Plavi projekt), while the other is scientific (TurtleBIOM). Several more related project proposals have been submitted and are pending approval (INTERREG funds). The Centre, operating under the auspices of Aquarium Pula, also educates greater than 90,000 visitors per year about the importance of conservation and the specific need to protect these ancient, charismatic animals. The centre is affiliated with aquariums throughout the EU, forming a specialist sea turtle network, in which it enjoys significant influence regarding the establishment of evidence-based guidelines and protocols for long-term sea turtle husbandry and rehabilitation.

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POSTER PRESENTATIONS
SESSION 5: HEALTH AND REHABILITATION

FIRST DETECTION AND MOLECULAR CHARACTERIZATION OF *Cucullanus carettae* BAYLIS, 1923 (NEMATODA: RHABDITIDA) IN LOGGERHEAD TURTLE (*Caretta caretta*) FROM THE ADRIATIC SEA

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Cucullanus carettae (Baylis 1923), is a nematode of the subfamily Cucullaninae described worldwide in loggerhead turtles (*Caretta caretta*). Regarding the Mediterranean, *C. carettae* has been just identified in Tyrrhenian and Ionian Sea. Conversely, until now a description of a unique specimen of *Cucullanus* sp. in loggerhead from the Adriatic sea is reported in literature. In a framework of a bio monitoring project of Abruzzo and Molise coasts, a parasitological survey was performed on stranded and by-caught sea turtles, at Istituto Zooprofilattico of Abruzzo and Molise "G. Caporale". During necropsy, the gastrointestinal system of 72 stranded loggerhead turtles was inspected for the isolation and the collection of the parasites. A massive infestation by *C. carettae* was found in the intestine of one loggerhead turtle, (1.4% positive) associated with chronic lymphoplasmocytic enteritis, while the remaining 71 were negative for the presence of the parasite. Five stools (3.6%), collected during necropsy, were positive for *C.*

carettae eggs. Adult parasites of the genus *Cucullanus* were identified according literature. Using DNA extracted from 2 adult specimens a 773bp segment of the 18S rDNA and 384 bp of the COI gene were amplified and sequenced. Sequences obtained were compared with those related to different *Cucullanus* species available on GenBank. Results showed a maximum similarity of 98% with *Cucullanus baylisi* (JF803935) for 18S and 87% with *Cucullanus extraneus* (KT260152) for COI gene. Remarkably, as no sequence of *C. carettae* is present in the database so far, we are planning to sequence more different DNA regions to better molecular characterize this species. To our knowledge this is the first identification of *C. carettae* in loggerhead turtles from Adriatic sea. Additional studies on the distribution of *C. carettae* in the Mediterranean are needed.

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POSTER PRESENTATIONS
SESSION 5: HEALTH AND REHABILITATION

CO-INFESTATION BY *Haplotrema mistroides* (MONTICELLI, 1896) AND NEOSPIRORCHIS NEOGEN 11 AS RESPONSIBLE OF A SEVERE CASE OF SPIRORCHIDIASIS IN A LOGGERHEAD SEA TURTLE (*Caretta caretta*) FROM ADRIATIC SEA

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Spirorchidiasis is considered the most important parasitic cause of stranding and mortality of sea turtles. In February 2018, an adult male of loggerhead (*Caretta caretta*) accidentally caught was hospitalized at Center Recovery treatment and rehabilitation Marine turtle (CRTM) "L. Cagnolaro". The turtle showed lethargy, neurological compromising and penile prolapse. Twenty-four hours later, the turtle died and it was necropsied at the Istituto Zooprofilattico Sperimentale of Abruzzo and Molise "G. Caporale" (IZSAM). Histological and parasitological examinations were carried out. Spirorchiid elements were identified by morphology and by a PCR targeting the 28S gene and ITS2 spacer of rDNA, molecular analyses were carried out on the host (mitochondrial D-loop). The turtle was thin with shells shrunken and the coelomic organs were pale. A bilateral abnormal conformation of epididymis and vas deferens was observed. Type 1 and Type 3 eggs of spirorchiiids were identified by stereomicroscope and light microscope in various organs. Histological examination showed dissem-

inated eggs in pancreas, spleen, kidney, lung, brain, intestine, adrenal gland, heart, thymus, vas deferens and epididymis associated to severe and diffuse multifocal granulomatous reactions. The eggs of type 1 and 3 were molecularly identified as *Haplotrema mistroides* and *Neospiroorchis* Neogen 11 respectively, confirming a co-infestation. This is the first case of severe spirorchiidiasis described in the Adriatic Sea in free-ranging loggerhead turtles. The turtle belongs to the haplotype CC-A2.1., the most frequent in the Mediterranean and also shared with the Atlantic. Much is still left to know on the epidemiology of this parasitic disease in the Mediterranean basin, identification of intermediate hosts and risk factors. Impairment of circulatory system due to disseminated granulomatous lesions could have been contributory to the capture and to the death of this animal.

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6TH MEDITERRANEAN CONFERENCE
ON MARINE
TURTLES
POREČ/CROATIA 2018

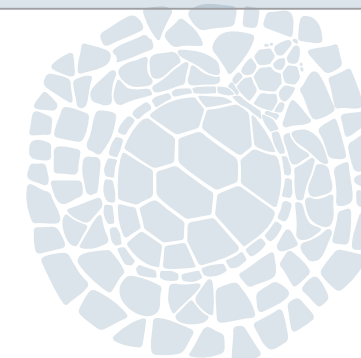
PROGRAM

| TIME | MONDAY, 15/10/2018 DAY 0 | TUESDAY, 16/10/2018 DAY 1 |
|-------|------------------------------------|--|
| 08:00 | | LATE REGISTRATION |
| 08:30 | | |
| 09:00 | | OPENING OF THE CONFERENCE |
| 09:30 | | PLENARY 1 |
| 10:00 | | |
| 10:30 | | COFFEE BREAK |
| 11:00 | | SESSION 1: POPULATION BIOLOGY AND ECOLOGY |
| 11:30 | | |
| 12:00 | | |
| 12:30 | | |
| 13:00 | | LUNCH BREAK 13:00 – 14:30 |
| 13:30 | | |
| 14:00 | | WORKSHOP 1: BIO-LOGGING FOR MARINE TURTLES |
| 14:30 | | |
| 15:00 | | |
| 15:30 | | |
| 16:00 | | COFFEE BREAK & POSTER SESSION 1: POPULATION BIOLOGY AND ECOLOGY |
| 16:30 | | |
| 17:00 | | WORKSHOP 2: USING DRONES FOR MARINE TURTLE RESEARCH AND CONSERVATION |
| 17:30 | | |
| 18:00 | REGISTRATION | |
| 18:30 | | |
| 19:00 | | MARINE TURTLE SPECIALIST GROUP MEETING |
| 19:30 | | |
| 20:00 | WELCOME RECEPTION 20:00 – 22:00 | |
| 20:30 | | |

| WEDNESDAY, 17/10/2018 DAY 2 | THURSDAY, 18/10/2018 DAY 3 | FRIDAY 19/10/2018 DAY 4 |
|--|--|---|
| SESSION 2: AT SEA DISTRIBUTION AND MOVEMENTS | PLENARY 2 | FIELD TRIP AND PRESENTATION OF GSM TRANSMITTERS (LIFE EUROTURTLES PROJECT) |
| COFFEE BREAK | SESSION 4: ANTHROPOGENIC THREATS | |
| SESSION 3: CONSERVATION AND MONITORING | COFFEE BREAK | |
| LUNCH BREAK 13:00 – 14:30 | SESSION 5: HEALTH AND REHABILITATION | |
| WORKSHOP 3 & 4 (PARALEL): TOWARDS A STRATEGY TO MITIGATE ILLEGAL TRADE IN MEDITERRANEAN MARINE TURTLES WHOSE BIODIVERSITY, WHOSE VALUE? ENGAGING WITH STAKEHOLDERS TO UNDERSTAND THEIR PERCEPTIONS | LUNCH BREAK 13:00 – 14:30 | |
| COFFEE BREAK & POSTER SESSION 2: CONSERVATION AND MONITORING & AT SEA DISTRIBUTION AND MOVEMENTS | WORKSHOP 6: MARINE TURTLE MEDICINE AND REHABILITATION | |
| WORKSHOP 5: IMPACT OF MARINE LITTER ON SEA TURTLES: BUILDING SYNERGIES ACROSS THE MEDITERRANEAN FOR MONITORING INGESTION AND ENTANGLEMENT | COFFEE BREAK & POSTER SESSION 3: ANTHROPOGENIC THREATS & HEALTH AND REHABILITATION | |
| IUCN MEDITERRANEAN MEETING (By invitation only) | ROUND TABLE: BUILDING SYNERGIES | |
| | | |
| | CONFERENCE DINNER 20:30 – 01:00 | |

| DAY 0 | MONDAY, 15/10/2018 | |
|---------------|--|-----------------------------------|
| 18:00 – 20:00 | REGISTRATION | Valamar Diamant Conference Center |
| 18:00 – 20:00 | SILENT AUCTION ITEMS HANDOVER | Valamar Diamant Conference Center |
| 20:00 – 22:00 | WELCOME RECEPTION | Valamar Diamant Conference Center |
| DAY 1 | TUESDAY 16/10/2018 | |
| 8:00 – 9:00 | LATE REGISTRATION | Valamar Diamant Conference Center |
| 8:00 – 9:00 | SILENT AUCTION ITEMS HANDOVER | Valamar Diamant Conference Center |
| 9:00 – 9:30 | OPENING OF THE CONFERENCE | Magnolia Conference Hall |
| 9:30 – 10:30 | PLENARY TALK: DYNAMIC OCEAN MANAGEMENT: A NOVEL APPROACH TO INTERACTIONS BETWEEN PEOPLE AND OCEANIC PELAGIC ORGANISMS CROWDER, Larry B. | Magnolia Conference Hall |
| 10:30 – 11:00 | COFFEE BREAK | |
| 11:00 – 13:00 | ORAL PRESENTATIONS SESSION 1: POPULATION BIOLOGY AND ECOLOGY Session Chairs: Carlos CARRERAS, Paolo CASALE | Magnolia Conference Hall |
| 11:00 – 11:15 | TROPHIC ECOLOGY OF LOGGERHEAD TURTLES (<i>Caretta caretta</i>) FROM THE AEOLIAN ARCHIPELAGO (ITALY) THROUGH STABLE ISOTOPE ANALYSIS | BLASI, Monica Francesca |
| 11:15 – 11:30 | FORAGING LOCATION AND SITE FIDELITY OF MEDITERRANEAN LOGGERHEAD TURTLES USING SATELLITE TELEMETRY AND STABLE ISOTOPE ANALYSIS | *HAYWOOD, Julia |
| 11:30 – 11:45 | MITOCHONDRIAL DNA STRS UNVEIL HIDDEN POPULATION STRUCTURING AND MIGRATION ROUTES OF MEDITERRANEAN GREEN TURTLE POPULATIONS | CARRERAS, Carlos |
| 11:45 – 12:00 | OVERESTIMATION OF SEA TURTLE POPULATIONS FROM REMIGRATION INTERVALS: ERROR ASSESSMENT AND NOVEL METHOD | CASALE, Paolo |
| 12:00 – 12:15 | PATTERNS OF NESTING OF THE LOGGERHEAD SEA TURTLE (<i>Caretta caretta</i>) IN THE SPANISH MEDITERRANEAN | MARCO LLORENTE, Adolfo |
| 12:15 – 12:30 | THE EVOLUTIONARY ADVANTAGES OF HETEROPLASMY IN mtDNA INHERITANCE OF GREEN SEA TURTLES | TIKOCHINSKI, Yaron |
| 12:30 – 12:45 | THE EFFECT OF GLOBAL TEMPERATURE RISE ON LOGGERHEAD TURTLE NESTS IN DALYAN BEACH, TURKEY. | *SOZBILEN, Dogan |
| 13:00 – 14:30 | LUNCH BREAK | |
| 14:30 – 16:30 | WORKSHOP 1: BIOLOGGING FOR MARINE TURTLES Organiser: Sandra HOCHSCHEID | Magnolia Conference Hall |
| 16:30 – 17:30 | COFFEE BREAK | |
| 16:30 – 17:30 | POSTER SESSION 1: POPULATION BIOLOGY AND ECOLOGY | Rosemary Conference Hall |
| 17:30 – 19:30 | WORKSHOP 2: USING DRONES FOR MARINE TURTLE RESEARCH AND CONSERVATION Organiser: Alan F. REES | Magnolia Conference Hall |
| 19:30 – 20:30 | MARINE TURTLE SPECIALIST GROUP MEETING | Magnolia Conference Hall |

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| 16:30 – 17:30 | POSTER SESSION 1: POPULATION BIOLOGY AND ECOLOGY Presenters must be present at their poster(s) throughout the session. | Rosemary Conference Hall |
| S1.01 | THERMAL ECOLOGY OF GREEN TURTLE (<i>Chelonia mydas</i>) NESTS IN THE LARGEST ROOKERY OF EASTERN MEDITERRANEAN | TURKOZAN, Oguz |
| S1.02 | PRELIMINARY DATA FOR MITOCHONDRIAL DNA CONTROL REGION 3'-STR ANALYSIS OF GREEN SEA TURTLE (<i>Chelonia mydas</i>) NESTING POPULATIONS IN THE MEDITERRANEAN | ULGER, Celal |
| S1.03 | MARINE TURTLE NESTING SURVEY AND STRANDING ASSESSMENT FROM TARTUS TO SYRIA'S BORDER WITH LEBANON | SAAD, Adib |
| S1.04 | NON-MODAL SCUTE PATTERN IN LOGGERHEAD: IS THIS A SIGN OF REDUCED FITNESS? | MAFFUCCI, Fulvio |
| S1.05 | DEFINING THE INTERESTING HABITAT OF THE MEDITERRANEAN SEA'S LARGEST LOGGERHEAD NESTING AGGREGATION USING THE EO4WILDLIFE PLATFORM | REES, Alan |
| S1.06 | SATELLITE TRACKING OF NESTING ACTIVITIES OF THE GREEN SEA TURTLES AT AKYATAN NESTING BEACH | YILMAZ, Can |
| S1.07 | NESTING ACTIVITY AND REPRODUCTIVE OUTPUT OF THE LOGGERHEAD TURTLE <i>Caretta caretta</i> IN CALABRIA (SOUTHERN ITALY) FOR TWO SEASONS (2016-2017) | DENARO, Maria |
| S1.08 | EXPLORING BEHAVIOR OF LOGGERHEAD TURTLE NESTING FEMALES IN THE SPAIN'S MEDITERRANEAN COASTS THROUGH SATELLITE TRACKING FOR CLUTCH PROTECTION | *ABALO-MORLA, Sara |
| S1.09 | HABITAT USE OF THE LOGGERHEAD SEA TURTLE (<i>Caretta caretta</i>) IN THE WESTERN MEDITERRANEAN INFERRED FROM LONG-TERM ANALYSES OF DIET AND EPIBIONT BARNACLES | *DOMÈNECH, Francesc |
| S1.10 | RESOURCE PARTITIONING BETWEEN GREEN TURTLES AND OTHER HERBIVORES IN CYPRUS | *CAMPOS, Patricia |
| S1.11 | AN EVALUATION OF 16 YEARS MONITORING AND CONSERVATION STUDIES OF SEA TURTLES ON DALAMAN, DALYAN AND FETHIYE BEACHES, TURKEY | BASKALE, Eyup |
| S1.12 | CLIMATIC CONDITIONS OF SPANISH BEACHES FOR NESTING OF SEA TURTLES | MARCO LLORENTE, Adolfo |
| S1.13 | EPIZOIC DIATOMS ASSOCIATED WITH THE NECK SKIN OF ADRIATIC LOGGERHEAD SEATURTLE | BOSAK, Suncica |
| S1.14 | POPULATION GENOMICS OF MARINE SPECIES: A PILOT STUDY TO IMPROVE LABORATORY PROTOCOLS | CARRERAS, Carlos |
| S1.15 | IS IT REALLY ANOTHER EXCEPTIONAL SEA TURTLE NESTING RECORD FOLLOWING THE 2012 AND 2016 NESTING CASES IN MALTA | MIFSUD, Carmen |
| S1.16 | VULNERABILITY OF THE LOGGERHEAD TURTLE NESTING POPULATION OF KURIAT ISLANDS (TUNISIA) EVIDENCED BY GENETIC ANALYSIS OF mtDNA CONTROL REGION | JRIBI, Imed |
| S1.17 | DIET OF THE LOGGERHEAD SEA TURTLES (<i>Caretta caretta</i> , LINNAEUS, 1758) IN TUNISIA (CENTRAL MEDITERRANEAN SEA). | *KARAA, Sami |
| S1.18 | NESTING OF LOGGERHEAD TURTLE (<i>Caretta caretta</i>) IN SOUTHEAST ADRIATIC CONFIRMED | PIROLI, Vilma |



| DAY 2 | WEDNESDAY 17/10/2018 | |
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| 9:00 – 10:30 | ORAL PRESENTATIONS SESSION 2: AT SEA DISTRIBUTION & MOVEMENTS Session Chairs: Sandra HOCHSCHEID, Bojan LAZAR | Magnolia Conference Hall |
| 9:00 – 9:15 | ARCHELON'S LONG-TERM IN-WATER MONITORING PROJECT AT AMVRAKIKOS GULF, GREECE: AN OVERVIEW OF RESULTS AND FUTURE DIRECTIONS | REES, Alan |
| 9:15 – 9:30 | ARGOS SYSTEM: IMPROVEMENTS AND FUTURE OF THE CONSTELLATION | BAUDEL, Sophie |
| 9:30 – 9:45 | THE EFFECT OF TELEMETRY SYSTEMS ON REPRODUCTION, GROWTH AND SURVIVAL OF ADULT SEA TURTLES | *OMEYER, Lucy |
| 9:45 – 10:00 | OCEANOGRAPHIC TURTLES: A MULTIDISCIPLINARY APPROACH FOR THE INTEGRATION OF SEA TURTLE TRACKING WITH OCEAN OBSERVING SYSTEMS | MARCH, David |
| 10:00 – 10:15 | OFFSHORE BEHAVIOUR OF NESTING LOGGERHEAD TURTLES: PRELIMINARY RESULTS OF DISPLACEMENT EXPERIMENTS IN TURKEY | *CERITELLI, Giulia |
| 10:15 – 10:30 | VALIDATING THE POTENTIAL OF USING A HIGHLY MIGRATORY MARINE SPECIES AS A MEANS TO COLLECT OCEANOGRAPHIC DATA: A PILOT STUDY ON LOGGERHEAD TURTLES IN THE WESTERN MEDITERRANEAN | HOCHSCHEID, Sandra |
| 10:30 – 11:00 | COFFEE BREAK | |
| 11:00 – 13:00 | ORAL PRESENTATIONS SESSION 3: CONSERVATION AND MONITORING Session Chairs: Oguz TURKOZAN, Alan F. REES | Magnolia Conference Hall |
| 11:00 – 11:15 | TURTLES ON THE TRASH TRACK: INSIGHTS FROM THE FIXED LINE TRANSECT MEDITERRANEAN MONITORING NETWORK AND MEDSEALITTER PROJECTS | ARCANGELI, Antonella |
| 11:15 – 11:30 | DEVELOPMENT OF AN OCEANOGRAPHIC DRIFT SIMULATION TOOL TO PREDICT LOCATIONS OF AT-SEA MORTALITY OF STRANDED TURTLES | SANTOS, Bianca |
| 11:30 – 11:45 | ARE MARINE PROTECTED AREAS (MPAS) AN EFFECTIVE CONSERVATION MEASURE FOR THE LOGGERHEAD SEA TURTLE (<i>Caretta caretta</i>) IN THE WESTERN MEDITERRANEAN? | *ABALO-MORLA, Sara |
| 11:45 – 12:00 | TO RESTRICT OR NOT TO RESTRICT? SMALL-SCALE FISHERMEN'S PERCEPTIONS ON MARINE PROTECTED AREAS (MPAS) | PANAGOPOULOU, Aliko |
| 12:00 – 12:15 | 30 YEARS OF MEDASSET: A PERSONAL JOURNEY INTO CONSERVATION | VENIZELOS, Lily |
| 12:15 – 12:30 | IT'S FUN, IT'S FAB AND IT'S FULLY FUNDED! (BUT IS IT FOR US)? THE CHALLENGES TO CONSERVATION THAT FLOW FROM ALLOWING OURSELVES TO BE OPPORTUNITY-LED. | STAMATIOU, Anna |
| 12:30 – 12:45 | TOWARDS THE INTEGRATED MEDITERRANEAN-LEVEL CONSERVATION OF MARINE TURTLES: THE NEED TO DESIGN AND ESTABLISH AN MPA MARINE TURTLES WORKING GROUP WITHIN THE MEDPAN NETWORK | SOURBES, Laurent |
| 13:00 – 14:30 | LUNCH BREAK | |
| 14:30 – 16:30 | WORKSHOP 3: TOWARDS A STRATEGY TO MITIGATE ILLEGAL TRADE IN MEDITERRANEAN MARINE TURTLES Organisers: Lobna BEN NAKHLA, Atef LIMAM, Mohamed N. BRADAI, Sami KARAA, Imed JRIBI | Rosemary Conference Hall |
| 14:30 – 16:30 | WORKSHOP 4: WHOSE BIODIVERSITY, WHOSE VALUE? ENGAGING WITH STAKEHOLDERS TO UNDERSTAND THEIR PERCEPTIONS Organisers: Peter MACKELWORTH, Jelena BASTA, Draško HOLCER, Bojan LAZAR, Matic JANČIČ | Magnolia Conference Hall |
| 16:30 – 17:30 | COFFEE BREAK | |

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| 16:30 – 17:30 | POSTER SESSION 2: CONSERVATION AND MONITORING | Rosemary Conference Hall |
| 16:30 – 17:30 | POSTER SESSION 3: AT SEA DISTRIBUTION AND MOVEMENTS | Rosemary Conference Hall |
| 17:30 – 19:30 | WORKSHOP 5: IMPACT OF MARINE LITTER ON SEA TURTLES: BUILDING SYNERGIES ACROSS THE MEDITERRANEAN FOR MONITORING INGESTION AND ENTANGLEMENT Organisers: Françoise CLARO, Gaëlle DARMON, Delphine GAMBALIANI, Jesús TOMÁS, Ohaiana REVUELTA, Lobna BEN NAKHLA, Atef LIMAM, Guido PIETROLUONGO | Magnolia Conference Hall |
| 19:30 – 20:30 | IUCN MEDITERRANEAN MEETING (BY INVITATION ONLY) | Magnolia Conference Hall |

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| 16:30 – 17:30 | POSTER SESSION 2: AT SEA DISTRIBUTION & MOVEMENTS Presenters must be present at their poster(s) throughout the session. | Rosemary Conference Hall |
| S2.01 | STRANDING RECORDS OF SEA TURTLES (<i>Caretta caretta</i> AND <i>Chelonia mydas</i>) FROM THE AEGEAN COAST OF TURKEY. | TURKOZAN, Oguz |
| S2.02 | OCEANIC GIANTS IN THE MEDITERRANEAN: FIRST MITOCHONDRIAL ANALYSIS OF LEATHERBACK TURTLES (<i>Dermochelys coriacea</i>) IN THE ADRIATIC AND TYRRHENIAN SEAS | NOVARINI, Nicola |
| S2.03 | UAV OFF-SHORE AERIAL SURVEY FOR ABUNDANCE ESTIMATES OF SEA TURTLES: A CASE STUDY IN LAMPEDUSA ISLAND, ITALY | *TOLVE, Livia |
| S2.04 | ESTIMATING 3D HOME RANGES OF SEA TURTLES USING TIME-DEPTH-RECORDERS | *RUFF, Jessica |
| S2.05 | ASSESSING THE EFFECT OF SEA TURTLE DIVING BEHAVIOUR AND ENVIRONMENTAL DRIVERS ON THE ACCURACY OF SATELLITE TELEMETRY LOCATIONS USING FASTLOC GPS DATA | *LEDOUX, Yolene |
| S2.06 | TESTING INEXPENSIVE TRACKING SYSTEMS FOR TURTLES: A CASE STUDY WITH GPS-GSM TAGS | *CERRITELLI, Giulia |
| S2.07 | FROM WEST TO EAST: SURVIVAL AND DISPERSAL ROUTES OF LOGGERHEAD SEA TURTLE POST-HATCHLINGS IN THE MEDITERRANEAN SEA | EDUARDO, Belda |
| S2.08 | SEA TURTLES PRESENCE AND DISTRIBUTION INSIDE THE GULF OF CORINTH (IONIAN SEA, GREECE) | AZZOLIN, Marta |
| S2.09 | THE GLOBAL MALE SEA TURTLE INITIATIVE | GARCIA CRUZ, Marco |
| S2.10 | EVIDENCE OF NESTING AREA OF <i>Caretta caretta</i> AND POTENTIAL FORAGING AREAS OF <i>Caretta caretta</i> AND <i>Chelonia mydas</i> IN SAMOS AND LIPSIS ISLANDS, NORTH-EASTERN AEGEAN SEA | PIETROLUONGO, Guido |

| 16:30 – 17:30 | POSTER SESSION 3: CONSERVATION AND MONITORING Presenters must be present at their poster(s) throughout the session. | Rosemary Conference Hall |
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| S3.01 | DEVELOPMENT OF MARINE TURTLE RESEARCH IN MOROCCO | BENHARDOUZE, Wafae |
| S3.02 | TURTLES OF THE ADRIATIC ORGANIZATION (T.A.O.) PROJECT: OVERVIEW AND PRELIMINARY RESULTS OF A NEW MARINE CONSERVATION PROJECT IN THE NORTHWESTERN ADRIATIC SEA. | FERRARI, Andrea |
| S3.03 | EXPERIMENTAL LESSONS ON THE BEACH | STAMATIOU, Anna |
| S3.04 | SEA TURTLES AND ECOSYSTEM SERVICES: TARTALIFE PROJECT EXPERIENCE | PETETTA, Andrea |
| S3.05 | COMPETING WITH FOXES AND BADGERS: A NEW CAGING TECHNIQUE TO PROTECT SEA TURTLE NEST ON DALYAN IZTUZU BEACH | KASKA, Yakup |
| S3.06 | ARE THE RELOCATED NESTS PROVIDING BENEFITS TO THE SEA TURTLE POPULATION? | *SIRIN, Ayfer |
| S3.07 | A BRIDGE BETWEEN PEOPLE AND SEA TURTLES: OVER 25 YEARS OF ACTIVITY WITH LAMPEDUSA TURTLE GROUP | ZUCCHINI, Marina |
| S3.08 | MARINE TURTLES CONSERVATION: ENVIRONMENTAL EDUCATION AS A STARTING POINT | SGAMBATI, Domenico |
| S3.09 | THE AGA SEA TURTLE EXHIBITION: BUILDING ECOLOGICAL AWARENESS AND FORMING RESPONSIBLE BEHAVIOR IN TOURISTS' HOME COUNTRIES AND ON SITE | MÜLLER, Miriam |
| S3.10 | NATIONAL ACTION PLAN FOR THE CONSERVATION OF MARINE TURTLES IN THE EGYPTIAN MEDITERRANEAN COAST | ABDELWARITH, Mohamed Said |
| S3.11 | AWARENESS IN THE PRESERVATION OF MARINE TURTLES IN THE BAY OF MONASTIR AND KURIAT ISLANDS | MALLAT, Hamed |
| S3.12 | PROGRESS OF WORK FOR MONITORING MARINE TURTLES ALONG EGYPTIAN MEDITERRANEAN COAST | *NAGUIB, Nahla |
| S3.13 | ABRUZZO REGIONAL SEA TURTLES NETWORK: EVALUATION OF EXPERIENCE AND PRELIMINARY RESULT OF THE FIRST THREE YEARS OF ACTIVITY | *DI RENZO, Ludovica |
| S3.14 | LIFE EUROTURTLES: COLLECTIVE ACTIONS FOR IMPROVING THE CONSERVATION STATUS OF THE EU SEA TURTLE POPULATIONS | JANČIČ, Matic |
| S3.15 | SEA TURTLES MONITORING AND CONSERVATION ACTIVITIES IN THE TYRE COAST NATURE RESERVE (LEBANON) | BENTIVEGNA, Flegra |



| DAY 3 | THURSDAY 18/10/2018 | |
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| 9:00 – 10:00 | PLENARY TALK: INTRODUCING MULTI-SPECIES APPROACH TO CONSERVATION OF MARINE MEGAFUNA BEYOND BORDERS: THE ADRIATIC CASE-STUDY Fortuna C.M., Holcer D., Mackelworth P., Lazar B. | Magnolia Conference Hall |
| 10:00 – 11:00 | ORAL PRESENTATIONS SESSION 4: ANTHROPOGENIC THREATS Session Chairs: Imed JRIBI, Mustapha AKSISSOU | Magnolia Conference Hall |
| 10:00 – 10:15 | REDUCING SEA TURTLES BY CATCH IN TUNISIA BY TESTING NEW MEASURES OF MITIGATION WITH FISHERMEN | *LOUHICHI, Maissa |
| 10:15 – 10:30 | TOWARD ESTIMATING SEA TURTLE BYCATCH IN THE SMALL-SCALE FISHERY WITH THE BIG IMPACT | *SNAPE, Robin |
| 10:30 – 10:45 | MONITORING MARINE DEBRIS INGESTION IN LOGGERHEAD SEA TURTLE, <i>Caretta caretta</i> , FROM EAST SPAIN (WESTERN MEDITERRANEAN) SINCE 1995 TO 2016 | *DOMÈNECH, Francesc |
| 10:45 – 11:00 | "BOXING" NESTS: AN "UNORTHODOX" BUT NECESSARY METHOD TO SAVE HATCHLINGS FROM SEVERE LIGHT POLLUTIONS | THEODOROU, Panagiota-Marigo |
| 11:00 – 11:30 | COFFEE BREAK | |
| 11:30 – 13:00 | ORAL PRESENTATIONS SESSION 5: HEALTH & REHABILITATION Session Chairs: Yakup KASKA | Magnolia Conference Hall |
| 11:30 – 11:45 | A NOVEL RESUSCITATION PROCEDURE FOR POST DROWNED MARINE TURTLES | LEVY, Yaniv |
| 11:45 – 12:00 | ENTANGLED FLIPPER IN <i>Caretta caretta</i> : TO AMPUTATE OR NOT TO AMPUTATE? | FRANCHINI, Delia |
| 12:00 – 12:15 | A 10 YEARS EVALUATION OF SEA TURTLE RESCUE AND REHABILITATION ACTIVITIES IN SEA TURTLE RESEARCH, RESCUE AND REHABILITATION CENTER (DEKAMER), DALYAN-TURKEY | KASKA, Yakup |
| 12:15 – 12:30 | BACTERIOLOGICAL SURVEY OF <i>Caretta caretta</i> FROM THE SOUTHWEST ITALIAN COAST: PREVALENCE, ANTIMICROBIAL RESISTANCE AND INFLUENCE OF ENVIRONMENT | *PACE, Antonino |
| 12:30 – 12:45 | SPIROCHORIDIASIS IN SEA TURTLES: AN OVERVIEW AND UPDATE OF DATA FROM MEDITERRANEAN SEA | MARCER, Federica |
| 12:45 – 13:00 | NORMAL ULTRASONOGRAPHIC FEATURES OF THE LOGGERHEAD (<i>Caretta caretta</i>) EYES. | MEOMARTINO, Leonardo |
| 13:00 – 14:30 | LUNCH BREAK | |
| 14:30 – 16:30 | WORKSHOP 6: MARINE TURTLE MEDICINE AND REHABILITATION Organizers: Daniela FREGGI, Antonio DI BELLO, Mariluz PARGA | Magnolia Conference Hall |
| 16:30 – 17:30 | COFFEE BREAK | |
| 16:30 – 17:30 | POSTER SESSION 4: ANTHROPOGENIC THREATS | Rosemary Conference Hall |
| 16:30 – 17:30 | POSTER SESSION 5: HEALTH AND REHABILITATION | Rosemary Conference Hall |
| 17:30 – 19:00 | ROUND TABLE | Magnolia Conference Hall |
| 20:30 – 01:00 | FAREWELL DINNER & BEST STUDENT PRESENTATION AWARDS | |

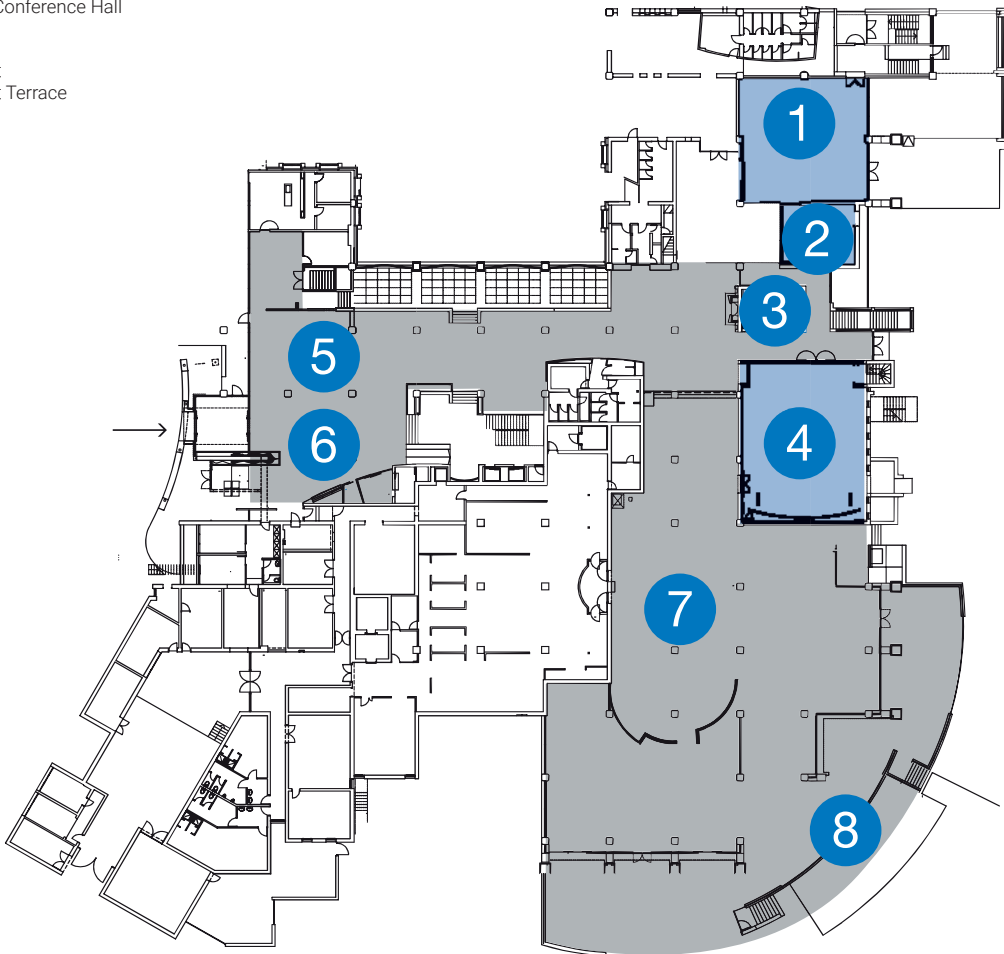
| 16:30 – 17:30 | POSTER PRESENTATIONS SESSION 4: ANTHROPOGENIC THREATS Presenters must be present at their poster(s) throughout the session. | Rosemary Conference Hall |
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| S4.01 | MONITORING AND CONSERVATION OF LOGGERHEAD TURTLE (<i>Caretta caretta</i>) IN THE AEOLIAN ARCHIPELAGO (SICILY, ITALY) | BLASI, Monica Francesca |
| S4.02 | BYCATCH AND STRANDINGS OF MARINE TURTLES ALONG THE EASTERN MEDITERRANEAN OF MOROCCO | AKSISSOU, Mustapha |
| S4.03 | STRANDINGS OF MARINE TURTLES IN SOUTHEASTERN DODECANESE ISLANDS WITH EMPHASIS ON ENTANGLEMENT | KONDYLATOS, Gerasimos |
| S4.04 | FISHERMEN APPROACH TO SEA TURTLES BYCATCH. RESULTS FROM A SURVEY WITH SPANISH SURFACE LONGLINE FLEET IN THE ALBORAN SEA | AGUILERA MOLINA, Raquel |
| S4.05 | UNDERSTANDING MEDITERRANEAN MULTI-TAXA 'BYCATCH' OF VULNERABLE SPECIES & TESTING MITIGATION- A COLLABORATIVE APPROACH | RAE, Vicky |
| S4.06 | FISHERS, SEA TURTLES AND SHARKS: ALLIANCE FOR SURVIVAL | TOULOUPAKI, Eleana |
| S4.07 | MEDSEALITTER – INTERREG MED | KALAITZI, Loukia |
| S4.08 | PRESENCE OF MICROPLASTICS IN THE DIGESTIVE TRACTS OF STRANDED LOGGERHEAD TURTLES (<i>Caretta caretta</i>) IN THE VALENCIAN COMMUNITY COASTS. | *NOVILLO, Olga |
| S4.09 | BRIDGING THE GAP: REVIEWING CLASSIFICATION OF PLASTIC DEBRIS INGESTED BY SEA TURTLES | *MCKINLAY, Susan Ellen |
| S4.10 | SPANISH MEDITERRANEAN COLLABORATIVE NETWORK FOR DATA SHARING AND STANDARDIZATION OF METHODOLOGIES FOR MONITORING DEBRIS IMPACT ON SEA TURTLES IN THE FRAME OF THE INDICIT PROJECT | TOMAS, Jesus |
| S4.11 | SPATIAL OVERLAP OF LARGE MARINE VERTEBRATES WITH FLOATING MACRO-LITTER IN THE SPANISH MEDITERRANEAN SEA | TOMAS, Jesus |
| S4.12 | INSIGHTS ON DELIBERATE HEAD TRAUMAS ON SEA TURTLES IN GREECE | NESTORIDOU, Polymnia |
| S4.13 | ASSESSMENT OF LITTER INGESTION IN THE LOGGERHEAD SEA TURTLE (<i>Caretta caretta</i>) IN THE MEDITERRANEAN SEA, AN INDICIT OUTCOME | DE LUCIA, Giuseppe Andrea |
| S4.14 | MORE THAN A MEDITERRANEAN NESTING ROOKERY: FEEDING GROUNDS AND ANTHROPOGENIC IMPACT ON MARINE TURTLES IN CYPRUS REVEALED BY STRANDING ANALYSIS | MASTROGIACOMO, Angela |
| S4.15 | PLASTIC INGESTION BY SEA TURTLES IN GREECE | *DIGKA, Nikoletta |
| S4.16 | IS THE LOGGERHEAD <i>Caretta caretta</i> A GOOD INDICATOR OF PLASTIC INGESTION ALSO AT LOCAL SCALE? | *VALENTE, Tommaso |
| S4.17 | THE EVALUATION OF THE FISHERIES INTERACTION BETWEEN THE SEA TURTLES AND FISHERMEN THE IN MEDITERRANEAN COAST OF TURKEY | *SOZBILEN, Dogan |
| S4.18 | SEA TURTLE MORTALITY ASSESSMENT IN VALENCIA REGION (SPAIN) FROM 2010 TO 2018. | CABEDO, Marco |
| S4.19 | ACCUMULATION OF ANTHROPOGENIC PLASTIC DEBRIS ALONG THE MEDITERRANEAN SHORELINE | OZDEN, Ozge |
| S4.20 | SPATIO-TEMPORAL PATTERN OF SEA TURTLE PRESENCE AND HUMAN INTERACTION ON THE SOUTHWEST ITALIAN COAST: AN UPDATE FROM THE CAMPANIAN STRANDING AND SALVAGE NETWORK 2007 - 2017 | HOCHSCHEID, Sandra |
| S4.21 | EVALUATING POST-RELEASE SURVIVAL OF LOGGERHEAD SEA TURTLES BYCAUGHT IN BOTTOM TRAWLS: ASSESSING EFFECTIVENESS OF LOW-COST CONSERVATION METHOD | GENOV, Tilen |
| S4.22 | RESULTS SYNTHESIS OF THE MONITORING SEA TURTLES STRANDED IN NORTHERN TUNISIA | EL HILLI, Attia |
| S4.23 | MICROPLASTIC AND MACROPLASTIC ABUNDANCE IN MARINE TURTLES STRANDED ON SAMOS ISLAND COASTLINE (NORTH-EASTERN AEGEAN SEA): PROPOSAL OF A STANDARDIZED SAMPLING PROTOCOL | PIETROLUONGO, Guido |
| S4.24 | DO TURTLES INGEST PLASTIC INADVERTENTLY? INNOVATIVE METHODS FOR THE STUDY OF DIET AND PLASTIC SELECTIVITY BY LOGGERHEADS IN THE NORTHWESTERN MEDITERRANEAN SEA. | DARMON, Gaëlle |

| 16:30 – 17:30 | POSTER SESSION 5: HEALTH & REHABILITATION Presenters must be present at their poster(s) throughout the session. | Rosemary Conference Hall |
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| S5.01 | MODULATION OF PLASMA BIOCHEMICAL PROFILES IN LOGGERHEAD SEA TURTLE (<i>Caretta caretta</i>) DURING RECOVERY | JAKŠIĆ, Željko |
| S5.02 | NEW DEVELOPMENTS AT THE MARINE TURTLE RESCUE CENTRE PULA, CROATIA | GOBIC MEDICA, Karin |
| S5.03 | HAEMATOLOGICAL AND BIOCHEMICAL PANELS IN TYRRHENIAN LOGGERHEAD SEA TURTLES (<i>Caretta caretta</i>) RESCUED BY THE CRTM: A COMPARATIVE ANALYSIS ACCORDING TO DIFFERENT CLINICAL FINDINGS AND SPECIFIC PATHOLOGIES | *DONADIO, Anna |
| S5.04 | DATABASE & ONLINE MAP OF SEA TURTLE RESCUE & FIRST AID CENTRES IN THE MEDITERRANEAN | TOULOUPAKI, Eleana |
| S5.05 | MULTIDRUG RESISTANCE IN CLINICAL ISOLATES FROM LOGGERHEAD SEA TURTLES (<i>Caretta caretta</i>) LIVING IN THE MEDITERRANEAN SEA. | *CIRILLI, Margie |
| S5.06 | INTRAVENOUS TRAMADOL FOR SURGICAL PAIN RELIEF IN GENERAL ANESTHESIA WITH PROPOFOL IN LOGGERHEAD (<i>Caretta caretta</i>) | *CICCARELLI, Stefano |
| S5.07 | ASSESSING HAEMATOLOGICAL AND BIOCHEMICAL PARAMETERS AND THEIR EFFECTIVENESS AS A HEALTH ASSESSMENT IN RESCUED LOGGERHEAD SEA TURTLES (<i>Caretta caretta</i>) IN LAMPEDUSA, SOUTH MEDITERRANEAN. | *STRINGER, Dani |
| S5.08 | PATHOLOGICAL FINDINGS IN SEA TURTLES STRANDED ALONG THE NORTH WESTERN COAST OF THE ADRIATIC SEA | MARCHIORI, Erica |
| S5.09 | AN UNUSUAL LESION OBSERVED IN A LOGGERHEAD SEA TURTLES (<i>Caretta caretta</i>) REFERRED TO THE CENTRO RICERCA TARTARUGHE MARINE – STAZIONE ZOOLOGICA ANTON DHORN – NAPOLI (CRTM). | AFFUSO, Andrea |
| S5.10 | CO-INFESTATION BY <i>Hapalotrema mistroides</i> (MONTICELLI, 1896) AND <i>Neospirochis</i> NEOGEN 11 AS RESPONSIBLE OF A SEVERE CASE OF SPIROCHIDIASIS IN A LOGGERHEAD SEA TURTLE (<i>Caretta caretta</i>) FROM ADRIATIC SEA. | *DI RENZO, Ludovica |
| S5.11 | NEWS FROM THE SEA: HOW TO EVALUATE THE EFFECTS OF REHABILITATION ON MARINE TURTLE LONG TERM SURVIVAL? | FREGGI, Daniela |
| S5.12 | THE IMPACT OF ARTIFICIAL UVB LIGHT ON WOUND HEALING OF INJURED LOGGERHEAD SEA TURTLE (<i>Caretta caretta</i>) | LUKAC, Maja |
| S5.13 | HEMATOLOGICAL PARAMETERS OF LOGGERHEAD SEA TURTLES (<i>Caretta caretta</i>) ADMITTED AND RECOVERED IN MARINE TURTLE RESCUE CENTRE PULA | LUKAC, Maja |
| S5.14 | DETERMINATION OF THE FACTORS THAT CAN INFLUENCE REHABILITATION OF <i>Caretta caretta</i> IN THE LAMPEDUSA SEA TURTLE RESCUE CENTER BETWEEN 2001-2016 | ROLDI, Camilla |
| S5.15 | SYMBLEPHARON AND SALT GLAND DYSFUNCTION IN A LOGGERHEAD SEA TURTLES (<i>Caretta caretta</i>). | LAMAGNA, Barbara |
| S5.16 | COMPARISON OF INTRAOCULAR PRESSURE MEASUREMENTS USING REBOUND AND APPLANATION TONOMETRY IN LOGGERHEAD (<i>Caretta caretta</i>) SEA TURTLES RESCUED AT THE CENTRO RICERCA TARTARUGHE MARINE – STAZIONE ZOOLOGICA ANTON DHORN – NAPOLI (CRTM). | LAMAGNA, Barbara |
| S5.17 | EFFECTS OF ENVIRONMENTAL ENRICHMENT ON BEHAVIOUR AND DIVING CONDITION OF SEA TURTLES IN REHABILITATION | KASIMATI, Eirini |
| S5.18 | FIRST DETECTION AND MOLECULAR CHARACTERIZATION OF <i>Cucullanus carettae</i> BAYLIS, 1923 (NEMATODA: RHABDITIDA) IN LOGGERHEAD TURTLE (<i>Caretta caretta</i>) FROM THE ADRIATIC SEA. | GUCCIONE, Sergio |
| S5.19 | LOGGERHEAD SEA TURTLE MICROBIOME – TURTLEBIOME PROJECT: INSIGHT INTO ENDOZOIC AND EPIZOIC COMMUNITIES | BOSAK, Suncica |
| S5.20 | CLINICAL EXPERIENCE IN THE TREATMENT OF DISEASES CAUSED BY INTERACTION WITH HUMAN ACTIVITIES IN 822 SEA TURTLES. | VALASTRO, Carmela |

| DAY 4 | FRIDAY 19/10/2018 | |
|---------------|---|--|
| 10:00 – 20:00 | FIELD TRIP | |
| 11:30 – 15:00 | BRIJUNI NATIONAL PARK | |
| 15:00 – 16:30 | LUNCH | |
| 16:30 – 19:00 | SEA TURTLE RESCUE CENTER, AQUARIUM PULA | |

VALAMAR DIAMANT HOTEL: GROUND FLOOR PLAN

- 1 Rosemary Conference Hall
- 2 Laurel Conference Hall
- 3 Olive Conference Hall
- 4 Magnolia Conference Hall
- 5 Lobby bar
- 6 Reception
- 7 Restaurant
- 8 Restaurant Terrace



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