

Annual Report 2020

IAC Annual Report General Instructions

Annex IV of the Convention text states that each Contracting Party shall submit an Annual Report each year. To complete this Annual Report, Focal Points should consult with appropriate stakeholders involved in sea turtle issues. If you have any questions regarding this Annual Report, please contact the Secretariat *Pro Tempore* at secretario@iacseaturtle.org

The submission deadline for this Annual Report is June 30th, 2020.

Part I (General Information)

Please fill out the following tables. Add additional rows if necessary.

a._ Focal Point

Institution	Parque Nacional Galápagos-Ministerio del Ambiente y Agua	
Name	Eduardo Espinoza Herrera	
Submission Date	31-07-2020	

b._ Agency or Institution responsible for preparing this report

Name of Agency or Institution	Dirección del Parque Nacional Galápagos Ministerio del Ambiente y Agua	
Name of the person preparing this report	Eduardo Espinoza Herrera	
Address	Ave. Charles Darwin- Parque Nacional Galápagos.	
Telephone(s)	593-52526511-52526189	
E-mail	eespinoza@galapagos.gob.ec	



Ecuador

Annual Report 2020

c._ Others who participated in the preparation of this report

Name	Agency or Institution	E-mail
Ander Gracia	Ministerio del Ambiente y Agua	ander.gracia@ambiente.gob.ec
Esther Palomino	Ministerio del Ambiente y Agua	esther.palomino@ambiente.gob.ec
Narcisa Cardenas	Ministerio del Ambiente y Agua	narcisa.cardenas@ambiente.gob.ec
Carlos Cruz	Ministerio del Ambiente y Agua	alfredo.cruz@ambiente.gob.ec
Pritha Tutasi	INOCAR	pritha.tutasi@inocar.mil.ec
Lissette Ramírez	Ministerio del Ambiente y Agua	lissette.ramirez@ambiente.gob.ec
Ana Carrión	Universidad San Francisco de Quito	acarrion@usfq.edu.ec
Daniela Alarcón	Universidad San Francisco de Quito	dealarcon@usfq.edu.ec
Andrea Sosa Alcívar	Ministerio del Ambiente y Agua	andrea.sosa@ambiente.gob.ec
Sebastián Alvarado Aviles	Ministerio del Ambiente y Agua	demetrio.alvarado@ambiente.gob.e
Johanna Moreira García	Ministerio del Ambiente y Agua	jessica.moreira@ambiente.gob.ec
Grindell Cabrera	Ministerio del Ambiente y Agua	grindellcabre@gmail.com
Daniel Alava	Ministerio del Ambiente y Agua	daniel.alava@ambiente.gob.ec
Patricio Loor	Subsecretaría de Pesca	ploor@produccion.gob.ec
Vanessa Velásquez	Subsecretaría de Pesca	vvelasquez@produccion.gob.ec
Tania Calderón	INOCAR	arenablanca88@hotmail.com
Alberto Proaño	Dirección Parque Nacional Galápagos.	aproano@galapagos.gob.ec
Cristina Miranda	Equilibrio Azul	cristina@equilibrioazul.org
Ronald Pincay Choez	Refugio de vida silvestre marino	ronald.pincary@ambiente.gob.ec
Beatriz Ladines	Responsable de REMACOPSE	beatriz.ladines@ambiente.gob.ec



Ecuador

Annual Report 2020

Part II (Policy and Management)

a._ General description of activities carried out for the protection and conservation of sea turtles

In accordance with Articles IX and XVIII of the text of the Convention, each Party shall establish monitoring programs, policies, and plans for implementation at a national level for the protection and conservation of sea turtles and their habitat.

As a result, the Party shall report on the action plans, management plan, or other types of instruments, describing their location, the species considered and the actions related to sea turtles implemented by governmental, non-governmental, and private institutions.

In addition to the above, please fill out the following tables and describe progress in the comments column.

	YES/NO/ In Progress	Comments
Does your country have a	YES	In the process of updating and
national action plan in accordance		approval by the Environmental
with Article XVIII?		Authority.
Does your country have policies and	YES	Environmental Policy for the
programs at local and regional		Marine and Coastal Management
scales in accordance with Article		COA Book V. Implementation of
XVIII?		Integrated Coastal Management,
		through Management Plans for
		the sea beach and adjacent strip
		with the GAD.
Does your country have monitoring	YES	Compliance with the objectives
programs in accordance with Article		of the National Plan for the
IX?		Conservation of Sea Turtles.



Ecuador

Annual Report 2020

b._ National legislation and international instruments related to sea turtles adopted during the preceding year

Describe any national regulations, international agreements, and other legal instruments related to sea turtles and/or relevant activities that were adopted during the preceding year (April 30th, 2019 – June 30th, 2020). Please provide a literature reference and attach the digital file for the legislation and its corresponding number. The laws adopting the international legislation should be included when they exist.

National Legislation						
Type and name of the legal instrument (No.)	Description (Range of application)	Sanctions(s) Imposed				
Organic Law for the Development of	Artisanal vessels and legal persons engaged in artisanal fishing activity	Serious offence: 2 to 5 SBUs. Very serious offence: 6 to 10 Unified Basic Salary (SBU).				
Official Gazette No. 187 published on April 21, 2020.	Industrial vessels	Serious offense: 31 to 200 SBU. Very serious offence: 201 to 1500 SBU.				
Ministerial Agreement MPECEIPSRP-2020-0043- A – March 13, 2020	Multipurpose boats	Serious offense: 31 to 200 SBU. Very serious offence: 201 to 1500 SBU.				
Ministerial Agreement MPCEIP R-2020-0076-A – July 4, 2020	Tuna purse seine vessels	Serious offense: 31 to 200 SBU. Very serious offence: 201 to 1500 SBU.				
	International Instruments					
Treaty, Convention, Agr Unders	eements, Memorandum of standing	Year signed and/or ratified				
IATTC Resolution C-19-01 – 18-05 on the Collection and A Aggregating Devices.	July 22-26, 2019.					
IATTC Resolution C-19-04 – Impacts on Sea Turtle	July 22-26, 2019.					
IATTC Resolution C-19-08 Scientific Observers on Longl	July 22-26, 2019.					

Note: If this is the first time a country is submitting this information, please include all pertinent national legislation and international instruments currently in force. For countries that have previously submitted a complete Annual Report, please provide information for any changes that have occurred since the most recent previously submitted Report.



Ecuador

Annual Report 2020

c._Actions for compliance with national and international legislation

c.1 IAC Resolutions

Fill in the following tables for each of the IAC Resolutions listed below. If a Resolution does not apply to your country, please mark the box as "RESOLUTION DOES NOT APPLY", and if a specific question does not apply, please mark the column "DOES NOT APPLY". If you need more space to describe these actions, please attach additional pages and note the resolution and question number to which you are responding.

Resolution CIT-COP7-2015-R2: Conservation of the Eastern Pacific Leatherback Turtle (*Dermochelys coriacea*)

ACCORDING TO RESOLUTION CIT-COP7-2015-R2, REPORT WHETHER YOUR COUNTRY:

RESOLUTION DOES NOT APPLY				
IS COMPLIANT WITH THE FOLLOWING:	YES	NO	DESCRIBE ACTION (*)	DOES NOT APPLY
1a) Have you created conservation plans and long-term programs that can reverse the critical situation of the leatherback turtle in the Eastern Pacific?	Х		The National Plan for Ecuador's Sea Turtles establishes the measures for the conservation of this species.	
1b) Are you implementing these conservation plans and monitoring programs?	X		Through regional working groups such as the LaudOPO network	
2. Have you taken conservation measures to eliminate poaching of leatherback turtles?	x		There are actions within the framework of control and surveillance program, as well as the biodiversity monitoring program to identify and eliminate consumption of sea turtle meat	
3. If your country has Eastern Pacific leatherback turtle nesting beaches: Have you taken conservation measures to protect the nesting sites and their associated habitats?	x		Activities are framed within the National Plan for Sea Turtles and in the case that nesting is recorded, a specific plan to protect, monitor, and control of the nest is implemented.	
4. Has your country adopted fishing techniques that reduce incidental capture and mortality of leatherbacks?	X		On-board observers provide talks on best practices for sea turtle handling. A kit for sea turtles release was provided to longline fishermen from Manabí (SRP)	

(*) Specify actions implemented, the name of the project or relevant document, location, objective(s), institutions responsible, contact, financial or other support (optional), results (both positive and negative), and duration.



Ecuador

Annual Report 2020

Resolution CIT-COP8-2017-R2: Conservation of the Hawksbill Turtle (*Eretmochelys imbricata*)

ACCORDING TO RESOLUTION CIT-COP8-2017-R2, REPORT WHETHER YOUR COUNTRY:

IS COMPLIANT WITH FOLLOWING:	ITHE	YES	NO	DESCRIBE ACTION (*)	DOES NOT APPLY
1. Are you strengthening monitoring of the illegal use and trade of hawksbill turtles and their products		х		Through the protected areas control and surveillance programs, CEPA, awareness is raised on sea turtle illegal trade of this species of turtles in Continental Ecuador. In Galapagos, there is control through the ABG and the Galapagos National Park.	
2. Are you enforcing pertinent hawksbill legislation?		х		Implementation of relevant environmental regulations regarding sea turtle protection and conservation, in mainland and in Galapagos.	
3. Are activities being carried out to stop the illegal trade of hawksbill products?		Х		There are actions framed in the programs on surveillance and control, and on biodiversity monitoring, to identify trafficking of constitutive elements.	
4. Indicate if your country is strengthening the protection of	a) Protection of nesting habitats	Х		Control in nesting areas, and monitoring, patrols, environmental education and nesting sites signaling.	
important nesting and foraging habitats by declaring protected areas and regulating anthropogenic activities that adversely impact these habitats	b) Protection of feeding habitats	Х		There is monitoring in feeding areas, control of sea turtle-human interactions, vessels and solid waste (environmental education) during tourist activities. (Green and hawksbill turtle distribution, demography, and use of habitat in Galapagos feeding, breeding, and resting areas)	

RESOLUTION DOES NOT APPLY

(*) Specify actions implemented, the name of the project or relevant document, location, objective(s), institutions responsible, contact, financial or other support (optional), results (both positive and negative), and duration.



Ecuador

Annual Report 2020

Resolution CIT-COP7-2015-R3: Resolution on the Conservation of the Loggerhead Sea Turtle (*Caretta caretta*)

ACCORDING TO RESOLUTION CIT-COP7-2015-R3, REPORT WHETHER YOUR COUNTRY:

			RESOLUTION DOES NOT APPLY	
IS COMPLIANT WITH THE FOLLOWING:	YES	NO	DESCRIBE ACTION (*)	DOES NOT APPLY
1. Has your country created national action plans and/or monitoring programs to promote loggerhead sea turtle conservation?	Х		Updating of The National Plan for Ecuador's Sea Turtles. Status: review from the environmental authority (to be published soon). Program for vulnerable species. Fisheries National Institute. Fisheries Undersecretariat and National Fisheries Institute.	
2. State if there are plans or recovery programs, or bilateral or regional cooperation.		Х		
3. Are these action plans or monitoring programs being implemented?	Х		Monitoring of the Plan, Programs and Projects by the authorities according to their competencies.	
4. Is there protection of the species at a state or federal level?	X		Fisheries Law, adopted in April 2020. Ministerial Agreements and Current Regulations.	
5. If your country has loggerhead turtle nesting	g beache	s:		
5a. Has your country taken conservation actions to protect nesting beaches and their associated habitats?		Х		
5b. Are there laws on turtle-friendly lighting in areas impacted by coastal development?		Х		
5c. Is there a long-term (minimum 10 years) standardized data available for population trend studies?		X		
6. Is there exploitation or direct harvest of loggerhead turtles in your country?		X		

(*) Specify actions implemented, the name of the project or relevant document, location, objective(s), institutions responsible, contact, financial or other support (optional), results (both positive and negative) and duration



Ecuador

Annual Report 2020

Resolution CIT-COP9-2019-R2: Conservation of the Northwest Atlantic Leatherback

ACCORDING TO RESOLUTION CIT-COP9-2019-R2, REPORT WHETHER YOUR COUNTRY:

IS COMPLIANT WITH THE FOLLOWING:	YES	NO	DESCRIBE ACTION (*)	Res. DOES NOT APPLY		
Note: Question 1 must be answered by all IAC Parties, please skip the other questions if the Reso is not applicable in your country.						
1. Has reached out to Canada, Guyana, French Guiana, Trinidad & Tobago, and/or Suriname to inform these nations about the critical situation of the population and priority actions for the conservation of leatherbacks in the NW Atlantic?				x		
IS COMPLIANT WITH THE FOLLOWING:	YES	NO	DESCRIBE ACTION (*)	DOES NOT APPLY		
2. Has implemented techniques to reduce leatherback bycatch and mortality in fisheries, following the UN-FAO Guidelines to Reduce Sea Turtle Mortality in Fishing Operations?						
3. Have fishery observer programs that comply with the minimum standards for scientific observer coverage that have been established by pertinent Regional Fishery Management Organizations?						
4. Has implemented laws and regulations related to Northwest Atlantic leatherback conservation, particularly related to fisheries bycatch and marine protected areas?						
5. If your country has Northwest Atlantic (NWA) le	eatherbac	k turtle	nesting beaches:			
5.1. Has your country implemented conservation measures for the protection of the NWA leatherback nesting beaches and associated habitats?						
5.2. Does your country have a monitoring and tagging program at the NWA leatherback nesting beaches?						
6. Is your country collecting data on interactions of the NWA leatherback with fishing fleets? Report data of interactions of the species with industrial longline vessels in Annex 3 of this report.						

(*) Specify actions implemented, the name of the project or relevant document, location, objective(s), institutions responsible, contact, financial or other support (optional), results (both positive and negative), and duration.



Ecuador

Annual Report 2020

Resolution CIT-COP3-2006-R2: Reduction of the adverse impacts of fisheries on sea turtles

ACCORDING TO RESOLUTION CIT-COP3-2006-R2, REPORT WHETHER YOUR COUNTRY:

In the column for "species" please use: Cm (Chelonia mydas), Lo (Lepidochelys olivacea), Dc (Dermochelys coriacea), Cc (Caretta caretta), Lk (Lepidochelys kempii), Ei (Eretmochelys imbricata)

IS CO FOL	OMPLYING WITH THE LOWING:	YES	NO	DESCRIBE ACTION (*)	SPECIES	DOES NOT APPLY		
Adopted the "Guidelines to Reduce Sea Turtle Mortality induced by fisheries operations", of the United Nations Food and								
Agric	Agriculture Organization (FAO), including:							
A. Re	esearch and monitoring of the adv	erse imp	act of fi	sheries on sea turtles				
i)	Collect information by fishery	X		Fisheries to catch: -Large pelagic fish (shallow longline) -Deep-sea code (deep longline) -Small pelagic fish (purse seine) -Polyvalent (Bottom trawl net) -Pomaderas (Bottom trawl net)	Cm, Lo, Dc, Cc,Ei			
ii)	Observer programs	Х		Undersecretariat for Fishing Resources. Fishing National Institute.	Cm, Lo, Dc, Cc,Ei			
iii)	Research on sea turtle/fishery interactions	X		Through programs and projects implemented according to competences.	Cm, Lo, Dc, Cc,Ei			
iv)	Information on non-Party vessels							
v)	Cooperation with non-Party states to obtain information	Х		IATTC	Cm, Lo, Dc, Cc,Ei			
B. M	itigation measures for the following	ng fishe	ries:					
i)	Long-line	Х		Sea turtles are released by the fisheries observers.				
ii)	Gillnets		Х					
iii)	Trawling (e.g., 1. TEDs: specify legally approved TEDs, their dimensions, material, and target species for that fishery, 2. time-area closures: specify a geographical area, time of closure and target species for that fishery, 3. tow times and/or 4. other measures)	X	V	Temporary closures, every year, according to IPAP investigations results. Polyvalent fishery - target species: hake and shallow water shrimp; Pomadera fishery – target species: Titi shrimp trawling nets RAFAVS102 (multipurpose boats and pomaderas). TED Super Shooter with 1 or 2 caps; made of steel.				
iv)	Other fishing gear (indicate which one(s))		Х					
v)	Fisher training programs about best practices for safe handling and release of	Х		Talks on best practices for sea turtle handling during fishing operations				



Ecuador

Annual Report 2020

	incidentally-caught sea turtles			
C. So	ocio-economic considerations			
i)	Support socio-economic activities that help mitigate adverse impacts of fisheries on sea turtles	X	Undersecretariat for Fishing Resources / Eastern Pacific Fishing School/ Dorado exporters consortium. Training on best practices for sea turtles handling. Sea turtle releasing kit delivered: positive results. Length: 1 year.	

(*) Specify actions implemented, the name of the project or relevant document, location, objective(s), institutions responsible, contact, financial or other support (optional), results (both positive and negative), and duration.

c.2 National and International Mandates

List actions that are being carried out to comply with national and international mandates (Ex: inspections, confiscations, sanctions, etc.)

d._Application [submission] of exceptions established in the Convention

Describe in detail the exceptions allowed in accordance with article IV, item 3(a,b,d), and Annex IV of the text of the Convention, in accordance to the procedure established by the COP (Doc. CIT-COP5-2011-R2). Attach management program.



Ecuador

Annual Report 2020

Part III (Research information)

a._ Threats

Indicate threats (Coastal development, incidental capture, direct use, contamination and pathogens, and climate change) by species, with information on the area and activities taken to control them in the following table. Lo = Lepidochelys olivacea; Lk = Lepidochelys kempii; Dc = Dermochelys coriacea; Ei = Eretmochelys imbricata; Cc = Caretta caretta; Cm = Chelonia mydas.

Species	Threat(s)		Actions	
Lo	☑Coastal development☑Incidental capture□Direct use	☑Contamination☑Pathogens☑Climate change	Monitoring and mitigation on nesting beaches.	
Lk	□Coastal development □Incidental capture □Direct use	□Contamination □Pathogens □Climate change		
Dc	☑Coastal development☑Incidental capture□Direct use	☑Contamination☑Pathogens☑Climate change	Monitoring and research	
Ei	 ☑Coastal development ☑Incidental capture ☑Direct use 	☑Contamination☑Pathogens☑Climate change	Monitoring, mitigation and research on nesting beaches.	
Cm	⊠Coastal development ⊠Incidental capture □Direct use	☑Contamination□Pathogens☑Climate change	Monitoring, mitigation and research on nesting beaches. Regional mitigation measures. Establishment of management measures	
Cc	□Coastal development ⊠Incidental capture □Direct use	☑Contamination☑Pathogens☑Climate change	Monitoring	



Ecuador Annual Report 2020

b._Research

Describe scientific research that is being carried out in the country relating to sea turtle population assessments including tagging, migration, and genetic studies, as well as those relating to conservation issues including habitat monitoring, fisheries interactions, disease, etc. Provide a list of references for the information used in this report and note how to obtain them when needed.

In addition to the above, please fill out the following table on the types of research being carried out in the country and with what <u>species</u>.

Research	Specie (s) (Lo, Lk, Cm, Ei, Cc, Dc)
Tagging	Lo, Cm, Ei
Migration	Lo, Cm, Ei
Habitat monitoring	Cm, Ei
Fisheries interactions	Lo, Cm, Ei, Dc, Cc
Genetics	Ст

c._ Other activities

Include information on environmental education activities, programs to establish and manage protected areas, and cooperative activities with other Party countries.



Ecuador

Annual Report 2020

Title of the project

Sea Turtle Conservation actions (*Lepidochelys olivacea* and *Chelonia mydas*) on the nesting beaches, Galera San Francisco Marine Reserve. Emeralds – Ecuador. Nesting season 2019 - 2020.

Season

Start: June 2019 End: May 2020

Area(s)

Galera San Francisco Marine Reserve

Institution

Coordinación Zonal de Esmeraldas-Ministerio del Ambiente del Ecuador

Responsible for this report

Andrea Sosa Alcívar

Participants (include if students/volunteers will participate)

RMGSF park rangers: Blg. Andrea Sosa Alcívar, Mr. Byron Mosquera, Mr. Carlos Erazo, Mr. Olmer Bass, Mr. Ricardo Ríos, Mr. Daniel Quintero, Mr. Daniel Vera.

Volunteers: Mr. Diego Tejedor, María C, Mr. Urs, Mrs. Ana Elena. Marine Scouts youth group

Institutional collaborators

SGMC.

Program type

The management programs implemented for the conservation of sea turtles in the RMGSF are:

- Biodiversity Management Program (monitoring of nesting, stranding, marking and control of introduced species).
- Communication and environmental education and participation program

General objective

Maintain the sea turtle nesting sites in the RMGSF in good condition

Specific objectives

Generate a 2019 - 2020 database to determine the long-term population trend, number of nests, hatching success and emergence.

Minimize direct and indirect threats that affect sea turtle nesting sites.

Question to answer

What is the number of turtle hatchlings born in the RMGSF?

What kind of affectations do ST clutches suffer at Galerita beach?

Methodology

The field work was carried out during patrols in the morning hours from 06:00 am to 10:00 am, along the beach to count, identify and protect the nests. The type of footprint and width



Ecuador

Annual Report 2020

were recorded, as well as coordinates with GPS Garmin 84, area and sector. Finally, the sand was dug to confirm the presence of eggs and the nest was marked and protected.

Hatching record

After 45 days after laying, the respective daytime monitoring was carried out to record the hatching of the nests. Evidence of hatching was identified as follows: sinking of the surface layer of the nest mouth was observed as movement of the hatchlings in the incubation chamber after several hours on even days, and then the emergence of hatchlings was observed. the neonates. When identifying emerged hatchlings in the monitored nests, the protective grill was not completely removed because this is how we prevent dogs from preying on them. This was maintained until exhumation proceeded three days after the hatchlings emerged.

With the application of the following formula, hatching and emergence success was calculated:

Eclosión (%) =
$$\frac{C}{C + HSDA + HNE + \# D} \times 100$$

Emergida (%) =
$$\frac{C (V + M)}{C + HSDA + HNE + \# D} X 100$$

Activities

<u>Actions to reduce threats at nesting sites:</u> Protection of the nests: during the nesting season of the turtles, the nests were protected to avoid predation by feral animals that are found within the nesting beach in the RMGSF (Galerita), as well as to avoid interaction with visitors. This protection consisted of making enclosures for the nests using different materials, such as: welded 10-inch iron metal grills, *guadua cane latillas*, plastic mesh, metal mesh, sticks and other materials found on the beaches.

<u>Control of introduced species</u>: In the RMGSF several groups of feral animals have been identified that represent a threat to the fauna of the site, for which reason control tours were carried out on the beaches, and dialogue with the dog owners so that they can tie them up. until the park rangers carry out the protection of the nests.

<u>Educational talks</u>: Participated in environmental and informative education talks on the importance of caring for and protecting sea turtles.

<u>Cleaning groups (mingas)</u>: With groups the aim of facilitating access to the beach so that the turtles can nest, cleaning mingas were organized to collect all organic waste, such as logs



Ecuador

Annual Report 2020

and branches, as well as inorganic waste, mainly fishing nets and plastics.

Results

The monitoring took place on the nesting beach of Galerita, which has an extension of 2.97 km and is located in the northern area of the RMGSF in the parish of Galera.

A total of 102 daytime patrol tours were carried out with an average of 5 hours each. In total, 510 hours were monitored, from June 2019 to May 2020.

A total of 117 nests have been recorded on 8 beaches in the RMGSF: 6 belonged to green turtles and 111 to olive ridley. Table 1 shows the incidence of nesting on the different beaches of the RMGSF.

Density by Beach

Beach	Nest	Hollow Body	U-turn	False walk
Galerita	106	5	3	1
Escondida	2	0	0	0
CSF	2	0	0	0
Quingue	1	0	0	0
Caimito	1	0	0	0
Tortuga	2	0	0	0
Coquito	2	0	0	0
Galera	1	0	0	0

Table 1. Activities of nesting turtles by beach.

Sea turtle nest relocations

According to the criteria applied in the face of a natural threat (beach erosion, tides or waves) or anthropic threat (human intervention or exotic or introduced animals), nest relocations are carried out to ensure hatching and emergence success. With this criterion, 22 nests were relocated, 1 on Galera beach and 21 on Galerita beach.

Nest protection with plastic mesh.

A total of 91 plastic meshes and reed fences were placed to protect sea turtle nests. The predation rate of sea turtle nests this season was 16.23% by feral dogs.

Exhumation Data

48 olive ridley turtle nests were exhumed on Galerita beach, with 2465 hatchlings released; and 5 green turtle nests, with a total of 312 hatchlings released, making a total of 3777 sea turtle hatchlings born in the RMGSF.

Regarding the species of *Lepidochelys olivacea*, the following results are shown; A total of 111 olive ridley turtle nests were recorded on Galerita beach. With a total of 2991



Ecuador

Annual Report 2020

eggs, the hatching and emerging success of the total nests exhumed was 98.93 % and 29.91 % respectively, and 16.23 % of predation.

Seasonal egg density L. olivacea			
Parameter	Season 2019 - 2020		
Emerged hatchlings	2465		
Live hatchlings inside the nest	0		
Dead hatchlings	89		
Eggs preyed on by dogs	0		
Infertile eggs	161		
Eggs without embryonic development	204		
Unhatched eggs with embryonic development	72		
Total eggs	2991		

Table 2. Data obtained from the nests exhumed in the 2019-2020 season.

Regarding the species of *Chelonia mydas*, the following results are shown;

Six *Chelonia mydas* green turtle nests were recorded on Galerita beach. With a total of 407 eggs, evidencing a hatching success of 96% and 91.69% emergence success and a 0% predation rate.

Seasonal egg density L. olivacea			
Parameter	Season 2019 - 2020		
Emerged hatchlings	312		
Live hatchlings inside the nest	9		
Dead hatchlings	11		
Eggs preyed on by dogs			
Infertile eggs	0		
Eggs without embryonic development	62		
Unhatched eggs with embryonic development	13		
Total eggs	407		

Table 3. Data obtained from the nests exhumed in the 2019-2020 season.

1. CONCLUSIONS.

- During the 2019 2020 sea turtle nesting season in the Galera San Francisco Marine Reserve, the following data was identified:
- Olive ridley turtle (*Lepidochelys olivacea*) and green turtle (*Chelonia mydas*) nesting was recorded.
- The reproductive activities of *Lepidochelys olivacea* in the 2019 -2020 nesting season in the RMGSF was with a total of 111 registered nests representing 94.87%, unlike the green turtle in a lesser proportion with 5.12%.



Ecuador

Annual Report 2020

- High predation by feral animals was witnessed (19 nests totally depredated), resulting in 16% of total intervention in relation to the number of nests in the entire season.
- Due to the evident degree of erosion due to strong waves and erosion of cliffs, 8.54 % of the nests on Galerita beach were relocated.
- A total of 2465 *Lepidochelys olivacea* sea turtle hatchlings reached the sea, of the 48 exhumed nests, they presented a hatching success of 98.93 % and 29.91 %.
- A total of 312 sea turtle hatchlings *Chelonia mydas* reached the sea, from the 6 exhumed nests, they presented a hatching success of 96% and emergence of 91.69%.

2. RECOMMENDATIONS

• Due to the natural phenomena that the nesting beaches can suffer and the threats from feral dogs, it is recommended to implement a pilot hatchery in the Galerita Beach of the RMGSF.







Ecuador Annual Report 2020



Photo 1. Record of olive ridley turtle tracks in one of the monitoring in Playa Galerita.

Photo 2. Volunteer supporting nest protection, Playa Galerita.







Ecuador Annual Report 2020





Ecuador

Annual Report 2020

Title of the project

CONSERVATION OF SEA TURTLE NESTING SITES THROUGH THE REDUCTION OF THREATS WITHIN THE PUNTILLA DE SANTA ELENA COASTAL MARINE FAUNA PRODUCTION RESERVE, TRES CRUCES, PUNTA BRAVA AND MAR BRAVO BEACHES. Salinas ECUADOR. SEASON 2019 -2020.

Season (date of this report)

Start: April 2019 End: March 2020

Area(s)

Puntilla de Santa Elena Coastal Marine Fauna Production Reserve.

Institution

Coordinación Zonal De Ambiente Guayas-Ministerio de Ambiente y Agua

Responsible for this report

Beatriz Ladines Villamar

Participants (include if students/volunteers will participate)

REMACOPSE park rangers: Blga. Beatriz Ladines, Blgo. Freddy Salinas, Blg. Jennifer Montoya, Mr. Alejandro Murillo, Blg. Héctor Rodríguez, Mr. Raúl Coronel and Ing. Nadia Quintero.

Volunteers from the Santa Elena Peninsula State University (UPSE): Luis Ortiz, Shanelka Quiñonez, Cristian Guacho, Karen González, Jonathan Villao, Lisseth Moya, Gabriela Moreno, Milton Cepeda, Jefferson Perero, Micaela Solis, Tatiana Lindao, Andrea Villamar, Darwin Beltrán , Keyla Burgos, Gabriela Tubay, Karina Laica, Eduardo Quirumbay, Joselyn Panimboza

Institutional collaborators (specify if there is an agreement)

Wildaid Ecuador.

International Conservation

Program type

The strategies or Management Programs implemented for the conservation of sea turtles, as conservation objects in REMACOPSE are: Biodiversity Management Program (Nesting Monitoring, stranding, marking and control of introduced species) Environmental communication, education and participation program and Public Use and Tourism Program.

General objective

Maintain in good condition the nesting sites for sea turtles in REMACOPSE

Specific objectives

- Generate a 2019-2020 database to determine long-term population trends, number of nests, hatching and emerging success, movement patterns, individual growth rates, and reproductive histories.
- Minimize direct and indirect threats that affect sea turtle nesting sites in REMACOPSE.

Question to answer



Ecuador

Annual Report 2020

What is the number of nesting female sea turtles that use the REMACOPSE beaches? When applying management and conservation measures to sea turtle nesting sites in REMACOPSE, what is the trend for long-term recovery of the nesting population and reproductive success?

Methodology

For the generation of a record of nests and footprints, daily daytime monitoring was applied on foot from July 2019 to March 2020, along the beaches of Tres Cruces, Punta Brava and Mar Bravo (La Chueca).

Ascent/descent tracks, number of nests and records of sea turtle strandings are recorded with their respective biometric data. Identified nests are followed up until they hatch, days after they are exhumed for the collection of data that will be used to calculate hatching and emergence success. (Hatching success comprises hatchlings that hatched but failed to hatch, while hatching success comprises hatchlings that hatched and subsequently successfully hatched).

Eclosión (%) =
$$\frac{C}{C + HSDA + HNE + \# D} \times 100$$

Emergida (%) = $\frac{C (V + M)}{C + HSDA + HNE + \# D} \times 100$

C = Number of empty shells counted (>50% complete).

V = Live inside the nest or live hatchlings between the shells (not those on the neck of the nest).

M= Number of dead hatchlings outside their shell.

HSDA = Eggs Without Apparent Development (Eggs not hatched, without an obvious embryo).

HNE = Unhatched Eggs (Unhatched eggs with evident embryo).

D = Predated (Open shells, almost complete, containing egg residue).

For the collection of data for: estimation of population density, movement patterns, individual growth rates and long-term reproductive histories, nocturnal monitoring is carried out four times a week, a physical marking method (Tags) is applied, coded and with information (email) recorded on the back of the brand, for identification and reporting. From each tagged or recaptured turtle, biometric data, species identification, identification of possible visible damage and number of eggs deposited are taken.

For the management of nests that are vulnerable, either due to predation by feral dogs, tidal flooding or beach erosion, the nesting site is relocated, considering all the characteristics of the nest and the original chamber.



Ecuador

Annual Report 2020

To control threats, the nests are protected with metal mesh, they are coded with the initials of the species to which they correspond and a numerical series (eg LO-001) and the respective monitoring is given until hatching.

The Program includes the control of feral dogs that enter the reserve, through the prohibition of pets on the beaches, the elimination and relocation of feral animals.

Activities

Daytime monitoring: From April 2019 to March 2020, daytime monitoring was carried out on sea turtle nesting beaches, such as Tres Cruces, Punta Brava and Mar Bravo (La Chueca), recording ascent/descent tracks and identification. of nests.

Night monitoring: In the current season from September to November 2019, night monitoring was carried out 4 times a week, making tours on the nesting beaches of the reserve. Night monitoring was scheduled to start approximately two hours before high tide.

Once the turtle is identified on the beach, we proceed to work on it once the eggs are laid (>30 eggs), observing any possible damage, scars or malformations; Morphometric data is taken, tags are applied when none is present, otherwise the brand code is recorded and the nest data is taken, as well as the count of the number of eggs laid in the chamber.

The application of the tag is normally carried out between the first and second flakes of the anterior fins or in the fold before the first flake. Both fins are marked with the help of an applicator, taking into account that when closing the tag there is a margin of 5 mm. from the edge of the skin. The Tags have a number and the initials of the place of origin (eg EC201), and on the back with the inscription info.tortugas@ambiente.gob.ec, to report the turtle in case it is recaptured by personnel from another project.

Hatching Record

After 50 days after laying, the respective daytime monitoring is carried out to record the census and hatching of the nests. When identifying emerged hatchlings in the monitored nests, the protection mesh is not completely removed, that is, it is maintained until the exhumation is carried out, in this way the sea turtle nests are protected until the end of the process, avoiding predation by feral dogs that enter nesting beaches.

Exhumation Record.

The nest exhumation process was carried out seven days after the hatchlings emerged, to record the following data: empty shells, infertile eggs, unhatched eggs, live and dead hatchlings inside the nest.

Once the season was over, the following formula was applied to the database to obtain the percentage of hatching and emerged success.



Ecuador

Annual Report 2020

Formulation

Eclosión (%) = (C)/ (C+HSDA+HNE+# D) x 100 Emergida (%) = (C - (V+M)) / (C+HSDA+HNE +# 100

C = Number of empty shells counted (>50% complete).

V = Live inside the nest or live hatchlings between the shells (not those in the neck of the nest).

M= Number of dead hatchlings outside their shell.

HSDA = Eggs Without Apparent Development (Eggs not hatched, without an obvious embryo).

HNE = Unhatched Eggs (Unhatched eggs with evident embryo).

D = Predated (Open shells, almost complete, containing egg residue).

Actions to reduce threats at nesting sites:

1.- Relocation of nests: Each of the nests and their location were evaluated; Being in vulnerable areas due to natural events, such as floodwaters and waves, the relocation was carried out, with the proper equipment (gloves, masks, basket for eggs, dark plastic to protect from the sun's rays), they were relocated to a site with the same characteristics of depth, width and length of the original nest chamber, this procedure must be carried out before completing 48 hours, to a site that presents better conditions, to later proceed with the protection.

2.- Control of introduced species: In the REMACOPSE, several groups of feral dogs have been identified that represent a threat to the fauna of the site, for which actions have been taken to capture puppies and adults, which were relocated through a program of adoption.

3.- Protection of nests: This season, the management measure for the conservation of sea turtle nests that has been previously applied was maintained, which consists of placing 1/4-inch metal mesh cylindrical fences. 60 cm in diameter and 70 cm high to avoid the destruction of the nests by predators (dogs) and to avoid the compaction of the sand in the egg chamber due to the entrance of tourists to the beaches.

Once the nest is identified, the mesh is placed enclosing the nest and 30 cm is buried so that it can be removed by predators. Four one-meter PVC bars are placed as a fence, closing them with tape that mentions a protected nest.

Results

The three beaches recorded in past seasons were monitored; Three crosses, Punta Brava and Mar Bravo.

TRES CRUCES BEACHES: With an extension of 1.5 km, it is located from the Chocolatera



Ecuador

Annual Report 2020

to the Tres Cruces islet.

PUNTA BRAVA BEACH: With an extension of 1 km, located from the islet Tres Cruces to Lobería.

MAR BRAVO BEACH: With an extension of 10 km, however, the nesting site is located 3.5 km from La Lobería to the sector called "La Chueca".

A total of 185 daytime monitoring was carried out with an average of 3 hours each and 54night monitoring with 12 hours of monitoring each night, in the respective nesting sites of sea turtles, from April 2019 to March 2020. recording and identifying tracks and nests of sea turtles.

A total of 58 *Lepidochelys olivacea* turtle nests and 1 *Chelonia mydas* nest were recorded on the three nesting beaches of the Puntilla de Santa Elena Coastal Marine Fauna Production Reserve; recording in the month of April to July 2019 a total of 5 nests of *L. olivacea* with little activity of nesting turtles, between August to December 2019 a total of 49 nests of *L. olivacea* and 1 nest of C. mydas were recorded, these being the months of greatest activity of nesting sea turtles.



Figure 1: Number of nests registered in the 2019-2020 season

Relocations of sea turtle nests.

According to the criteria that are applied in the event of a natural threat (beach erosion, tides or waves) or anthropic threat (human intervention or exotic or introduced animals), nests are relocated to ensure hatching and emergence success; Taking this criterion, 9 nests were relocated, which were recorded on beaches such as: Chipipe, Mar Bravo (laboratory area), which were relocated to Tres Cruces beach and nests that were in the risk zone in La Chueca were transferred in the same beach to a higher area.

Protection of nests with metal mesh.



Ecuador

Annual Report 2020

A total of 49 metal meshes and plastic mesh fences were placed to protect sea turtle nests until February 2020.

The predation rate on sea turtle nests this season was 15.4% of egg predation by feral dogs.

Exhumation data.

Fifty-eight olive ridley turtle nests were exhumed, obtaining 3,692 hatchlings and 1 green turtle nest, obtaining 32 hatchlings, making a total of 3,689 sea turtle hatchlings born in REMACOPSE.

Regarding the species *Lepidochelys olivacea* and *Chelonia mydas*, the following results are shown:

The estimation of the hatching and emerged success of the total nests exhumed was 69.69% and 66.88% respectively and 15.26% of predation. Both hatching and emerging success were higher at Punta Brava beach compared to the other nesting beaches. (See Table 1).

Table 1: Successful hatching	and emergence of	f nests at each o	f the monitoring sites
during the 2019-2020 season.			

Density by Beach.				
Beach	Hatching (%)	Emerged (%)	Predation (%)	
Mar Bravo	65,24	62,69	23,48	
Punta Brava	77,76	76,25	14,64	
Tres Cruces	73,18	69,57	0,37	
Punta Carnero	92,36	80,43	0	

Table 2: Data obtained from exhumed nests of *L. olivacea* and *C. mydas* in the 2019-2020 season.

Seasonal egg density L. olivacea and C. mydas during the season		
Parameter	Season 2019 - 2020	
Emerged hatchlings	3724	
Live hatchlings inside the nest	60	
Dead hatchlings	90	
Eggs preyed on by dogs	777	
Infertile eggs	23	
Eggs without embryonic development	264	
Unhatched eggs with embryonic development	176	
Total eggs	5076	

The nests reported in Tres Cruces Beach had a hatching success of 72.44%. In the exhumations, the result was that 10.80% of the eggs did not present an apparent



Ecuador

Annual Report 2020

development.

While on the beach of Punta Brava a 77.76% hatching success and 2.2% of eggs without apparent development were obtained. In turn, La Chueca in Mar Bravo, obtained a 65.24% hatching success and 2.88% of the eggs did not present an apparent embryonic development.

NIGHT MONITORING – TAG MARKING.

During the nocturnal monitoring, it was possible to mark three turtles of the *Lepidochelys olivacea* species on the nesting beaches of REMACOPSE. (See table 3)

Cod.	Data	Dooah	Spagios	Coord	linates	# of	ACC	LCC	Observations
Tags	Date	Deach	species	Lat.	Long.	eggs	(cm)	(cm)	Obset valions
235- 236	08/10/19	Tres Cruces	Lepidochelys olivacea	0499621	9757713	77	75	79	
239- 240	8/10/19	Mar Bravo	<i>Lepidochelys</i> olivacea	500997	9756194		70	67	Hollow Body Activity.
245- 246	22/11/19	Mar Bravo	Lepidochelys olivacea	500832	9756265	S/n	71	68	A turtle was found camouflaging the nest

Table 3: Data of nesting turtle markings during the 2019-2020 season in REMACOPSE

CONCLUSIONS.

- During the 2019-2020 sea turtle nesting season of the Coastal Marine Fauna Production Reserve, the following data was identified:
- Olive ridley turtle (*Lepidochelys olivacea*) and green turtle (*Chelonia mydas*) nesting was recorded.
- The months with the highest registration of nests were from August to November 2019, the latter being the one with the highest registration.
- Intervention by anthropic predators (feral dogs) was witnessed in 6 registered nests, of which 4 were totally depredated and 2 partially, resulting in a 10% total intervention in relation to the number of nests in the entire season.
- Due to the evident degree of erosion, 15% of the nests recorded this season were relocated.
- Through nocturnal monitoring, it was possible to mark three Olive Ridley turtles with titanium tags. Of which two carried out nest activity and one with a false walk and hollow body.



Ecuador

Annual Report 2020

- A total of 3724 sea turtle hatchlings of the species *Lepidochelys olivacea* and *Chelonia mydas* reached the sea, from the 59 nests registered in REMACOPSE, presenting a 69.69% hatching success and 66.88% emergence success.
- The predation percentage obtained was 15.26%. The Tres Cruces beach presented the lowest percentage of predation (0.38%) in relation to the other nesting beaches.
- The Punta Brava beach presented the highest hatching percentage (77.76%) in relation to the other nesting beaches.

RECOMMENDATIONS

- Due to the threats posed by feral dogs, it is recommended to continue the protection of registered nests at nesting sites within REMACOPSE.
- Due to the natural phenomena that nesting beaches can suffer and the threats from feral dogs, it is recommended that nests found in risk areas be relocated.





Ecuador Annual Report 2020





Ecuador Annual Report 2020





Ecuador

Annual Report 2020

PACOCHE COASTAL WILDLIFE AND MARINE REFUGE NESTING SEASON 2019 – 2020:

Prepared by: Ronald Pincay Choez

Reviewed by: Iliana Solórzano

Monitoring team: Ángel L. López Reyes, Andrés Taffur Álvarez, Leonardo A. Alonzo Zambrano, Roberto A. Rosado Zamora, Gino M. Orlando Cedeño, Víctor Flores Murillo, José Luis Ferrin Montesdeoca, Carlos J. Zambrano, Héctor Briones Chamba, Ronald J. Pincay Choez, Iliana E. Solórzano.

1. INTRODUCTION

The Ministry of the Environment and Water, through the administration of the Pacoche Coastal Marine and Wildlife Refuge, promotes initiatives aimed at the conservation of Sea Turtles, in compliance with International Agreements and Current Environmental Regulations. Within this framework, since June 2012 as part of the Biodiversity Management Program, the project "Conservation of sea turtles, reduction of threats to the nesting habitat within the Pacoche Coastal Marine and Wildlife Refuge and its area of influence" has been implemented.".

The Pacoche Coastal Marine and Wildlife Refuge is part of the National Heritage of Natural Areas of Ecuador (PANE) that integrates the National System of Protected Areas (SNAP); It is located between the Manta and Montecristi cantons, and has an area of 31,517.90 hectares, of which 26,468.21 hectares correspond to the marine area and 5,049.69 hectares to the land area. Its creation date was September 2, 2008 through Ministerial Agreement No. 131, and its extension date was November 6, 2014 through Ministerial Agreement No. 359.

The purposes of the project are based on recording information that allows determining nesting parameters, intervals and frequencies, number of nesting females, hatching successes, among others. All this information becomes a key tool to identify conservation strategies, action plans and management of the nesting beaches of Ap. Pacoche and its area of influence.

In this context, this attached report reflects the relevant results of the eighth season of the project, and synthesizes the results generated from June 1, 2019 to June 30, 2020, refers to results obtained on nesting intervals and frequency, number of females, clutch size, hatching percentage, among others; this in order to formulate strategies that contribute to decision-making that increase the effectiveness of the management and conservation plan for sea turtles.



Ecuador Annual Report 2020

2. RESULTS

2.1 BEACHES WITH NESTING RECORDS

During the 2019-20 season, nesting was recorded on five beaches: San José in Montecristi canton; and San Lorenzo, La Botada, Liguiqui and Santa Marianita beaches, in the Manta canton; Of the total number of beaches, four are located within the Pacoche protected area.

The permanent monitoring beaches are located in the extreme north-west of the protected area on the Pacific coast, including La Botada and San Lorenzo beaches, making up a length of 3.2 kilometers of beach. The monitoring plan considered routes based on reports on the Liguiqui and Santa Marianita beaches, the first of which is located 2 km from San Lorenzo beach, while the next beach is located in the area of influence, 9 kilometers from the northern limit of the protected area with an extension of 1.3 kilometers of beach line (Map 1).



Map No. 1. Sites with nesting of sea turtles in the Pacoche Coastal Marine and Wildlife Refuge and area of influence.



Ecuador Annual Report 2020

2.2 MONITORING EFFORT

Daytime monitoring was carried out daily and uninterrupted on La Botada and San Lorenzo beaches, from 08:00 a.m. to 12:00 p.m. (4 hours per day). Nocturnal monitoring was carried out only at La Botada beach during the high nesting season between the months of September and November from 10:00 p.m. to 6:00 a.m. (duration 8 hours), with a frequency of five times a week. Two park rangers always participated in these activities, with which the monitoring effort of the 2019-2020 season was reflected in 1,936 effective hours.

2.3 BEACHES WITH REGISTERED NEEDLES

During the daily and permanent monitoring, two sea turtle nesting beaches within the protected area were prioritized:

- La Botada beach, with an extension of 1.0 km, located between DATUMWGS8417S X0510379Y9883290 and X0510794Y9884607.
- San Lorenzo Beach, with an extension of 2.2 km, located between the coordinates DATUMWGS8417S X0509824Y9882811 and 0510900Y9880586.

However, in response to reports and complaints from citizens and/or people from the coastal communities of the protected area, nests were registered on the following beaches:

- Santa Marianita Beach, with an extension of 1.6 km, located between DATUM WGS8417S X0518849Y9893934 and DATUM WGS8417S X0518025 Y9892503.
- Liguiqui Beach, with a length of one kilometer, located between the coordinates DATUM WGS8417S X0513140Y9886716 and DATUM WGS8417S X0512885Y9886248.
- Playa San José, within the protected area, coordinate location DATUM WGS8417S X0517991Y9865133.

2.4 NUMBER OF NEEDLES BY BEACH

Through consecutive monitoring, a total of 324 sea turtle clutches were recorded during the 2019-2020 season. These records correspond to 304 clutches on four beaches in the protected area (San José, San Lorenzo, La Botada, Liguiqui) and 20 clutches on Santa Marianita beach



Ecuador

Annual Report 2020

located in the area of influence of the protected area. Graph No. 1



2.5 NESTING DENSITY ON INDEX BEACHES

A higher number of nests per unit of beach surface was found in La Botada, whose density index for the season was 68.88 clutches/ha, followed by San Lorenzo beach with an index of 45.00 clutches/ha. The rest of the beaches presented low indices, with which the organization of the beaches based on these values, allows determining the beaches of San Lorenzo and La Botada as those with the highest index and efficiency of nesting by surface. Table No. 2

Table 2. Nesting density by beach area. SEASON 2019-20

BEACH	Beach surface (ha)	Nesting density Clutches/ha
La Botada	2,25	68,88
San Lorenzo	3,20	45,00
TOTALES	5,45 has	

Fuente: MAAE / Administración RVSMC-Pacoche 2020

2.6 SPECIES RECORDED IN THE SEASON

During the season, two species of sea turtles were recorded according to the following distribution: *Lepidochelys olivacea* with 321 clutches (99.1%) and *Chelonia mydas* with 03 clutches (0.9%). Graph No. 2

Graph No. 2 Distribution by species registered in the RVSMC-Pacoche



Fuente: MAAE / Administración RVSMC-Pacoche 2020

2.7 TIME OF NESTING

During the 2019-20 season, there was a significant increase in the monthly accruals for the month of October, setting the high season range for the months of September to November 2019, registering in this period the equivalent of 70.0% of the total registered clutches (Graphic No. 3).

Graph No. 3 Temporal variability of nesting season 2019-20



Source: MAAE / RVSMC-Pacoche Administration 2020



Ecuador

Annual Report 2020

2.8 MANAGEMENT OF NESTS

Permanent monitoring made it possible to determine the main threats to sea turtle nests, among them: erosion, beach dynamics, flooding due to spring tides, runoff, and predation by wild and domestic animals; therefore, as a management strategy, the relocation of clutches in safe areas was implemented, in those cases in which their location in situ represented a risk to their reproductive success.

In the case of La Botada, because it is a dark beach and isolated from human presence, a high negative incidence was registered generated by the presence of the mountain fox (Lycalopex sechurae), an opportunistic species that identified a source of food in the clutches; those clutches that were kept in their natural location (In Situ) were partially or totally depredated. Given this, it was decided to transfer the registered clutches to a hatchery built to reduce the incidence of the threat.

Graph No. 4 reflects the management strategy implemented, achieving the relocation of 214 sea turtle clutches, equivalent to 66.0% of the total records, and of which a total of 111 clutches (34.3%) located on La Botada beach, were transferred to the hatchery on this same beach.

The hatchery was made up of two sections with a surface area of 140m2, duly delimited with plastic mesh and permanently monitored to assess the physical and biotic conditions during the incubation process.

MANAGEMENT TYPE	VALUE
In situ	110
Relocated to hatchery	111
(RV)	
Relocated to beach (RP)	103
TOTALS	324

Graph No. 4. Management strategies, 2019-2020

2.9 MONITORING OF INCUBATION TEMPERATURE

During this season, the variation in incubation temperature of a clutch relocated to the La Botada beach hatchery was monitored. For this, a HOBO brand thermometer was used, which was placed inside the incubation chamber approximately 25 cm away, coinciding with the middle of the incubation chamber; the reading was recorded every hour throughout the period. The record was made to the clutch with code BO-VI-134 of the species *Lepidochelys olivacea*.


Ecuador

Annual Report 2020

The implantation of the thermometer was carried out on December 1, 2019

and was removed on February 9, 2020; the incubation period of the clutch was 58 days. Temperature monitoring shows a caloric increase in the month of December, to then stabilize in January with short ranges and frequencies of thermal variation.

It is determined that the temperature during incubation was maintained above 30.0 °C, which will undoubtedly lead to a greater number of females (Lutz and Musick, 1997). Graph No. 5.





Source: MAAE / RVSMC-Pacoche Administration 2020

2.10 MARKING

During the 2019-20 season, 17 sea turtles of the *Lepidochelys olivacea* species were tagged, at which time some morphometric characteristics of the specimens were also recorded, such as the length and curved width of the carapace, among others. The code and detail of the markings are shown in table No. 3.

Cod TACS	Data	Baach Spacing		Coordinates	Coordinates nests		
Cou. TAGS	Date	Deach	Species	Lat.	Long.	# of egg	
586 / 587	06/09/2019	La Botada	Lepidochelys olivacea	510772	9884968	100	
588 / 589	07/09/2019	La Botada	Lepidochelys olivacea	510752	9884188	113	
590 / 591	10/09/2019	La Botada	Lepidochelys olivacea	510784	9884717	86	
592 / 593	19/09/2019	La Botada	Lepidochelys olivacea	510788	9884796	93	
594 / 595	19/09/2019	La Botada	Lepidochelys olivacea	510795	9884712	108	

Table 3. Detail of TAG'S plates applied during the 2019-2020 season

The second secon		In	nter-American Co Conserv Anı	nvention for vation of Sea Ecuador nual Report	r the Protec a Turtles 2020	tion and
596 / 597	20/09/2019	La Botada	Lepidochelys olivacea	510800	9884724	103
598 / 599	20/09/2019	La Botada	Lepidochelys olivacea	510822	9884501	77
601 / 602	24/09/2019	La Botada	Lepidochelys olivacea	510790	9884761	108
603 / 604	24/09/2019	La Botada	Lepidochelys olivacea	510775	9884665	91
603 / 604	25/09/2019	La Botada	Lepidochelys olivacea	510789	9884482	87
605 / 606	25/09/2019	La Botada	Lepidochelys olivacea	510780	9884483	85
607 / 608	26/09/2019	La Botada	Lepidochelys olivacea	510773	9884483	103
609 / 610	26/09/2019	La Botada	Lepidochelys olivacea	510777	9884667	106
611/612	28/09/2019	La Botada	Lepidochelys olivacea	510805	9884458	106
613 / 614	28/09/2019	La Botada	Lepidochelys olivacea	510803	9884616	156
615/616	28/09/2019	La Botada	Lepidochelys olivacea	510790	9884398	88
617 / 618	06/09/2019	La Botada	Lepidochelys olivacea	510772	9884968	100

Source: MAAE / RVSMC-Pacoche Administration 2020

2.11RECORDED THREATS

Despite the management implemented, during the 2019-20 season there were many difficulties that reduced the reproductive success of the season, with the first being the incidence of the Sechura fox (Lycalopex sechurae), a species that has adopted in its diet, the consumption of sea turtle eggs, resulting in the total affectation of 37 clutches and a partial affectation of another 33 clutches. In the same order of affectation, there is the incidence of domestic dogs, who excavate the clutches and proceed to partially consume the contents, in this way 21 clutches were affected mainly on San Lorenzo beach, which represents 14.7 % of incidents.

These factors, added to low temperatures and excess water tables, caused high humidity and therefore a proliferation of fungi of the Fusarium genus, affecting approximately 12% of the total clutches registered. It should be considered that in those clutches partially depredated, albuminoid contents were spilled into the rest of the eggs, which later generated the colonization of bacteria and fungi and the interruption of the embryonic development process.

Another of the factors that generated a negative impact, mainly in the hatchery, was the presence of ants, fly larvae and even geckos that affected 14% of the clutches relocated within the hatchery on La Botada beach. The proportion of threats according to their origin is detailed in graph No. 6.

Graph No. 6. Threats recorded over total clutches, 2019-2020 season



The affectation by predation of eggs carried out by the species Lycalopex sechurae, was recorded at night; for this, the individuals waited for the moment in which the turtle spawned and returned to the sea to immediately dig and consume the content of the eggs; in some cases and depending on the number of individuals present, the affectation to the clutch was total or partial. Graph No. 7.

In relation to the total number of registered clutches, the incidence of negative factors in the season caused the total affectation of 42 clutches, that is, 13% of the total number of records, while the partially affected clutches were of the order of 31.2. % of the total registrations.



Graph No. 7. Levels of affectation in nests, 2019-2020 season

Source: MAAE / RVSMC-Pacoche Administration 2020



Ecuador

Annual Report 2020

2.12VARIABLES BIOLOGICAL PARAMETERS OF STUDY

A total of 225 clutches were exhumed, equivalent to 69.4% of the records. Based on the information collected, the different study parameters were determined, considering the methodology set forth in section 3.8 of this document.

2.12.1 Hatching percentage

To determine the hatching percentage, the number of empty shells without organic matter content, whose surface is greater than 50% of the shell, was obtained; Likewise, the number of infertile eggs without embryonic development, eggs with embryonic development and predated eggs within the clutch was obtained.

Eclosión (%) =
$$\frac{\#C}{\#C + \#HSDA + \#HNE + \#D} \times 100$$

The development of the equation determines the following results:

Eclosión (%) = $\frac{8520}{8520 + 2534 + 4615 + 4549} \times 100$

2.12.2 Percentage of emerged

To calculate the hatching rate for the season, the total number of shells, the number of live and dead hatchlings found in the chamber or sand column of the nest, the number of infertile eggs, and the number of unhatched eggs were obtained from the exhumations. with embryonic development and predated eggs.

The formula as well as its development is presented below:



Ecuador

Annual Report 2020

Emergida (%) = $\frac{\#C - (\#V + \#M)}{\#C + \#HSDA + \#HNE + \#D} \times 100$

Emergida (%) =
$$\frac{8520 - (336 + 269)}{8520 + 2534 + 4615 + 4549}$$
 X 100

Emergida (%) = 39,14

The breakdown of the results makes it possible to determine the reproductive parameters based on the nesting beaches, as detailed below:

	VARIABLES					
BEACH	Average number of eggs per clutch	hatching %	% emerged	deformation index		
La Botada	97,4	34,30	33,00	2,00		
San Lorenzo	96,75	33,66	30,53	5,32		

3. ENVIRONMENTAL EDUCATION

During the 2019 - 2020 season and in response to the 2019 Annual Operational Management Plan (PGOA), the Environmental Communication, Education and Participation (CEPA) program was carried out, which included an environmental education program based on raising awareness among students from educational institutions in the area of influence of the Pacoche Refuge.

3.1 Educational centers in the area of influence with which actions were coordinated

Within the framework of the project "Conservation of sea turtles, reduction of threats to the nesting habitat within the Pacoche Coastal Marine and Wildlife Refuge and its area of influence", environmental awareness activities focused on the conservation of sea turtles were developed., through the protection of their nesting sites. This program intervened directly in 14 educational institutions located in 12 communities and/or sectors of the area of influence of Ap. Pacoche as detailed in table No. 3.



Ecuador

Annual Report 2020

No	ESTABLISHMENT	COMMUNITY
1	Educational unit "Juan Montalvo Fiallo"	La Solita
2	Educational unit "Luis Antonio Bailón"	Pile
3	Educational unit "Tulmira Palacios Rivera"	Las Cruces
4	Educational unit "José María Córdova"	Santa Marianita
5	Educational unit "Robert Isaac Mero Largacha"	Santa Rosa
6	Educational unit "Santa Marianita"	Santa Marianita
7	Educational unit "Eloy Alfaro Delgado"	Las Piñas
8	Educational unit "Naidelyn Mero Arcentales"	Santa Marianita
9	Educational unit "Amazónico"	Rio Caña
10	Educational unit "Sucre"	Pacoche
11	Educational unit "Teodoro Wolf"	San Lorenzo
12	Educational unit "Simón Bolívar"	Pacoche
13	Educational unit "Ahitana Najhaby Ponce Santana"	San Lorenzo
14	Educational unit "Bolivia No. 72"	El Aromo

Table 3. Educational centers in which the environmental education program was carried out

For this purpose, from the Provincial Directorate of the Ministry of the Environment in Manabí through the administration of the AP. Pacoche, coordinated with the District Directorate of the Ministry of Education 13DO3 Manta - Jaramijó - Montecristi, the approval of the work plan and execution schedule of environmental education activities in the educational system.

3.2 Activities implemented

3.2.1. Environmental interpretation – information fairs

This activity was implemented based on the environmental education schedule approved by the Ministry of Education, to be carried out in 14 educational centers. For this purpose, a strategy was organized for each visit, which consisted of bringing to each educational institution a series of recreational and exhibition tools with which an awareness fair was implemented.

Among the elements that the stand had were illustrative models, playful games such as giant puzzles, knowledge box, among others. In addition to this, contests were held in which questions were asked about the topics taught during the day; Those who answered favorably received gadgets for the dissemination and promotion of the conservation strategies that are implemented in the territory.

The purpose of it was to sensitize the student population of educational centers, in the conservation and protection measures of the sea turtle monitoring program that can be assumed locally to contribute to the conservation of biodiversity. Each session lasted 30 minutes. He



Ecuador

Annual Report 2020

The total of students was 812 students from 14 educational centers in 12 communities in the area of influence of AP Pacoche.

4. PHOTOGRAPHIC ANNEX





Ecuador

Annual Report 2020

Photo 5: Eggs with the presence of fungi,	Photo 6: Eggs with the presence of fungi,
found during exhumation.	found during exhumation.
Photo 7: Clutch found on La Botada beach,	Photo 8: Track sweeping activity during
2019-2020 season	daytime hatching event at San Lorenzo beach



Photo 9: Emergence of hatchlings of *Chelonia mydas* in San Lorenzo beach.



Ecuador

Annual Report 2020

Title of the project

Distribution, demography and habitat use of the green turtle (*Chelonia mydas*) and hawksbill turtle (*Eretmochelys imbricata*) in the feeding, breeding and resting areas of Galapagos

Season (date of this report)

Start: July 2019 End: July 2020

Area(s)

Galapagos Marine Reserve

Institution

Galapagos Science Center, Universidad San Francisco de Quito

Responsible for this report

Daniela Alarcón Ruales

Participants (include if students/volunteers will participate)

Institutional collaborators

Directorate of the Galapagos National Park

Program type

Monitoring the aquatic ecology of tortoises in the Galapagos

General objective

Expand the understanding of the aquatic ecology of sea turtles (*Chelonia mydas*, *Eretmochelys imbricata*) in the feeding and resting areas in Galapagos. Contribute with significant information to face its current and future conservation

Specific objectives

1. Expand knowledge about its population status in Galapagos, mainly in marine-coastal areas.

2. Expand the understanding of habitat use and range of life in reproductive and non-reproductive seasons.

3. Understand behavior patterns of sea turtles in feeding grounds.

4. Contribute to the understanding of the effects of climate change on the populations of sea turtles present in the Galapagos.

5. Understand the effects of marine debris on the populations of Sea Turtles present in Galapagos.

6. Include local youth in research projects with sea turtles to stimulate education, citizen science, and control and compliance with management and conservation regulations.

7. Recommend conservation strategies, management and regulations based on the results of this project.

Question to answer

What is the condition of the sea turtle populations in a protected area like the Galapagos? **Methodology**



Ecuador

Annual Report 2020

Different methodologies are carried out, including: **1.Photo identification.**

Photo-identification is a non-invasive method already verified for sea turtles. It is done by analyzing photographs taken from the right and left sides of the turtles using the I3S software (Interactive Individual Identification System) and the online software Wildme and Wildbook. The same one that works based on the generation of a unique code formed from the numerical analysis of the combination of patterns recognized in the post-ocular scales, temporal scales and tympanic scales. Said numerical analysis has been adapted according to the methodology presented by Jean Claire (Jean et al. (2010). The photographs are taken at the time of capturing the individuals, additionally local youth and people interested in contributing to citizen science issues send us photographs of individuals in different sites of the archipelago that are analyzed with the same methodology.

2. Capture and marking of individuals. External marks type INCONEL.

Animals will be captured by hand with the use of snorkeling equipment, in the different areas previously described, to apply INCONEL-type stainless steel tags. The tags will be applied quickly and without negative impact to the turtles by using a special applicator for that purpose (Balazs 1992). While the turtle is captured, a complete record of measurements and photos will be made. Standard measurements: curved carapace length (LCC), curved carapace width (ACC), tail length (LC), tail plastron (CL) and weight (Balazs 2002). A GPS point will be taken to record the location of the captured individual for later mapping.

3. Sampling, diet and genetic analysis.

With the individuals captured through the use of snorkels, after applying the metallic INCONEL marks described above, with the help of a sterile scalpel, skin and shell samples of a size of 5mmx5mm will be taken, which will be stored in salt. table inside eppendorf tubes, to later perform analysis of stable isotopes and diet in the studied turtles and genetic subjects.

4. Acoustic Monitoring. Installation of markings (V16, VEMCO®). Installation of continuous video cameras to obtain behavior information in real time.

Transmitters (V16, VEMCO) (length = 9.5 cm long x 1 cm wide) (VEMCO, Halifax, Nova Scotia, Canada) will be placed on individuals of both turtle species, n=50. After being acoustically marked, the turtle will be returned to the water in the same place where it was captured. A unidirectional hydrophone (VEMCO-VH110) connected to a VR100 receiver will be used, which was installed on a vessel of length +- 6 meters. The hydrophone, submerged in water, detects the signal emitted by the transmitter when it is within the range



Ecuador

Annual Report 2020

of the receiver +- 500 m. The transmitters are coded to emit a GPS signal every second.

The brands will be equipped with GoPro® continuous video cameras (GoPro, CA, USA). A synthetic foam buoyancy base (Syntech, VA, USA) will be used to give the chamber positive buoyancy. The camera will be located on the front of the brand. The camera will be in an underwater housing which will be easily mounted and removed from the animal by means of a timed release suction cup (6 to 8 hours). Continuous video tags will be applied to a turtle by placing a small suction cup on the carapace on the first vertebral scute. The entire process of placing the continuous monitoring mark with an underwater camera lasts approximately 10 minutes. The camera with the acoustic mark will release itself after an approximate time of 4 to 6 hours of recording or after the required follow-up time, a person swimming with a snorkel will remove the camera from the turtle just by touching the device on the animal. The videos obtained in these recordings will be visually analyzed by project scientists to better understand the specific objectives set, additionally it is expected to use these videos as didactic material with prior authorization from the DPNG.

Activities

Water monitoring activities are carried out, work is being done on issues of dissemination of information to the community, work is being done on scientific publications.

As a result, in this reporting year, work has been done on the following information, for reasons of the COVID-19 pandemic, field work has been suspended since March 2020. **Results**

Our effort has focused on analyzing data and studying specific issues that contribute to the expected results.

Photo identification: Photographs of sea turtles that have been taken by users of the marine reserve have been compiled to acquire them in our local database. Additionally, the database of more than 700 individuals identified between green and hawksbill turtles is now being analyzed by a software that presents better characteristics than I3S, which is the program used previously. Now the photographs are being analyzed through the Microsoft identification program called Wild me in which through a user it is possible to store information in the cloud and compare populations at a regional level. This program can be an excellent tool in non-invasive work with sea turtles with the possibility of recognizing individuals and comparing them at a regional level.

Capture and Marking of individuals: The capture and recapture program continues in which individuals are monitored through INCONEL tags. This year, 27 individuals of green turtles and 3 new individuals of hawksbills have been captured.

This year we focused on making specific captures for the determined methodology; In total,



Ecuador

Annual Report 2020

we captured 12 new tortoises, which are now part of the 682 tortoises that have been captured and measured in Galapagos by the project (Table 5). Most of the new captures were females (6 turtles), then juveniles (5 turtles), and finally a male (see table 1 with data).

recaptures

This year, 15 turtles were recaptured and measured to see their growth and movement (Table 6). With the exception of one turtle (GAL298), all the turtles were caught on the same beach that they were caught other times. To see their growth, the curved length of the carapace (LCC), the curved width of the carapace (ACC), and the total length of the tail (LTC) were analyzed. The average growth rate per year of juvenile, female and male turtles was calculated (Figure 4). Males grow faster in tail length (1.25cm/year), while juvenile turtles grow faster in length (1,653cm/year) and width (2,945cm/year) of the carapace.

A temperature study was carried out with the captured individuals to find a less invasive method of taking the body temperature of the turtles, it was found that using the infra red (IR) gun pointing at the cloaca results in the closest values to those taken. with the couple-thermoelectric. Table 2 shows all the temperature values taken in 2019 with the thermoelectric couple and with the IR gun pointed at different places on the body of the turtles. The temperature taken by the thermoelectric couple is internal, so it could be said that it is the real temperature of the turtle. To find out which temperature values taken with the IR gun at various places on the body are closest to the values of the thermoelectric couple, the average of the difference between each value taken by the IR gun and the thermoelectric couple was calculated. The place with the closest values when using the IR gun to the values of the thermoelectric couple is the cloaca, with an average difference of 0.73°C (Figure 3, 4). These results suggest that the use of the IR gun aimed at the cloaca of the turtle is an effective alternative to measure body temperature in a less invasive way. Sampling: skin and shell samples continue to be collected from captured individuals. Analyzes are carried out in regional collaboration. View post information.

Additionally, with the samples collected, genetic analyzes were carried out (framework contract), which are being used for studies at the regional level to investigate whether the genetic and morphological variation of the endangered green turtle (*Chelonia mydas*) is consistent in a geographical context. We predicted an association between population genetic structure and body shape variation at a broad scale (between lineages) and at a fine scale (between **feeding areas**) using mitochondrial DNA and geometric morphometry (See Figures 5,6,). Acoustic marking and scientific video

Work is being done on the videos collected through different software using BORIS and Arc GIS. The results are expected to be presented next year.

Graphics



Ecuador

Annual Report 2020

8						
Tag/Marca de Aleta Izquierda	Tag/Marca de la Aleta derecha	Species/Espe cie	Morphotype/ Morfotipo	Sexo/Gender	FECHA/DATE	Capture location/Lugar de Captura
JG112	JG113	Cm	Verde	Junvenile		Loberia
JU801	JU802					
EA0934	EA0935	Cm	Verde	Juvenile		Loberia
GAL15211	GAL15212	Cm	Verde	Juvenile	10/3/19	Carola
GAL15212	GAL15214	Cm	Verde	Juvenile	10/3/19	Carola
GAL01GS		Cm	Verde	Male	24/04/2019	Carola
GAL15227	GAL15226	Cm	Verde	Female	26/04/2019	Loberia
GAL15199	GAL15200	Cm	Verde	Female	26/04/2019	Loberia
GAL15176		Cm	Verde	Juvenile	26/04/2019	Loberia
GAL15249		Cm	Verde	Female	26/04/2019	Loberia
GAL15228	GAL15229	Cm	Verde	Female	26/04/2019	Loberia
EA0118	EA0119	Cm	Yellow	Juvenile	22/01/2020	Rosa Blanca
EA0120	EA0121	6	Carey	Female	22/01/2020	Rosa Blanca
(C157	JC158	Cm	Verde	Juvenile	10/3/2019	Carola
JC157	JC158	Cm	Verde	Female	20/4/2019	Carola
JC223	no tag	Cm	Verde	Female	10/3/19	Carola
No tag	JG187	Cm	Amarilla	Juvenile	10/3/2019	Carola
No tag	JG187	Cm	Amarilla	Juvenile	24/04/2019	Carola
JC236	JC238	E	Carey	Juvenile		Loberia
JU801	JU802	Ð	Carey	Juvenile	10/3/2019	Carota
1G3	IGS	Cm	Amarilla	Junvenile	24/04/2019	Carola
JD857	no tag	Cm	Verde	Female	20/08/2019	Carola
JC155	JC156	Cm	Verde	Female	20/08/2019	Carola
JU722	JU723	Cm	Verde	Female	20/08/2019	Carola
JU716	JU717	Cm	Verde	Male	10/3/19	Carola
JG203	no tag	Cm	Amarilla	Juvenile	10/3/19	Carola
ID697	no tag	Cm	Amarilla	Juvenile	10/3/19	Carola
JU797	JU798	Cm	Amarilla	Juvenile	10/3/19	Carola
JU797	JU798	Cm	Amarilla	Juvenile	24/04/2019	Carola
JU799	JU800	Cm	Verde	Junvenile	24/04/2019	Carola

Turtle	couple-	IR	IR	IR	IR right	IR left
	thermoelectric	cloaca	carapace	neck	axillary	femoral
	cloaca (°C)	(°C)	(°C)	(°C)	(°C)	(°C)
GAL145	17.9	18.5	18.8	19.3	17.6	17.4
GAL577	17.7	17	17.3	17.5	17.1	17.5
GAL671	17.9	18	19.7	19.5	19	17.5
GAL672	18.2	17.1	18.8	17.8	16.8	17.3
GAL673	18	18.9	22	19	18.8	19.1
GAL674	18.3	19.5	20.4	19.8	19.1	18.6
GAL109	18.8	19	21.9	19.1	19.9	19.4
GAL146	17.9	19	21.5	20.6	18.4	18.6



Ecuador

Annual Report 2020

GAL151	17.9	18.9	20	20.2	19.1	18.9
GAL298	17.6	17.6	18.4	17.7	17.5	17.5
GAL108	18.4	18.2	19.5	19.5	18.4	18.2
GAL532	18.1	19.4	20.8	20.4	19.5	19.2
GAL146	26.5	26.1	26.5	25.7	25.4	25.7
GAL577	26.4	25.2	27	26.8	25.3	25.4
GAL109	26.6	25.4	24.7	24.2	23.6	23.5
GAL529	24.1	24.2	24.6	23.6	22.5	22.9
GAL640	24.5	23.6	23.7	24.3	24	23.6
GAL227	23.8	22.6	22.6	23.6	23.5	23.1
GAL675	24.8	24.4	23.8	23.8	23.9	23.8
GAL582	23.3	22.8	23.1	23.3	23.3	22.8
GAL676	23.8	24	24.2	24.4	24.7	24.3
GAL580	24	23.2	23	23.2	23.4	23.3
GAL109	24.7	25.5	26.1	26.6	25.4	25.8
GAL416	25.9	25.5	27.1	26.1	24.6	24.6
GAL677	26.1	24.3	25.9	24.4	26.2	25.8
GAL577	26.2	26	26.6	24.8	24.2	26.5
GAL581	26.5	25.8	26.4	24.5	23.2	24.9
GAL580	26.6	26.6	22.5	22.4	21.2	22
GAL678	26.4	25.1	25.7	26.7	25.2	26.4
GAL679	25.7	26.2	26.4	25.3	26.7	26.2
GAL680	24.3	26.3	27.1	27.2	26.3	25.3
GAL681	24.9	25	27	26.1	26.2	26.3
GAL682	25.2	26.2	26.9	27.3	27.4	26

Table 2: Body temperatures of sea turtles captured in 2019 taken with the thermocouple (internal) and the IR gun (external)



Ecuador







Chelonia myaas



Ecuador Annual Report 2020





Ecuador

Annual Report 2020

Title of the project

Marine Turtle Monitoring Report in the Rio Muisne Estuary Mangrove Wildlife Refuge "RVS-MERM"

Season 2019-2020

Season (date of this report)

Start: July 2019 End: February 2020

Area(s)

Rio Muisne Estuary Mangrove Wildlife Refuge "RVSMERM"

Institution

Coordinación Zonal Esmeraldas - Ministerio del Ambiente y Agua

Responsible for this report

Sr. Ander Gracia G. Responsable del Programa Manejo de Biodiversidad.

Participants (include if students/volunteers will participate)

Atty. Elvis Chávez O., Eng. Dixon Cedeño T., Mr. Donato España G., Eng. Alex Cevallos F., Mr. Raul Pinargote C., Mr. Sandro Obando A., Mr. Jorge Villacres C., Mr. Héctor García Z., Eng. Karina Casierra H., Atty. Argelio Ortiz RVSMERM Officials, Ms. Carmen Wells V, and Hotel Royal Decameron Mompiche Staff (Volunteers)

Institutional collaborators

Conservación Internacional

GIZ

Proyecto Marino Costero WILDAID Inc. SGMC

Program type

The strategies or Management Programs implemented for the conservation of sea turtles, as conservation objects in RVSMERM are: Biodiversity Management (Nesting Monitoring, Stranding)

General objective

Determine through day and night monitoring that in the Province of Esmeraldas, Muisne canton, Muisne and Bolívar parish, Muisne and Portete beach, there is nesting of Olive Ridley Turtle (*Lepidochelys olivacea*).

Specific objectives

1. Protect the nesting areas of the Olive Ridley Turtle (*Lepidochelys olivacea*) on Muisne and Portete beaches.

- 2. Determine the number of clutches deposited during the breeding season.
- 3. Protect nests from present threats.
- 4. Mitigate threats to sea turtle nests.

5. Generate priority information on Sea Turtles as the RVSMERM Team.

Question to answer

What is the number of nesting female sea turtles that use the beaches of Muisne and Portete? When applying management and conservation measures to sea turtle nesting sites in



Ecuador

Annual Report 2020

RVSMERM, what is the long-term recovery trend of the nesting population and reproductive success?

Methodology

To efficiently comply with the implementation of Monitoring, the following methodology was applied:

1. Playa de Portete has a horizontal zoning, 11 wooden boards were placed, the same ones that are located in a north-south direction, are numbered increasingly (starting from 0 to 11) and Muisne Beach refers to the location of private properties adjacent to the beach.

2. For the rescue or care of sea turtles affected by anthropic activities, the "Ecuador Marine Fauna Stranding Protocol" will be applied.

3. The RVSMERM Park Rangers are trained both theoretically and practically, they know the necessary information about biology, ecology, behavior, management, current status of sea turtle species, and data collection for subsequent filling of file, which include data such as species identification, trace identification, measurements, nest relocation, egg handling, egg count, biometrics, exhumations.

4. The training will also be carried out for interns and volunteers who wish to participate in the monitoring, which will be instructed in what the sea turtle conservation program consists of.

5. Sensitization to users, citizens, educational centers and tourists of the Portete and Muisne Beach, through talks, campaigns, advertising spaces, which will include messages about the value of the sea turtle and the importance of its conservation for maintain the balance of the marine ecosystem.

6. Work meetings were held with the CEPA, Control and Surveillance, Tourism, MPCEIP-ZONAL 1-SRP and Marina programs, to plan control and disseminate the Sea Turtle conservation laws to fishermen and vessels that carry out fishing operations in front of to the coasts of Muisne since they beat and kill the Turtles to detach the hooks from their mouths.

7. The records established in the National Sea Turtle Plan were implemented, for the survey from the arrival of the turtles to the hatching of the eggs.

8. In each patrol, the data corresponding to the files will be recorded, as general information, the name of those responsible for monitoring, the date of monitoring, tide, start and end time of monitoring will be recorded.

9. A consecutive number will be assigned to each nest found starting from 001, in addition the time of the sighting and the type of activity in which it was found will be noted, using the time distribution of 24:00 hours.

10. A monthly and quarterly monitoring and evaluation system will be implemented, by the Administrator, Technician, responsible for the Biodiversity Program of the RVSMERM Protected Area, which generates alerts based on the results presented by the Park Rangers after daily monitoring, carrying out a record of the information obtained during the conferences and analyze the percentage of hatching success, in order to establish



Ecuador

Annual Report 2020

compliance with the objectives and in case of identifying difficulties, threats or findings, define urgent application strategies.

11. The Park Rangers in charge of the daily monitoring of sea turtles, will deliver to the Refuge Administrator and person in charge of the Biodiversity Program a daily report of the activities carried out, findings found and recommendations.

1. Monitoring was carried out daily during the 8-month period, beginning in July 2019 and ending in February 2020.

2. Daytime patrols were carried out from (06:00 a.m.) to (14:00 p.m.), and night patrols from (10:00 p.m.) to (06:00 a.m.) at Portete beach, and at Muisne beach Daytime tours from (08:00 a.m.) to (11:00 a.m.) to verify traces and possible nests, patrolling in ebbing and rising tides and at mid-tide, although the sampling effort will be modified according to the emergence of turtles towards the beach , dividing the patrols in turns to cover during the day.

3. For daytime and nighttime monitoring, the RVSMERM Administrator, through the planning sent, will designate two AP Rangers as responsible for Monitoring.

4. The park rangers responsible for monitoring must count the nests and footprints of the turtles, for this, they must identify if the footprint is up to the beach or down to the sea, if the track belongs to a pre-nesting activity or corresponds to a nest.

5. The nests that are identified in situ will be protected from domestic animals (dogs) and farm animals (cows and horses), by using quadrangular metal meshes of 60 cmx 60 cm at surface level, introducing fixatives into the sand 40 cm.

6. When the turtle is observed, the points and the area and what type of activity it was carrying out from the moment of the encounter will be recorded.

7. It will also be recorded as observations if the turtle had some type of injury, amputation, tumors, hooks, mark or if the individual was dead or stranded on the beach (according to the monitoring file).

8. Regarding the collection of biometric data to nesting females, it will be carried out at the moment that the turtle that is in the spawning stage (>30 eggs) or when the turtle locates the slope of the beach and goes towards elmar (returning). The turtle will be handled at all times using latex gloves.

9. For the collection of morphometric data, flexible tape measures of 150 cm in length and a caliper will be used.

10. Nesting turtles will be marked with a tag applicator, these have a number and the initials of the place of origin (EC101), and on the back with the inscription info.tortugas@ambiente.gob.ec, to report to the turtle in case of being recaptured by personnel from another project or nesting beach.

11. Measures of the width of the footprint and the type of symmetry will be taken from the observed traces.

12. To establish the symmetry of the trail, a wooden stick will be placed from one fin print to the other horizontally. If both tracks coincide linearly, the trail is symmetrical, if not, it



Ecuador

Annual Report 2020

will be asymmetrical.

13. Management of the nest: once the nest is located, it will be decided what will be the best management for it, based on factors such as the location, if the site is safe, if it is prone to being reached by the tide, if the site is highly erodible, if there is evidence of predators or other animals that can cause damage, looters, light pollution.

14. After 50 days after the nest is laid, the respective daytime monitoring is carried out to record the census and hatching in the nests. When identifying emerged hatchlings in the monitored nests, the protection mesh is not completely removed, that is, it is maintained until exhumation is carried out.

15. The process of exhuming the nests is carried out three days after the emergence of the hatchlings, to record the following data: empty shells, infertile eggs, unhatched eggs, live and dead hatchlings inside the nest. Once the season was over, the following formula was applied to the database to obtain the percentage of hatching and emerged success.

Formulation

a.

Eclosión (%)= (C)/(C+HSDA+HNE+# D) x 100 Emergida (%)= (C - (V+M))/(C+HSDA+HNE +# D) X 100

C = Number of empty shells counted (>50% complete).

V = Live inside the nest or live hatchlings between the shells (not those in the neck of the nest).

M= Number of dead hatchlings outside their shell.

HSDA = Eggs Without Apparent Development (Eggs not hatched, without an obvious embryo).

HNE = Unhatched Eggs (Unhatched eggs with evident embryo).

D = Predated (Open shells, almost complete, containing egg residue).

Actions to reduce threats at nesting sites:

1. Relocation of nests: Each of the nests and their location were evaluated; Being in vulnerable areas due to natural events, such as floodwaters and waves, the relocation was carried out, with the proper equipment (gloves, masks, basket for eggs, dark plastic to protect from the sun's rays), they were relocated to a site with the same characteristics of depth, width and length of the original nest chamber, procedure must be carried out before completing 48 hours, to a site that presents better conditions, to later proceed with the protection.

2. Control of introduced species: Several groups of dogs and farmyard animals have been identified on the Portete and Muisne Beach, which represent a threat to the fauna of the site,



Ecuador

Annual Report 2020

for which actions have been taken, a census of dogs has been carried out and a Discussed with the owners so that during the nesting season at night they are kept in captivity.

3. Protection of the nests: During the season, the protection of the nests has been carried out with the use of the following materials: electro-welded mesh, wood from the middle and flags or pleibo in order to protect the nest from interaction with the nests. visitors and predation by dogs found within the sea turtle nesting beaches in the RVSMERM.

Results

Two beaches were monitored: Portete, which is approximately 2.33 km long. and Muisne with 5,700 km approx.

Daytime and nighttime monitoring was carried out, recording and identifying traces of sea turtles, the Olive Ridley species (*Lepidochelys olivacea*), the results by beach were as follows:

Portete beach: 91 nests confirmed, protected and monitored, 1 arrival with a nest located on Mompiche beach and relocated to Portete beach, 8 nests attacked and destroyed by dogs, 2 nesting females attacked and killed by dogs; and 3 unmonitored hatched nests.

Muisne beach: 25 confirmed, protected and monitored nests. A total of 128 *Lepidochelys olivacea* turtle nests were recorded on the two nesting beaches of the Muisne River Estuary Mangrove Wildlife Refuge. (See table)

Beach	Nest	Hollow Body	U-turn	false walk
Portete	103	0	0	0
Muisne	25	0	0	0

Table 1. Activities of nesting turtles by beach.

Sea turtle nest relocations

According to the criteria that are applied in the event of a natural threat (beach erosion, tides or waves) or anthropic threat (human intervention or exotic or introduced animals), nests are relocated to ensure hatching and emergence success; Taking this criterion, 29 nests that were recorded on the Portete beach were preseded upon, which were relocated on the same beach towards the upper area where the spring tide does not reach them LO-2, LO-3, LO-5, LO- 6, LO-8, LO-11, LO-14, LO-15, LO-MOMPICHE16, LO-21, LO-22, LO-24, LO-38,

LO-39, LO-41, LO-46, LO-47, LO-51, LO-55, LO-57, LO-63, LO-66, LO-74, LO-75, LO-76, LO-79, LO-83, LO84 and LO-92.

On Muisne beach, 20 nests were relocated and are the following: LO-1, LO-2, LO-3, LO-



Ecuador

Annual Report 2020

4, LO-5, LO-6, LO7, LO-8, LO-9, LO-10, LO-11, LO-12, LO-13, LO-14, LO-15, LO-16, LO-17, LO18, LO-19 and LO-20.

Protection of nests with metal mesh

Once a nest was detected in situ, it was protected with electro-welded mesh. The PA has a total of 100 metal meshes.

The rate of predation of sea turtle nests on portete beach during the season was 7.7 % of egg predation by dogs, while on muisne beach there were no events of damage to nests by dogs in El Aguaje September affected Nests # 1, 2 and 3, of a total of 341 relocated eggs, only 84 live hatchlings and 2 infertile eggs were recorded, the rest of the eggs were affected and carried by the tide.

Exhumation Data

117 olive ridley turtle nests were exhumed, obtaining 8090 sea turtle hatchlings born in the RVSMERM.

Regarding the species of Lepidochelys olivacea, the following results are shown;

The estimation of the hatching and emerging success of the total number of nests (117 nests) exhumed was:

Density per Beach L. olivacea					
Beach	Hatching (%)	Predation (%)	Emerged (%)		
Portete	81.37%	80.78%	7.7%		
Muisne	83.92%	83.10	0.0%		

Table: Hatching and emerging successes of the Lepidochelys olivacea turtle.

Seasonal egg density L. olivacea				
Parameter	Season 2019 - 2020			
Emerged hatchlings	8090			
Dead hatchlings	30			
Eggs preyed on by dogs	42			
Infertile eggs	1366			
Eggs without embryonic development	33			
Unhatched eggs with embryonic development	379			
Total eggs	9940			
Table: Data obtained from the nests exhumed in the 2019-2020 season.				
CONCLUSIONS.				



Ecuador

Annual Report 2020

From the results of the nesting of turtles of the 2019-2020 season in the Manglares Estuario Rio Muisne Wildlife Refuge "RVSMERM" the following are mentioned: 1. In the 2019 - 2020 nesting season, Olive Ridley turtles (*Lepidochelys olivacea*) were recorded.

2. 100% of the nests were protected, marked and monitored.

3. 6351 *Lepidochelys olivacea* turtle hatchlings were released to the Marine zone of the RVSMERM beach in Portete in the 95 exhumed nests with hatching success of 81.37%, emergence success of 80.7% and a predation rate of 7.7%.

4. 1739 *Lepidochelys olivacea* turtle hatchlings were released to the RVSMERM Marine area, Muisne beach in the 25 exhumed nests with hatching success of 83.92%, emergence success of 83.10% and a predation rate of 0.0%.

5. The existing dogs in the buffer zone of Playa Portete devoured 8 nests and attacked 2 nesting females.

6. 32 Dead Sea Turtles were registered on the RVSMERM beaches and 10 Live Turtles, Rehabilitated themselves that were stabilized in the AP Offices, to later Transfer them to REVICOF.

7. In July 2019, a meeting was held with the councilors of the Muisne canton and Authorities of the Ministry of the Environment with the purpose of creating an ordinance for the non-presence of urban fauna on the beaches of the canton and to date we have not had results on resolution of the ordinance.

8. A census of dogs was carried out on the beaches of Muisne and Portete, dialogue was held with the owners of the dogs, explaining to them that for the 2020-2021 season they should keep the dogs in captivity at night.

9. The main threat of nesting females in the marine area is incidental fishing with spinel or longline since marine species swallow the hooks and are hit on the head and shell by the fishermen to detach the hooks and in the terrestrial area They are the dogs that devour the nests.

RECOMMENDATIONS.

Through the results obtained on the RVSMERM nesting beaches, the following is concluded:



Ecuador

Annual Report 2020

 That the team of park rangers continuously monitor the Sea Turtle Nesting Beaches in the RVSMERM, to obtain more information on the species that nest during the seasons.
 Due to the natural phenomena that nesting beaches may suffer and the threats from feral dogs, the implementation of a hatchery on Muisne and Portete Beach is recommended.

3. Hold work meetings with the CEPA, Control and Surveillance, MAP-SRP and Marina program, to plan control and disseminate the Sea Turtle conservation laws to fishermen and vessels that carry out fishing operations off the coast of Muisne.

4. From the Esmeraldas Zonal Coordination - Ministry of the Environment and Water, the LOSEP is reviewed and based on the laws, a special work schedule is prepared for the RVSMERM Park Rangers during the Sea Turtle Nesting season 2020 - 2021, which includes the months of July to February work from (23:00 pm to 06:00 am), time in which effective and effective monitoring will be carried out and more data will be collected from the season.

5. Socialize the sea turtle conservation project in the communities, associations, schools and beaches of the Muisne canton.

6. In coordination with the CEPA and TOURISM program, carry out continuous cleaning tasks in the nesting areas.

7. Request the PAE (Ecuador Animal Protection) to carry out a pet sterilization campaign on the Muisne and Portete beaches and thus prevent dogs from continuing to breed and destroy nests.

8. Based on the results of dead and rehabilitated turtles, create the need for the province of Esmeraldasse to build a Marine Fauna Attention and Rehabilitation Center, to reduce the costs of transporting Bruised Specimens

IMAGES





Ecuador Annual Report 2020



Sr. Ander Gracia G. Guardaparques RVSMERM – ander.gracia@ambiente.gob.ec

In the 2018-2019 monitoring season, the following results were obtained:

1. 9,935 *Lepidochelys olivacea* turtle hatchlings were released into the RVSMERM marine zone in the 120 exhumed nests with a hatching success of 98.92%, an emergence success of 88.23% and a predation rate of 0.38%.

2. On the beaches of Muisne and Portete, 177 sea turtle arrivals were recorded, resulting in the following data: 120 Hatched Nests 67.79%, 40 Nests Predated by Dogs 22.59% and 17 Nests Affected by Aguaje 9.60%.

35 Dead Sea Turtles were registered on the RVSMERM beaches and 10 Live Turtles, Rehabilitated themselves that were stabilized in the AP Offices, to later Transfer them to REVICOF and they take them to the PNM to be attended by Specialized personnel from the Fauna Marina Rescue Center .

Note: The NGO Equilibrio Azul worked on the Portete beach from 2008 to 2015, monitoring the beach throughout the nesting season day and night, determined during the monitoring the following information in the year 2012 60 nests, 2013 88 nests, 2014 69 nests and 2015 89 nests; in the administration of the AP, the information of all the years of Monitoring of Blue Balance is not available.

Sr. Ander Gracia G Guardaparques RVSMERM



Ecuador

Annual Report 2020

Title of the project

CONSERVATION OF SEA TURTLE NESTING SITES THROUGH DAY AND NIGHT MONITORING. GENERAL VILLAMIL BEACHES - ECUADOR. SEASON 2019 -2020.

Season (date of this report)

Start: June 2019 End: June 2020

Area(s)

Villamil Beaches National Recreation Area

Institution

Ministerio del Ambiente y Agua del Ecuador

Responsible for this report

Carlos Méndez Román.

Participants (include if students/volunteers will participate)

ANRPV park rangers: Blga. Yolanda Bazurto, Ing. Saily Hernández, Lcda. Gricelda Franco, Blgo. Orlin Quinde, Mr. Jhonny Martinez

Institutional collaborators

International Conservation; Wild Aid

Program type

The strategies or Management Programs implemented, for the conservation of sea turtles, as conservation objects in ANRPV are: Biodiversity Management Program (Nesting Monitoring, rescues in case of stranding and tagging) Environmental communication, education and participation program and Public Use and Tourism Program

General objective

Maintain the nesting sites for sea turtles in the ANRPV in good condition.

Specific objectives

Generate a 2019 - 2020 database to determine the long-term population trend, number of nests, hatching and emerging success, movement patterns, individual growth rates and reproductive history.

Minimize direct and indirect threats that affect sea turtle nesting sites

Methodology

For the generation of a record of nests and footprints, daily daytime monitoring was applied on foot from July 2019 to March 2020, in the first 5 km of the AP.

Ascent/descent tracks, number of nests and records of sea turtle strandings are recorded with their respective biometric data. The identified nests are followed up until hatching, days later they are exhumed for the collection of the following data, for the calculation of hatching and emergence success. (Hatching success includes hatchlings that hatched but did not hatch, hatching success includes hatchlings that subsequently hatched successfully).



Ecuador

Annual Report 2020

Eclosión (%) =
$$\frac{C}{C + HSDA + HNE + \# D} \times 100$$

Emergida (%) = $\frac{C (V + M)}{C + HSDA + HNE + \# D} X 100$

C = Number of empty shells counted (>50% complete).

V = Live inside the nest or live hatchlings between the shells (not those in the neck of the nest).

M= Number of dead hatchlings outside their shell.

HSDA = Eggs Without Apparent Development (Eggs not hatched, without an obvious embryo).

HNE = Unhatched Eggs (Unhatched eggs with evident embryo).

D = Predated (Open shells, almost complete, containing egg residue).

For the collection of data for the estimation of population density, movement patterns, individual growth rates and long-term reproductive history, through nocturnal monitoring, three times a week, a physical marking method (Tags) is applied, coded and with information (email) recorded on the back of the brand, for identification and reporting. Biometric data, species identification and number of eggs laid are collected from each tagged or recaptured turtle.

To control threats, the nests are protected with plastic mesh, they are coded and the respective monitoring is given until they hatch.

Activities

Daytime monitoring: From July 2019 to March 2020, daytime monitoring was carried out in the first 5 km of the ANRPV, considered nesting sites for sea turtles.

Night monitoring: In the current season during the months of August, September, October and November 2019, night monitoring was carried out 3 times a week, making tours of the nesting beaches of the ANRPV, night monitoring was scheduled to start approximately two hours before high tide.

Once the turtle has been identified on the beach, we proceed to work on it once the eggs are laid (>30 eggs), observing any bad scar formation, morphometric data is taken, tags are applied, if it does not present and otherwise it is the brand code is recorded and the nest data is taken in addition to the count of the number of eggs laid in the chamber.

The marks are normally located between the first and second scales of the anterior fins or in the fold before the first scale. Both fins are marked with the help of an applicator, taking



Ecuador

Annual Report 2020

into account that when closing the tag there is a margin of 5 mm from the edge. of the skin. The Tags have a number and the initials of the place of origin (EC201), and on the back with the inscription info.tortugas@ambiente.gob.ec, to report the turtle in case it is recaptured by personnel from another project.

Hatching Record

After 50 days after laying, the respective daytime monitoring is carried out to record the census and hatching in the nests. When identifying emerged hatchlings in the monitored nests, the protection mesh is not completely removed, that is, it is maintained until the exhumation is carried out, in this way the sea turtle nests are protected until the end of the process.

Exhumation Record.

The nest exhumation process was carried out seven days after the hatchlings emerged, to record the following data: empty shells, infertile eggs, unhatched eggs, live and dead hatchlings inside the nest. Once the season was over, the following formula was applied to the database to obtain the percentage of hatching and emerged success.

Formula

Eclosión (%)= (C)/(C+HSDA+HNE+# D) x 100 Emergida (%)= (C - (V+M))/(C+HSDA+HNE +# D) X 100

C = Number of empty shells counted (>50% complete)

V = Live inside the nest or live hatchlings between the shells (not those in the neck of the nest).

M= Number of dead hatchlings outside their shell.

HSDA = Eggs Without Apparent Development (Eggs not hatched, without an obvious embryo).

HNE = Unhatched Eggs (Unhatched eggs with evident embryo).

D = Predated (Open shells, almost complete, containing egg residue).

Results

The first 5 km of the ANRPV were monitored, obtaining only the record of a single nest at the height of Hostería El Delfín.

Exhumation Data

One Olive Ridley turtle nest was exhumed, obtaining 126 shells.

Regarding the species of *Lepidochelys olivacea*, the following results are shown;



Ecuador

Annual Report 2020

The estimation of the hatching and emerged success of the entire exhumed nest was 95.45 % and 93.93 % respectively and 0 % predation.

Density L. olivacea					
Beach	Hatching (%)	Emerged (%)	Predation (%)		
Sector Hostería el delfín	95.45	93.93	0		

Table 1: Hatching and emerging successes of the *Lepidochelys olivacea* turtle, season 2019-2020.

Seasonal egg density L. olivacea							
Parameter	Season 2019 - 2020						
Emerged hatchlings	126						
Dead hatchlings	0						
Eggs preyed on by dogs	2						
Infertile eggs	6						
Eggs without embryonic development	0						
Unhatched eggs with embryonic development	0						
Total eggs	134						
Table 2. Data obtained from the nest exhume	d in the 2019-2020 season.						

CONCLUSIONS.

During the 2019 - 2020 sea turtle nesting season in the ANRPV, an olive ridley turtle (*Lepidochelys olivacea*) nest was identified. RECOMMENDATIONS

• It is recommended to create a group of volunteers to be able to monitor more possible nesting areas

Images





Ecuador

Annual Report 2020

Photo 1, 2. Data collection of exhumations

Reference for access to information

Lcdo. Carlos Méndez – Responsable de ANRPV – Carlos.mendez@ambiente.gob.ec

Blga. Yolanda Bazurto – Especialista de ANRPV – Yolanda.bazurto@ambiente.gob.ec

General remarks:

The number of nests registered during the 2019-2020 period was the same compared to the 2018-2019 season.

Responsibility Signature:



Ecuador

Annual Report 2020

Title of the project

SEA TURTLE CONSERVATION THROUGH PROTECTION AND RESEARCH ACTIVITIES IN NESTS AT HIGH ANTHROPOGENIC AND NATURAL RISK TOURIST AREAS IN EL PELADO MARINE RESERVE AND ITS ZONES OF INFLUENCE, SANTA ELENA-ECUADOR. SEASON 2019 -2020

Season

Start: June 2019 End: May 2020

Area(s)

Marine Reserve "El Pelado"

Institution

Dirección Provincial De Ambiente De Santa Elena

Responsible for this report

Biól. Sebastián Alvarado

Participants

Biól. Sebastián Alvarado Lcdo. David Ortiz Ing. Alex Pilay Tcnlg. Pesq. Verónica Chipe Tcnlg. Pesq. Viviana Medina Tcnlgo. Pesq. Cesar Soledispa

Biol. Alex Borbor Biol. Solange Bolaños

Institutional collaborators

- Ecuador Mundo Ecológico Permiso de investigación generado por parte la Dirección Provincial de Ambiente Santa Elena, a través de la Unidad de Patrimonio Natural y Vida Silvestre; mediante Oficio Nro.MAE-DPASE-2017-2181-O, otorgado a la Biól. Jodie Jessica Darquea Arteaga, INVESTIGACION CINETIFICA N°006-17IC-FAU-DPASE-MA con el tema "Monitoreo de anidación de tortugas marinas en playa rosada 2017-2018" validez hasta el año 2020.
- Parque Marino de Valdivia, Administradora Biól. Jessica Zambrano Cornejo, asistencia Médica MVz. Pedro Soto Pérez.
- Voluntarios de la Escuela de Español de Montañita.
- Voluntarios Ecuador Volunter Conection
- Conservación Internacional
- Fondo de Inversión Ambiental Sostenible

Program type

Biodiversity Management Program (Nesting Monitoring, stranding, marking and control of introduced species)

Communication, Education and Participation Program

Environmental. Control and surveillance program

Research and monitoring program



Ecuador

Annual Report 2020

General objective

Establish strategic actions in order to conserve populations and habitats of sea turtles in the country, carrying out institutional and community strengthening activities, developing awareness programs towards the species, and promoting research.

Specific objectives

- Execute monitoring of land tours to identify nesting sites for sea turtles on the different beaches of the REMAPE.
- Execute monitoring focused on the identification of nesting sites for nesting sea turtles of the species *Eretmochelys imbricata* in Playa Rosada belonging to REMAPE.

• Execute Headstarting Plan for Eretmochelys imbricate hawksbill hatchlings. Background

Since 2013, the Provincial Directorate of Santa Elena through the Administration of the El Pelado Marine Reserve (REMAPE), through the Biodiversity and Natural Resources Management Program in the Sea Turtles and nesting component, establishes the importance of monitoring both day and night on the beaches belonging to the REMAPE and its areas of influence, which have the objectives of recovering and conserving the composition and abundance of the coastal marine ecosystems, thus guaranteeing the good condition of the reproduction and foraging sites of sea turtle species, since then lines of action have been carried out for the protection of survival and hatching success in the incubation chambers of sea turtle nests, proceeding to the placement of confinement with plastic mesh, in order to collect information on the birth rate of hatchlings by species in each season.

Thanks to these monitoring methods, it has been possible to identify the nesting beaches that are therefore both within the AP and its areas of influence. For this reason, three species that nest in the objective areas have been registered, of which we will mention the Turtle. Olive Ridley (*Lepidochelys olivacea*) where its conservation status is Vulnerable and its nesting areas registered through land controls are on the beaches of Capaes, Punta Blanca, Monteverde, Valdivia, Playa Bruja, Libertador Bolívar, Rio Chico, Manglaralto, Montañita, and Palaya Rosada, Olón, when identifying the nesting in these areas, the administration established that the REMAPE buffer zones are not registered in the National System of Protected Areas, however, during the nesting season, daytime controls must be carried out regularly. frequent in the aforementioned beach areas.

Therefore, we have the Green Turtle (*Chelonia mydas*) its conservation status is Endangered, it should be noted that the 2016-2017 season no nesting of this species was recorded on the REMAPE beaches.

Finally, there is the Hawksbill Turtle (*Eretmochelys imbricata*), its conservation status is Critically Endangered, which has been recorded in Playa Rosada, Playa Chipi, Portete Chico, and Portete Grande. It is extremely important to take into account that these last three seasons we have registered a decrease in nesting of the last mentioned species, which causes



Ecuador

Annual Report 2020

concern for the administration since they have only been identified through nightly monitoring in 2015 to 2017 populations of less than 10 nesters per season

But we do not leave aside the natural and anthropogenic activities that have occurred in the nesting areas during the season, such as strong water flows and urban constructions respectively, for this reason nest relocation and hatchling rescue strategies have been used, which They are also hosted by the Valdivia Marine Park, which is an Institution allied to the MAE of Santa Elena where they are of great support to help recover the species of hatchlings of straggling sea turtles that did not manage to emerge successfully, because when exhuming They are found inside the chamber in weak states and therefore they are transferred to this place for their recovery and later release. However, given the critical state of the population of the species of sea turtles, the administration of the El Pelado Marine Reserve begins the "headstarting" project, which implies the breeding in captivity of hatchlings collected in the wild.

The hatchlings are kept for several months to help them avoid high mortality in their first year. It is intended that these turtles survive and grow as wild turtles after their release (Segurado, 2016).

Activities

For the development of monitoring of sea turtle nesting sites on the beaches of the El Pelado Marine Reserve, in situ monitoring has been carried out, through the following strategies:

Day monitoring

They consist of carrying out daily monitoring of the beaches of the Protected Area through walking tours carried out by the PA park rangers, aimed at monitoring the intertidal zone and berm, to verify the presence of sea turtle tracks:

During **the MONITORING OF SEA TURTLE NESTING SITES ON THE BEACHES OF THE "EL PELADO" MARINE RESERVE**, the routes are made in an area of approximately 4.38 km per day that correspond to the following beaches: Palmar 2.10 km, Playa Rosada 0.74 km, Ayangue 0.70 km, Murilla Chica 0.10 km, Murilla Grande 0.15 km, Portete Chico 0.28 km, Portete Grande 0.31 km, Valdivia 1.25 km, Playa Bruja 0.90 km, and the beaches that are outside protected areas where they were located through daytime controls or Through complaints, these activities are carried out with Park Ranger technicians who detail in reports and matrices noting the following:

Identification of species of conservation interest found on the beaches of the El Pelado Marine Reserve.

- Data collection and measurements of the records of footprints and nests found during the monitoring of the REMAPE beaches.
- Photographic record of the sites where traces of arrivals of sea turtles of interest for



Ecuador

Annual Report 2020

conservation were found during the monitoring.

- Monitoring of nests found during the 2019-2020 season.
- Entry of information in the technical matrices of nesting records of sea turtles of the species *Eretmochelys imbricata*, *Chelonia mydas*, *Lepidochelys olivacea*, from REMAPE.

NIGHT MONITORING

Nighttime monitoring is carried out exclusively in the area identified as Playa Rosada and Chipi Chipi with a distance of 0.74 km sectored by letters from A to R with a continuous distance of 20 meters, the monitoring process carried out during the season will continue. 2018 - 2019

Night monitoring begins at 6:00 p.m. one day until 6:00 a.m. the next day, with the participation of Park Ranger technicians from the El Pelado Marine Reserve and technicians from the Ecuador Mundo Ecológico group.

To guarantee the effectiveness of night tours, monitoring is carried out at 30-minute intervals at strategic points along the beach.

Once the rise of a species of nesting sea turtle has been identified, the protocol mentioned in the methodology for sea turtle monitoring and data recording in the technical sheet figure 2 is applied.

- Record of date and time of the ascent of the nester
- Describe if you went up at low, medium or high tide.
- Describe if the lunar phases influence the rises of the species.
- Record coordinates and sectioning nesting site.
- Record of nesting species and egg count
- Record of morphometric data of the registered species.
- Description of the direct observation of the physiognomy of the species.
- Measurement of depth and width of the nesting chamber.
- Data collection of the track width and path of the sea turtle
- Record the distance from the nest to the slope.
- Nest relocation if necessary and manageable



Ecuador

Annual Report 2020

IORA:		MAREA	в	M	A	MINISTERIO DEL AMBIENTE	ICI.	DI UDOS	EI E	Pelado
LARA:	OSCUP	CURA:		AGUAJE:				· · · · · · · · · · · · · · · · · · ·		
UGAR:		AREAP	PROTEG	SI	NO					
SPECIE:	DC	CM	EI	LO						
DAD:	A()	J()				HA PARA REGISTRO DE 1	TORT	UGAS M	ARINAS	ANIDADOF
JUMERO DE	E TAG:									
JUEVA / REI	CAP:					Monitoreadores:				
CTIVIDAD:						Marea				
CC:						B:baja M: media A	A: alta			
VCC:				A						
PIBIONTES	3:			H		Especie:				
AÑOS:	SE	NO:	R	25		DC: Dermochelus oo	riacea	(Laúd)		
PODEDA	ÑO	- ARAN		CM: Chelonia mudas	(Verde	2				
ORTE	OBTE		El: Eretmochelus imb	ricata ((Careu)					
BACTURA			· 12-	-25-	-11 -	LO: Lenidochelus aliv	vácea ()	Golfinal		
UTILACIÓ	V.		14	327	7 -			are a may		
ALEORMA	CIÓN			27	1 -	Actividad	_			
TROS		J -	VU: Vuelta en U		N: Nido	HC: Hue	on querpo			
						FC: Falsa ca	minata	N/N: Nid	sobre nid	0
ATITUD:										
ONGITUD:						ZONA:		COBERT	JRA VEGE	TAL:
ECTOR:						1. Zona intermareal		1 Ausenci	a de vegeta	ción
ONA:	1	2	3	4		2. Entre la pendiente		2. Vegetación rastrera		
OBER VEG	1	2	3	-		3. Despues de la pendie	ente	3. Arbustos que cubre el nido		e el nido
BOFUNDI	A DEL N	IDO:	*			4. Tierra				
LTO DE NI	00-		ANCHO	DEL NI	0.		_			
NIDO HAO	JALAPE		E.	DEC 191			_			
ECOBBIDO).						_			
NCHO DE	HUELLA	-			-		_		-	
EHUBICAC	1 St	NO:					_			+
OTAL LUE		TADOS:	HIEVO	SIDEEOR	SMES-		_			
	100000	1000	TRACTO	J CALF OF	11112-02					
DIALHUE	IOMES.									

Figure 1.- REMAPE data sheet for nesting record data

RELOCATION PROCESS

This process is carried out only and exclusively if the location of the nesting chamber made by a nesting sea turtle is in an area vulnerable to drastic changes in its state, either due to natural issues such as constant waves, progressive erosion of the slope beach, water steps; or anthropic effects such as crowded tourist areas, urban expansion, among others, and work with machinery or heavy equipment and not leaving pollution aside. This season there have been two relocations of nests of the species *Lepidochelys olivacea*.

The materials necessary to carry out the night monitoring work are listed in photograph 1. It is very important that every day, in the hours prior to monitoring, it is checked that all the material is in proper working order and in sufficient quantity, it must be cleaned and Maintain equipment that requires it (applicators, clamps, GPS, flashlights, etc.). Every day a person from the team will be designated for this task.


Ecuador Annual Report 2020



1. Backpack 2. Headlamp 3. Flashlight 4. Tape measure 5. GPS Garmin 6. Spare batteries 7. Tape Measure 8. Monitoring sheet 9. Pencil 10. Bookmark 11. 30-meter tape 12. Gauge 13. Tags 14. Tag's applicator 15. Pliers 16. Accountant 17.Motorola Radio

Photograph 1.- Materials donated by REMAPE to carry out the respective night monitoring.

Activities carried out to preserve the nesting of Sea Turtles

- Linking volunteers from the Spanish School of Montañita and staff from Volunter Conexión Ecuador Santa Elena
- Participatory forum efforts in the conservation of sea turtles, where students of the UPSE Marine Biology career are informed about the efforts made to study these species that are vulnerable to anthropogenic attacks.
- Environmental Education on the importance of sea turtles in Educational Units and tourists who visit beaches with a high percentage of nesting, such as Playa Rosada.
- Protection of nests with fences built by Park Rangers, each fence is made with plastic and wood mesh materials, each fence is 1 square meter and at the same time an informative sign is placed to let tourists know the nest protection area that They are found on the beaches they visit.
- Recruitment of volunteers
- During the sea turtle season, we have received volunteers from the Montañita Spanish School and from Volunter Conection Ecuador who carried out activities such as the development of sea turtle protection fences and signs for nesting sites together with the technicians. REMAPE park rangers, each month two to three volunteers enter, for this a meeting is held with the Reserve Administrator to introduce the new foreign volunteer who will work for a period of one to two weeks.

Volunteer Engagement



Ecuador

Annual Report 2020

During the sea turtle season, we have received volunteers from the Montañita Spanish School and from Volunter Conection Ecuador who carried out activities such as the development of sea turtle protection fences and signs for nesting sites in conjunction with Park Ranger technicians. of the REMAPE, each month two to three volunteers enter, for this a meeting is held with the Reserve Administrator to introduce the new foreign volunteer who will work for a period of one to two weeks

Results

Exhumation of Nests Registered by REMAPE

End date of sea turtle seasons 2019-2020; of which is within the role of nesting state of the REMAPE (See Graphic # 1) for such the following results have been obtained: The El Pelado Marine Reserve is in its sixth monitored season, registering a total of 28 sea turtle nests (See Table # 1), located on the following beaches belonging to REMAPE:

Table 1. NESTING OF SEA TURTLES BY BEACHES IN LA REMAPE			
	# of nests	%	
Playa Rosada	25	83%	
Playa Bruja	2	7%	
Portete chico	1	3%	
Portete grande	2	7%	
Total	30	100%	

The nesting distribution is defined as follows: 25 nests located in Playa Rosada belonging to Hawksbill Turtle (*Eretmochelys imbricata*), in the Playa Bruja sector it was possible to identify 2 nests belonging to Olive Ridley Turtle (*Lepidochelys olivacea*), while in In the Portete Grande (Ayangue) sector, 2 nests have been identified, belonging to Hawksbill Turtles (*Eretmochelys imbricata*) and in the Portete Chico (Ayangue) sector, 1 nest has been identified, belonging to Hawksbill Turtles (*Eretmochelys imbricata*).

Regarding the variety of species of nesting sea turtles, which frequented the 2019 and 2020 season, in the El Pelado Marine Reserve, the following table 2 stands out:

Table 2. SEA TURTLE NESTING BY SPECIES ON THE BEACHES OF LA REMAPE			
SPECIES	# of nests	PERCENTAGE	
Chelonia mydas	0	0%	
Lepidochelys olivacea	2	7%	
Eretmochelys imbricata	28	93%	
Total	30	100%	
	·		



Ecuador

Annual Report 2020

Of which the Hawksbill turtle (*Eretmochelys imbricata*) occupies the first place with 93 of the total nests registered within the REMAPE (graph #2), represented with 28 nests, maintaining for the sixth consecutive season; preceded by the species of Olive Ridley turtle (*Lepidochelys olivacea*) represented with 7 of the total records, with 2 nests, in the 2016-2017 season no nests of turtles of the species *Chelonia mydas* were recorded.

ANALYSIS OF THE HATCHING PROCESS OF THE 2019-2020 SEASON WITHIN A PROTECTED AREA (IN TRANSIT).

To record data, a technical sheet is needed to later tabulate them in the REMAPE nesting matrix and the corresponding formula to obtain Hatching and emergence success, figure 2.

tal de Huevos losionados (C)		Código: N-RE Monitoreador Exito de eclo	MAPE-2018 es sión (%) = -	#C + #HSDA	#C + #HNe + #ETN	
tal de Huevos losionados [C]		Exito de emer	es sión (%) = -	#C + #HSDA	#C + #HNe + #ETN	
tal de Huevos losionados_[C]		Exito de eclo	sión (%) = -	#C + #HSDA	#C + #HNe + #ETN	
tal de Huevos losionados (C)		Exito de eclo	sión (%) = -	#C + #HSDA	#C + #HNe + #ETI	- Ve + #D x 1
tal de Huevos losionados_[C]		Exito de eclo	sión (%) = -	#C + #HSDA	#C + #HNe + #ETN	Ve + #D x 1
tal de Huevos losionados [C]		Exito de eclo	sión (%) = ·	#C + #HSDA	+ #HNe + #ETI	Ne + #D x 1
tal de Huevos iosionados [C]		Exito de emer				
		Exito de emer				
	_	Exito de emer				
	_	Exito de emer				
		Exito de emer	1 1 1 1 1 1 1	#6	C = (#V + #M)	
			gida (%) =	#C+#HSDA	+ #HNe + #ET	'Ne + #D *
4)	(ETNe)	C: CASCARO	NES ECLOSIO	NADOS		
-		HSDA: HUEV	OS NO ECLOS	SIONADOS SIN I	DESARROLLO AP/	ARENTE INFE
		HNe: HUEVOS	NO ECLOSIO	NADOS CON E	MBRION ESTADIO	0 (1,2,3)
		ETNe: Embrio	nes aparentem	nente a término, r	no eclosionados de	ntro de un cas
		o hueros No Ec	losionados ro	itos por el embri	ión (crías con cierta	a cantidad de y
	_	externa) (ESTA	DIO 4)			
		D: DEPREDAL	DOS O VIVOS DEM	TOO DE LA CÁI	14.04	
	_	M: NEONATO	S MUERTOS!	DENTRO DE LA	CÁMARA	
		Hesponsa	ble:			
		l'echa de	entrega:_			
et for nesting	g data					
=		#C	# ET N	a 1 #D	<i>x</i> 100	
	$= \frac{\#C + \#I}{\#C + \#I}$	= #C + #HSDA +	4() IEINe) E: NUMERO 4() IEINe) C: CASCARO! HSDA: HUEVI HSDA: HUEVI HSDA: HUEVI HNe: HUEVOS ETNe: Embrio o heros No Ec caterna) (ESTA D: DEPREDAD W: NEONATO Hesponsa recha de Fecha de eet for nesting data #C #C + #HSDA + #HNE +	4() IEINe) E: NUMERO 4() IEINe) C: CASCARONES ECLOSIO HSDA: HUEVOS NO ECLOSIO HSDA: HUEVOS NO ECLOSIO HNe: HUEVOS NO ECLOSIO ETM:: Embriones aparentes Contraction Contraction Image: State of the state of th	4() IEINe) IEINe) 4() IEINe) C: CASCARONES ECLOSIONADOS HSDA: HUEVOS NO ECLOSIONADOS CON E HSDA: HUEVOS NO ECLOSIONADOS CON E HNe: HUEVOS NO ECLOSIONADOS CON E ETNe: Embriones aparentemante a término, i chevros No Eclosionados rotos por el embri enternos (ESTADIO 4) D: DEPREDADOS Y: NEONATOS WUYOS DENTRO DE LA CÁI Hespons able: Fecha de entrega: eet for nesting data #C #C #C #C + #HSDA + #HNe + #ETNe + #D	$= \frac{\#C}{\#C + \#HSDA + \#HNe + \#ETNe + \#D} x 100$



Ecuador

Annual Report 2020

Exito de emergida (%) =

Hawksbill Turtle (Eretmochelys imbricata)

So far in the 2019-2020 season, a total of **28 Hawksbill turtle** (*Eretmochelys imbricata*) **nests** have been recorded, of which 19 have already been exhumed, <u>accounting for 3,203</u> eggs belonging to this species, of which 2,749 hatched safely. favorable, and the difference of 454 did not hatch for different reasons, such as because they were infertile or fully developed, of which 118 were infertile and 336 were still in the stage (59 stage I eggs, 36 stage II eggs, 42 in stage III, and 196 eggs were in stage IV.) The 6 remaining nests that are found in Playa Rosada were not exhumed due to the declaration of the National Government through Official Register No. 160.

With the aforementioned, it was possible to obtain hatching and emerged results from 28 nests of 19 nests. **obtaining an 85.77 Hatching Success and 83.16 Emergence Success.** (See graph # 3).

Once the quarantine situation turns green, the exhumations of the missing nests on Playa Rosada will proceed.

Olive Ridley Turtle (Lepidochelys olivacea)

Regarding this variety of turtle, a total of <u>2 nests have been registered</u>, counting <u>176 eggs</u> <u>belonging to this species</u>, of which <u>133 hatched favorably</u>, while unlike <u>43 it did not</u> <u>hatch due to natural reasons since 6 were infertile and 37 were still in stage stage (0 in</u> <u>stage I, while 4 were in stage II, 19 were in stage III and finally 14 were in stage IV,)</u>

With the aforementioned, it was possible to obtain 75.5 <u>Hatching Success and 49.0</u> <u>Emergence Success, this result is generated by the calculation of 45 live and dead</u> <u>hatchlings that failed to emerge from the nest. (See chart #3).</u>

In two seasons ago and this season, the only two nests of this species registered within the PA had an incubation time of more than 75 days to hatch, it is presumed that due to the temperature of the climate that occurs in the last three years, they could have affected its embryonic development

GREEN TURTLE (*Chelonia mydas*)

Regarding this variety of sea turtle, it has not been recorded in the PA. It is significant to indicate the importance of the Playa Rosada sector, due to the information



Ecuador

Annual Report 2020

it generates year after year regarding the monitoring of the nesting sites of the Hawksbill sea turtle (*Eretmochelys imbricata*) in the El Pelado Marine Reserve, considering the little information that has been generated to date at the country level regarding this species of sea turtle.

In addition to what was mentioned above regarding the monitoring of the identification of nesting areas and nesting turtles during the 2019-2020 season within the PA, it is important to highlight the monitoring in the areas of influence, where the following results were obtained: Considering the 2019-020 sea turtle nesting season; Outside the PA, a total of 14 nests have been registered on different beaches of influence, sites that were monitored and reported by the community through complaints made through social networks or telephone calls, of which the following sites established in Table 3 emphasize :

Table 3. NESTING OF SEA TURTLES OUTSIDE THE PA		
Monitored beaches	# of nests found	Percentage
Curía	2	14%
Manglaralto	5	36%
Olón	4	29%
Pacoa	1	7%
Río Chico	2	14%
Total	17	100%

It is important to mention that all the nests found outside the El Pelado Marine Reserve belong to the species of Olive Ridley sea turtle (*Lepidochelys olivacea*) (See Graphic # 2)

ANALYSIS OF THE HATCHING PROCESS OF THE 2019-2020 SEASON OUTSIDE THE PROTECTED AREA

Olive Ridley Turtle (Lepidochelys olivacea)

Regarding this species of turtle, a total of <u>14 nests</u> have been registered, of which they reached the hatching stage, obtaining the following results: <u>1319 eggs belonging to this</u> species were counted, of which 979 hatched favorably, while that unlike 340 did not manage to hatch due to natural reasons since 237 were infertile and 103 were still in the stage stage (16 in stage I, 13 in stage II, while 28 were in stage III and finally 46 were found in stage IV)

With the aforementioned, it was possible to obtain $\underline{75.0 \text{ Hatching Success and } 51.2}$ Emergence Success, (See graph # 3)

NIGHT MONITORING AND MARKING PROCESS OF NESTING TURTLES IN PLAYA ROSADA



Ecuador

Annual Report 2020

In this 2019-2020 season, no night monitoring is carried out, since reports from tourists and staff from the Rosada beach restaurant mentioned the constant robberies that were carried out when entering the beach at different times of the day.

At the same time, the night monitoring activities carried out by the group of researchers from Ecuador Mundo Ecológico, directed by Biol. Jodie Darquea. It should be noted that the information or report from the foundation has not yet been delivered to the REMAPE Administration.

ACTIONS CARRIED OUT FOR ACTIVITIES AFFECTING SEA TURTLE NESTING

With TECHNICAL REPORT No. 001 REMAPE-UPNSE- 2020, where the official letter No. 020- RMJD2020 dated January 13, 2020 was attended, registered by document No. MAE-DPASE2020-0124-E, issued by Mr. Robert Medina, member of the Ecuador Mundo Ecológico Foundation, where he mentions the following:

- To date, no arrivals have been recorded in the southern sector of the beach.
- The arrivals (4) have been registered in the northern sector (small beach).
- An indeterminate nest on the north side was swept away by sand removal.

And the Provincial Directorate of the Environment of Santa Elena ordered the removal of the lights from the companies mentioned in said technical report for the entire nesting and hatching season that runs from December to May year after year.

Headstarting Plan for Hawksbill Hatchlings Eretmochelys imbricata

With TECHNICAL REPORT No.- 500 MAE-UPNSE-REMAPE-2019, the REMAPE Hawksbill Headstarting plan begins, with the support of the Valdivia Marine Park, which provides us with the facilities and ponds to carry out this project. Results of more than 50 survivals were obtained, which are expected to reach the sizes and weights for their reintroduction to their habitat. The neonates have been in the Headstarting Plan for approximately 14 months and it is expected that when they reach 16 or 17 months of life, and have the necessary heights and weights, they can be released.

CONCLUSIONS

- A total of 44 nests of two species that nest both inside and outside the protected area were identified.
- Only 2 species of sea turtles that nested in the 2019-2020 season are recorded, *Eretmochelys imbricata* and *Lepidochelys olivacea*. This season, like the 2016-2017 season, the species *Chelonia mydas* is not recorded.
- A total of 1,319 laid eggs of the *Lepidochelys olivacea* species were obtained outside the PA, including 814 live hatchlings.
- Within AP, a total of 3,379 laid eggs were obtained, including 2,765 live hatchlings; these are results of both registered species.



Ecuador

Annual Report 2020

- The hawksbill TURTLE species (*Eretmochelys imbricata*) continues to predominate in terms of nesting in the El Pelado Marine Reserve, achieving 83.16 hatchling successes as a result, that is, 2657 live hatchlings emerged from 19 nests already exhumed.
- The success of hatching and emergence in the species *Eretmochelys imbricata* is much higher, the percentage that exceeds 80, than in the species *Lepidochelys olivacea*.
- The emergence of hatchlings of the *Eretmochelys imbricata* species is maintained at the same percentage level of hatching success, therefore it is presumed that the chemical or physical factors of the environment where the eggs are incubating are favorable.
- The emergence of hatchlings of the species *Lepidochelys olivacea* is very low, this suggests that there is a natural factor that is affecting the incubation process that delays the hatching of these species.
- No new nesters have been registered in the 2019 2020 season.
- Nocturnal monitoring is not possible.
- In 2019, the REMAPE Hawksbill Headstarting plan began, guarding sea turtles, these species are 1 year 2 months old.







Ecuador Annual Report 2020



Photograph 2.- Construction of a fence for the nesting of sea turtles in the company of foreign volunteers.



Photograph 3.- Placement of informative signs on the sea turtle nesting beaches



Ecuador Annual Report 2020



Photograph 4.- Headstarting project, carried out in the Valdivia Marine Park.



Photograph 5.- Pond cleaning for the stay of rescued hatchling turtle species, Headstarting project



Ecuador Annual Report 2020





Ecuador

Annual Report 2020

Title of the project

SEA TURTLE MONITORING, LAS PALMAS-ESMERALDAS BEACH, RVSMERE ZONE OF INFLUENCE 2019-2020 SEASON

Season (date of this report)

Start: June 2019 End: March 2020

Area(s)

Esmeraldas River Mangrove Estuary Wildlife Refuge

Institution

Dirección Provincial de Ambiente de Esmeraldas -Ministerio del Ambiente del Ecuador

Responsible for this report

Esther Sulay Palomino Becerra – Narcisa Sorlinda Cárdenas Araujo

Participants (include if students/volunteers will participate)

RVS-MERE: MSc. Esther Palomino, Eng. Rosario Tene, Mr. Pedro Cañola, Eng. Karina Casierra, Lcda. Maria Fernandez, Licdo. Billy Soto, Lic. Ana Semisterra, Ms. Tatiana Caicedo, Mr. Marcos Charcopa,

Mr. Joel Ruano; SGMC: MsC. Narcisa Cardenas; Lic. Elver Quiñonez; PUCE: 20 interns; UTELVT 60 interns: UPMA: 5 troops (UPMA); FLOPEC; GADMCE

Institutional collaborators

PUCE-Interinstitutional Cooperation Framework Agreement with the DPAE; UTELVTE – Framework Agreement for Inter-institutional Cooperation with the DPAE; SGMC-RED-AMCP; CI; WILDAID; GIZ; Blue Balance; POLINAL (UPMA); FLOPEC; GADMCE; MINEDUC; MINTUR; UTE-LVT, THERMOESMERALDAS

Program type

The RVS-MERE carries out the work of monitoring sea turtles in response to the PGOA through the

Programs of:

- Management of Biodiversity and Natural Resources

- Communication, Education and Environmental Participation

General objectives

- Carry out Day and Night Monitoring of Sea Turtles in Las Palmas Beach, with the participation of the RVSMERE team, with the support of the SGMC and volunteers from the universities and users, which allows the gathering of technical information on the number of arrivals, monitored, unmonitored nests, newborns, mortality percentage, aimed at the conservation of nesting and reproduction areas of migratory species that arrive in the sector, during the period from June to February 2019-2020.
- Continue strengthening the process of planning, coordination, monitoring and evaluation with public and private institutions, tourism service providers, the fishing sector and NGOs, in order to strengthen the involvement of stakeholders in the conservation of sea turtles and reduce the negative impacts generated in the nesting



Ecuador

Annual Report 2020

area of sea turtles in Las Palmas beach.

Specific objectives

- Generate information on the number of ascents, nest laying, records of unmonitored nests, birth of hatchlings, % mortality, % emergence and % hatching of Sea Turtles at Playa de las Palmas in the city of Esmeraldas.
- Strengthen the participation of public and private institutions, NGOs, the educational sector, media universities and citizens in general.
- Carry out day and night control and surveillance to monitor the rise and laying of nests of sea turtles until their release.
- Implement awareness and dissemination campaigns aimed at citizens, spa users and tourists about the importance of protecting sea turtles.
- Carry out control and surveillance to avoid the development of recreational, cleaning and maintenance actions that could affect the nesting area of sea turtles on Las Palmas beach.

Question to answer

What is the number of ascents, nest laying, records of unmonitored nests and hatchlings (Golfina) at Las Palmas beach during the 2019 season?

What are the threats faced by the sea turtle nests due to the tourist and recreational intervention in Playa Las Palmas?

Methodology

- The information was collected using the following methodology in the field and through inter-institutional coordination:
- Before, during and after the monitoring of Sea Turtles of the 2019 Season, work meetings will be held with Public and Private Institutions, Universities, NGOs, tourism service providers (formal and informal) and the media, where the proposal for monitoring of sea turtles Season 2019, actions will be coordinated, partial results will be presented and in case of difficulties, immediate solution strategies will be suggested that lead to the strengthening of the process.
- Prior to the development of recreational actions, maintenance and cleaning in the sea turtle nesting area, planned by the Municipality of Esmeraldas, FLOPEC and the Ministry of Tourism, it must be coordinated with the Provincial Directorate of the Environment of Esmeraldas, in order that through the RVSMERE and SGMC team, it is verified that these will not affect the migratory species, their nests and proceed according to the guidelines established in June 2017.
- The training process aimed at Park Rangers, Technicians,
- Administrator of the RVS-MERE and Specialist of the SGMC and volunteers from the Universities,
- National Police and Lifeguards, who participate in the monitoring.
- Daytime and nighttime monitoring on Las Palmas beach will also have the support of the Environmental Police Unit, tourist service providers, informal vendors,



Ecuador

Annual Report 2020

ancestral users and visitors.

- Through workshops and exchanges of experiences between the teams of the AMCP of the province of Esmeraldas, with the technical support of the Specialist of the SGMC, the methodological tools will be standardized, based on the realities of each one of the beaches.
- In the month of September, the date of greatest nesting of sea turtles and in which night monitoring will be carried out, the Park Rangers and Technical teams, the RVS-MERE Administrator and the SGMC Specialist, will work a total of 16 hours a day, considering that the daytime is also carried out, the same ones that will have the respective compensations according to the established protocol.
- The daytime monitoring from Monday to Friday, from 6:00 a.m. to 10:00 a.m.- 2:00 p.m. to 6:00 p.m., will have a minimum of 2 volunteers and 4 on weekends and holidays, considering the large influx of visitors that is generated in Las Palmas beach.
- Night monitoring will not be carried out from 10:00 p.m. to 6:00 a.m., if there is no Police support in accordance with the provisions of the Protocol.
- During the development of the in situ monitoring, the Park Rangers and volunteers with the application of technical sheets and weekly reports will carry out control tours for the identification of arrivals of Sea Turtles, identification of footprints, nests, signaling, protection, hatching, emergence, release will be assisted. of the newborns, and later the exhumation will be carried out.
- Through the strengthening of the system of planning, execution, follow-up and permanent evaluation of Sea Turtle Monitoring, compliance with the objectives and timely identification of difficulties will be verified, which will allow the generation of strategies aimed at solving them.
- During the monitoring, the Park Rangers and volunteers will raise awareness among beach users (Tourists, service providers, athletes, informal vendors, etc.), about the importance of sea turtles, which will generate commitments on the part of the users for the conservation of migratory species.
- In order to make timely decisions, the updating and generation of methodological tools aimed at the proper management of the information collected in the field will continue, which will be systematized in the office based on the results of the evaluations carried out in previous seasons.
- Through the documentation of the Monitoring of Sea Turtles on Las Palmas beach Seasons 2017 and 2018, the dissemination of the process implemented to achieve the results will continue, which will be generated with the support of Wild Aid.
- During the monitoring of sea turtles, the godfathers and godmothers of the 2019 season process will be involved, who will participate in the awareness campaigns for users and in the monitoring sessions according to their interest and commitment.

Activities

Training and Work Meetings



Ecuador

Annual Report 2020

- Continued with the implementation of training for students from educational establishments surrounding the protected area, universities, National Police, Municipality of Esmeraldas, Tourist Service Providers and informal vendors, on issues related to the importance of Sea Turtles and tools, methodologies and instruments for the effective development of monitoring and conservation.

- Work meetings were held with Authorities and Representatives of Public and Private Institutions and NGOs, in order to socialize the 2019 Turtle Monitoring Proposal-

2020 and Generate Commitments according to their powers and responsibilities to strengthen it, maintaining the zoning of the nesting area in Playa Las Palmas and defining strategies to reduce or avoid threats

- The Administration and Park Rangers of the RVS-MERE-SGMC participated in training sessions and a congress in Lima, Peru, where all the work being carried out on Las Palmas beach aimed at the protection and conservation of the species was presented.

Las Palmas beach zoning:

- The zoning of Las Palmas beach generated since 2017 where the highest intertidal line was defined to determine risk sites for nests, allows deciding their relocation within 24 hours in previously established hatcheries, which has avoided the impact on nests during the 2019 season

- With the work that is being implemented for the construction of the Management Plan for Playa de Mar and the Adjacent Strip of Playa Las Palmas (PMPM) for the Integrated Coastal Management Plan based on RCODA with GADMCE, through the Focal Point the MSc. Narcisa Cardenas was achieved jointly with the actors (MINTUR, GADMCE, RVSMERE), the zoning of Las Palmas beach, in order to order the uses and the nesting area for sea turtles, where the Rompeolas is established as a conservation area

- Publications of the monitoring results.

The RVSMERE-SGMC team developed a Scientific Article that was published by the PUCESE magazine thanks to the management of the RED-AMCP, on the spatial distribution of Sea Turtle Nests in Playa Las Palmas

Attention to the possible affectations by recreational activities.

- It has been possible to sustain the continuous inter-institutional coordination between the DPAE through the RVSMERE and SGMC with the Municipality of Esmeraldas and FLOPEC, which has allowed the development of recreational activities that are planned on Las Palmas beach, to be carried out prior to the tour and authorization from the Environmental Authority so that they do not affect the nesting areas of sea turtles

- In the same way, the DPAE, through the RVS-MERE-SGMC team, in order to avoid affecting the turtle nesting area, has contingency plans to prevent activities such as beach cleaning from affecting the development of established daily monitoring.



Ecuador

Annual Report 2020

Elaboration of hatchery and relocation of nests:

- With the Technical guidelines issued by the Fundación de Equilibrio Azul, the RVS-MERESGMC team rehabilitated the 2 nurseries located in the Balao and Rompeolas Zones, where nests were relocated, within 24 hours, which were identified within the intertidal line and that could be affected by the tide.

Day monitoring:

- From June 2019 to March 2020, the development of the monitoring of Sea Turtles in Las Palmas beach continued, from 06:00 a.m. to 10:00 a.m. in the morning and in the afternoon from 2:00 p.m. to 6:00 p.m.

Night monitoring:

Based on the results of previous seasons, night monitoring in 2019 was carried out during the month of September, from Monday to Sunday, making tours in the Breakwater area on Las Palmas Beach from 10:00 p.m. to 6:00 a.m.: 00. The daytime and nighttime monitoring had the participation of students from the UTELVTE}, PUCE and National Police - UPMA, RVS-MERE and SGMC team, where activities such as: Identification of ascents and descents of sea turtles, placement of Tags, identification and follow-up of monitored nests, registration of unmonitored nests, attention to the release of hatchlings, exhumations, sensitization and awareness during the monitoring of visitors to Las Palmas beach, identification of possible threats in the nesting area, filling out technical sheets, logbook, weekly report, signage placement and maintenance, nest cleaning, relocation of affected and at-risk nests.

Tag's placement

- Once the arrival of the turtles is identified, the Tag' is placed on the second scale on the back of the upper right flipper.

Exhumation

The exhumation of the identified monitored and unmonitored nests was carried out after three days of hatching, where the following data is taken:

C = Number of empty shells counted (>50% complete).

V = Live inside the nest or live hatchlings between the shells (not those in the neck of the nest).

M= Number of dead hatchlings outside their shell.

HSDA = Eggs Without Apparent Development (Eggs not hatched, without an obvious embryo).

HNE = Unhatched Eggs (Unhatched eggs with evident embryo).

D = Predated (Open shells, almost complete, containing egg residue).

Identified threats



Ecuador

Annual Report 2020

At the beginning of the 2019-2020 season, there were damages due to theft, however, with the support of GADMCE, UPMA, the alleged offenders were arrested and precautionary measures were issued, setting a precedent, which allowed the threat to be reduced.

Calculation of hatching and emerged percentage

The hatching success includes the hatchlings that managed to hatch but did not leave the nest, the hatching success includes the hatchlings that hatched and subsequently successfully hatched from the nest, for the calculation of the corresponding percentages the following formula:

Results

Continuing with the implementation of the methodology established in 2017, the following results were obtained

- 5Km of monitored beach

- 1 zoning made up of 3 zones defined for monitoring on Las Palmas beach,

called Rompeolas, FLOPEC and Balao (see map).

- 241 daytime monitoring with 8 hours a day

- 26 nocturnal monitoring with 8 hours each night, in the area of Rompeolas in Las Palmas beach.

- 111 identified nests of Olive Ridley turtles (Lepidochelys olivacea).

- 101 nests monitored and 10 unmonitored

- 111 nests exhumed

- 14 sea turtles identified

- 14 Tags placed (EC 943; EC941;EC944; EC945; EC947; EC950; EC952; EC953; EC954; EC955; EC956; EC974; EC963; EC967.)

- 103 people participate in the monitoring of Sea Turtles

- 16 participating institutions
- 1 Identified Sea Turtle Species (Golfina)
- 10,370 eggs, 8,685 live hatchlings
- 2 nurseries located in the Balao and Rompeolas Zones
- 100 nests relocated to nurseries due to being in danger zones

ANALYSIS OF RESULTS

1. Of the 111 nests of the Olive Ridley turtle (*Lepidochelys olivacea*) identified on Las Palmas beach, 34 were registered in the month of September, where the highest nesting activity



Ecuador

Annual Report 2020

occurs.

Table 1. DISTRIBUTION OF NESTS PER MONTH 2019-2020 SEASON PLAYA LAS PALMAS

MONTH	NUMBER OF NESTS
June	5
July	10
August	28
September	36
October	16
November	8
December	8
TOTAL	111

2. The density of nests identified by area in Playa Las Palmas is as detailed below:

Table 2. NESTING AREAS PLAYA LAS PALMAS SEASON 2019 – 2020

ZONES	MONITORED NESTS	NON- MONITORED NESTS	TOTAL NESTS PER AREA
BALAO	13	1	14
FLOPEC	18	2	20
ROMPEOLAS	70	7	77
TOTAL	101	10	111

3. Calculation of hatching and emergence success at Las Palmas beach:

Eclosión (%) = 86,11

Emergida (%) = 82,45

CONCLUSIONS.

The Process of monitoring the nesting of Sea Turtles in Playa Las Palmas Season 2019-2020, generated the following conclusions:

1 The participation of Public Private Institutions Universities, media contributed to the results achieved during the season

2 Permanent day and night monitoring allowed the collection of timely information in the field and the fulfillment of the objectives established in the proposal.

3 The permanent training provided to the Park Rangers and volunteers allowed them to have



Ecuador

Annual Report 2020

the necessary tools and comply with the activities in accordance with the provisions of the proposal.

4 The dissemination of the monitoring activities and results through the mass media contributed to the awareness of citizens about the importance of the conservation of Sea Turtles

5 The commitment of the Provincial Directorate of the Environment of Esmeraldas and the Undersecretariat of Marine and Coastal Management, Wildaid, through the provision of tools, materials, knowledge, contributed to the efficient compliance of the monitoring

6 The commitment of the RVS-MERE Administrative and Park Rangers team, during the development of permanent monitoring, including weekends and holidays, with the implementation of a monitoring and evaluation planning system, were fundamental for the fulfillment of the objectives.

7 Of the 111 nests identified on Las Palmas beach, 8,685 hatchlings entered the sea.

8 Of the 111 nests identified on Las Palmas beach, 36 were recorded in the month of September, where the highest nesting activity occurs.

9 Of the 111 nests identified, 100 were relocated, of which 8,561 entered the sea, neonates

10 In the 2019-2020 nesting season at Las Palmas beach, the hatching success was 86.11% and the emergence success was 82.45%.

11 At the beginning of the 2019-2020 season, there were damages due to theft, however with the support of GADMCE, UPMA, the alleged offenders were arrested and precautionary measures were issued, setting a precedent that allowed the threat to be controlled.

12 The arrival of 14 turtles was identified during monitoring at Las Palmas beach, 14 tags were placed on them (EC 943; EC941; EC944; EC945; EC947; EC950; EC952; EC953; EC954; EC955; EC956; EC974; EC963; EC967 .)

13 Control and surveillance tours continued with the support of the SGMC Specialist, to prevent tourist and recreational activities from affecting the sea turtle nesting area in Las Palmas Beach.

RECOMMENDATIONS

- From the implementation of the monitoring process of sea turtles on Las Palmas beach Season 2019-2020, the following is recommended:
- Continue with inter-institutional coordination aimed at having the participation of institutional actors and users, which allows continuing to strengthen the monitoring of sea turtles in the 2019 season.
- Continue with the application of the methodological, planning, monitoring and evaluation tools generated during the 2017 monitoring, and implemented in 2018 and 2019, which have allowed the collection of information in a timely and adequate manner.
- Continue strengthening the capacities of the Park Rangers, RVS-MERE Technical Team and SGMC in order to adequately address any situation that arises during the



Ecuador

Annual Report 2020

monitoring of sea turtle nesting season 2019.

- Continue counting on the logistical support, equipment and materials and exchange of experiences by the SGMC-RED-CI-WILDAID
- Let the work continue.



Fig 1. Distribution of nests by area in Playa Las Palmas Season 2018-2019.





Ecuador Annual Report 2020





Ecuador Annual Report 2020





Ecuador

Annual Report 2020



contribution to the MTM)



Ecuador Annual Report 2020



Exhibition of the work of Monitoring of Sea Turtles in Congress in Lima

Reference for access to information

MsC. Esther Palomino – Responsable de RVS-MERE – esther.palomino@ambiente.gob.ec MsC. Narcisa Cardenas – Especialista SGMC – narcisa.cardena@ambiente.gob.ec

General remarks:

In the monitoring of the 2019-2020 season, a nest arrival behavior similar to that of 2018 was obtained.

Responsibility Signature:

Janis bankeros huns

TECHNICAL REPORT No. 005-2020-JM-BIOD-UPN-MAAE

1. Project Title:

Activities for the conservation of sea turtles in Crucita's resort.

2. Season (date of this report)

Start: March 1, 2019 End: March 31, 2020

3. Protected area

None

4. Institution:

Dirección Zonal Manabí-Ministerio del Ambiente y Agua.

5. Responsible for this report:

Lcda. Johanna Moreira García

6. Participants

Karen Espinoza, Dessiré García, Zoila Marcillo, Francisco Zambrano Anzules, Fernando Macías, Lelia Zambrano, Gabriel Mendoza, Josué García, Ángel Centeno, Cecibel Tenelema.

7. Institutional collaborators (specify if there is an agreement)

Gobierno Autónomo Descentralizado Portoviejo



Ecuador

Annual Report 2020

8. Type of program

Nesting.

9. General objective

• Generate information on the conservation status of sea turtles on Crucita beach.

10. Specific objectives

• Collect information on nesting of sea turtles on Crucita beach in Portoviejo canton.

11. Methodology

11.1 Study area

The parish of Crucita is a beach that belongs to the Portoviejo Canton, Manabí Province, its beach has an approximate length of 16.5 km of beach profile, bordering to the north with the mouth of the Portoviejo river in the place known as La Boca and to the south with Jaramijó canton.

Since 2014, the Manabí Zonal Coordination and the Portoviejo GAD began monitoring sea turtles on Crucita beach and the official record of the largest number of clutches occurs in the tourist area called "segment B" in the delimitation (Image 1)., since it has more participation of tours by the aquatic rescue personnel of the GAD Portoviejo or the sightings made by citizens and tourists who reported to ECU 911.



Ecuador Annual Report 2020



Image 1: Delimitation of the nesting area in Crucita.

11.2 General methodology

Nesting and hatching

To monitor and record sea turtle nesting, the Compendium of protocols and manuals for the care of sea turtles in the Crucita parish was followed, to

The nesting registry included the participation of people from the community such as: volunteers, carpers, lifeguards, tourist servers, who, following the guidelines established in the aforementioned document, reported the presence of turtles in the area to the authority.

Once the technicians identified the clutch, they proceeded to assess whether it was at high risk (areas where they are flooded by the tide, or a lot of traffic of people, vehicles or boats), for which the parameters described in the protocols are used. established for this beach.



Ecuador Annual Report 2020

In the protection of nests, whether in situ or relocated, the method that has been used until now was continued, which has been the use of enclosures with plastic mesh, 2-inch PVC pipes, protection tape around it, and a sign. with information on: species, nest number, nesting date, estimated date of hatching and indicating the type of clutch it is (in situ or relocated) (Image 2).



Image 2: Clutch protection system used in the 2019 season

Once the emergence of the first hatchling is reported, the group of accredited volunteers maintained day and night control on the beach to ensure that the turtles can reach the water, protecting them from the threats of anthropic effects such as: light pollution, dogs, vehicles on the beach, among others, one of the actions carried out is the sweeping of footprints in the areas where hatchlings have to travel to reach the sea.

Exhumation:

If the emergence of the neonates occurs at night or in the absence of personnel, the seventy days were expected, as established in the compendium of protocols of this locality. The exhumations of the nests were carried out by MAAE personnel or personnel trained for this activity.

The necessary information is taken to evaluate the hatching success of the clutches, whether they are in situ or relocated, to obtain data that help us understand the adequacy of the beach as an incubation system, the general health of the nesting population or the methods of management employees.



Ecuador

Annual Report 2020

The hatching success analysis for Crucita beach was carried out using the methodology described in the Manual on management techniques for the Conservation of sea turtles on nesting beaches" of the Inter-American Convention for the Protection of Sea Turtles (IAC) published in 2011, with the application of the following formula:

Hatching success rate =

Cascarones

- X 100

#Total de huevos incubados

Where:

Cascarones: Number of empty shells.

#Total de huevos incubados: Total number of eggs that were incubated in that nest (shells, unhatched eggs (with or without apparent development and predated eggs)

12. Results

During the monitoring carried out year by year by this Ministry for this season, a total of 13 clutches of olive ridley sea turtles (*Lepidochelys olivacea*) were recorded.

During the 2019 season, following the guidelines of the "Compendium of protocols and manuals for the attention of sea turtles in the parish of Crucita", it was necessary to relocate six clutches to a safer place, which represents 46.2% of the total number of clutches.

In monitoring the nesting of sea turtle clutches in Crucita, their incubation time was evaluated, for which a result of 43 days for in situ clutches and 52 days for relocated clutches was obtained, which shows a time higher for the latter.

Table No. 1: Crucite incubation time

Average days of incubation		
Location	Time	
In situ	43	
Relocated	52	

With the information obtained during the exhumations, the hatching success of the clutches in Crucita was determined, which corresponds to 86% for relocated clutches and 75% for in situ clutches (Image 3), showing that hatching success is higher in clutches that are relocated to this beach.



Ecuador Annual Report 2020



Image 3: Percentage of hatching success in Crucita clutches.

In this season, temperature monitoring was carried out in two clutches in Crucita, for which an Onset automatic temperature storage device (HOBO) was used, placed at a depth of 45cm inside the clutch to monitor the temperature in the center of the clutch. as established by the protocol for Monitoring the incubation temperature of sea turtle clutches CONANP-2013.

From the results obtained in this monitoring it was possible to determine that from day 23 both clutches increase their temperature, which is directly related to the metabolic heat generated within them. The first clutch reaches a maximum temperature of 31.51°C and the second 33.15°C, despite the fact that both are within the same relocation area.



Image 4: Average temperature inside the clutches.

13. Conclusions

Although Crucita is not a protected area nor is it part of the SNAP, the nesting of sea turtles in this resort has been occurring for several years, however, thanks to the efforts of volunteers, GAD Portoviejo and the Ministry of the Environment and Water, it has been The protection and monitoring of clutches has been achieved since 2015. The results show a total of 13 clutches for the olive ridley species (*Lepidochelys olivacea*) for the 2019-2020 season, maintaining a similar trend to previous years.

The hatching success within a clutch is linked to several factors that intervene during this process such as temperature, composition of the sand, relative humidity, management of the clutches, precipitation, among others; From the analysis of the information obtained in the exhumations, it was determined that the relocated clutches had a higher percentage of hatching success with 86%.

Because Crucita is a beach that is outside a protected area, it presents more anthropogenic effects that lead to the need to relocate the clutches to a safer place. In this season, six clutches were relocated, which represents 46.2% of the total clutches. In addition to this, one of the threats at this site is light pollution, since at the time of nesting and subsequent hatching the lights from the boardwalk cause a strong disturbance to the behavior of the hatchlings and their mothers, disorienting them and causing them to walk towards the road instead of looking for the sea.

The Manabí Zonal Directorate began monitoring the temperature in two nests in Crucita, with the use of an automatic temperature storage device (HOBO), purchased with their own



Ecuador

Annual Report 2020

funds from area technicians, to assess the impact that climate change may have on this nesting beach.

14. Recommendations

Crucita is a tourist resort that houses an important beach for the conservation of sea turtles; For this reason, since there are no MAAE personnel constantly there, community work should be strengthened with the recruitment and training of more volunteers. It is also necessary to provide field materials and promote the preparation of informative material that helps disseminate information. collected.

It is suggested that for sea turtle monitoring activities and others such as the impact of climate change, the Undersecretary of Natural Heritage distributes the inputs obtained through NGOs or Cooperators not only for protected areas but also for nesting sites that are not They are within the National System of Protected Areas, as is the case of Crucita, and they provide information on the clutches for the corresponding analysis.

Reference for access to information:

Manabí Zonal Directorate-Ministry of Environment and Water.

13. Photographic annexes



Picture 5: Nest relocation



Ecuador Annual Report 2020



Image 6: Control during daytime hatching.



Image 7: Use of saran to counteract light pollution during the nocturnal hatching process.



Ecuador Annual Report 2020



Image 8: Exhumation of clutches at Crucita beach.



Image 8: Olive ridley turtle hatchling hatching in Crucita.

Prepared by:

Lcda. Johanna Moreira García



Ecuador Annual Report 2020

WILDLIFE ASSISTANT

a Street

Reviewed by: Blga. Julia Cordero G. WILDLIFE RESPONSIBLE ZONAL DIRECTION MANABÍ MINISTERIO DEL AMBIENTE Y AGUA.



Ecuador

Annual Report 2020

Title of the project

Evaluation of critical nesting and feeding areas for sea turtles in the marine zone of the Machalilla National Park and its area of influence

Season (date of this report) July 31, 2020

Start: November 2019 End: April 2020

Area(s)

Machalilla National Park and its surroundings

Institution

Equilibrio Azul

Responsible for this report

Cristina Miranda

Participants

Cristina Miranda, Felipe Vallejo, Sofía Jones, Ricardo Gonzáles, Luis Mera, Emma Korein, Alejandra Ariza

Institutional collaborators

ICAPO – Iniciativa Carey del Pacífico Oriental

Program type

Nesting and Foraging

General objective

Identify the population states of the different species of sea turtles in the Machalilla National Park (PNM) area, and through research contribute to their conservation

Specific objectives

- Understand the population dynamics of sea turtles with special emphasis on hawksbill turtles (*Eretmochelys imbricata*) and green turtles (*Chelonia mydas*) in the PNM
- Identify nesting beaches in the PNM
- Identify aggregation and foraging areas in the PNM
- Measure population sizes on beaches and water, abundance, behavior. Using the data collected, assist with the development of sea turtle conservation policies in Ecuador

Question to answer

Methodology

- Daytime monitoring of tracks and nests
- Night nesting monitoring
- Daily monitoring of nests
- Monitoring and telemetry in the water
- Monitoring of turtles in the water through transects, capture-recapture and underwater cameras



Ecuador

Annual Report 2020

Activities

Results

The following ten beaches were monitored in and around Machalilla National Park: -La Playa de Salango (PNM) -Puerto Lopez -Salango (PNM and outside) -Salando Island (PNM) -Boobies -Golden Beach -Puerto Rico-Las Tunas -The Friars (PNM) -Tortuguita Beach (PNM) -Prieta Beach (PNM)

In addition, Machalilla beach, Sombrerito beach, Bálsamo 1 and Balsámo 2 were monitored, but with less effort.

In total, 102 nests were recorded on these beaches for the following species: Hawksbill (*Eretmochelys imbricata*)-65 nests, green/black (*Chelonia mydas*)- 4 nests and olive ridley (*Lepidochelys olivacea*)-30 nests; could not identify the species from three nests.

We recorded hawksbill nests on all the monitored beaches with the exception of Playa Prieta and Tortuguita.

• Daytime monitoring of tracks and nests

Daytime monitoring was carried out on all the mentioned beaches. The index beaches of hawksbill turtles and those that we consider to be of equal importance (La Playita de Salango, Salango, Puerto López, Piqueros and Dorada) were monitored every day from the beginning of the season in November 2019 until when it was no longer possible. patrol more due to the COVID-19 pandemic in April 2020. The rest of the beaches were monitored every two days.

• Night nesting monitoring

Night monitoring of traces, nests and nesting females was carried out on two beaches (La Playita de Salango and Playa Dorada) with a total of 132 nights patrolled between November 17, 2019 and March 18, 2020 (date that had to be stopped). night monitoring due to the COVID-19 pandemic). During this monitoring, a total of 49 nests were recorded in La Playita de Salango, of which 48 were hawksbill turtles and one olive ridley. At Playa


Ecuador

Annual Report 2020

Dorada we recorded a total of three hawksbill nests and one green nest. Thanks to nocturnal monitoring we were able to identify a total of 13 hawksbill nesting females, of which seven were re-emigrants from past seasons, and six were new recruits.

• Daily monitoring of nests

We had to relocate a total of 48 nests since they were very close to the tide, in areas where the sea level has risen and now covers it completely at high tide, in areas where there was a risk of flooding or erosion due to rain, or in areas where there was a risk of predation by dogs (especially in Puerto Rico - Las Tunas). Of those 48 nests, 66% were in La Playita de Salango, and had to be relocated to a hatchery (17 nests) or in situ (15), since the sea level has risen and there is almost no space left for the survival of the nests. nests without being covered or eroded by sea level.

On the beaches outside the Machalilla National Park, protection nets against dogs were placed, buried in the sand. However, on the beach of Puerto Rico - Boobies, a lot of nest predation by dogs was observed. A total of 42 destroyed nests were counted prior to the start of this season's monitoring, and in our monitoring two nests destroyed by dogs were recorded. We registered two nests destroyed by dogs on the beach of Puerto López.

• Monitoring and telemetry in the water

We placed a satellite transmitter on a hatchling hawksbill turtle that we rescued last season (2018-2019) on Salango beach and that was rehabilitated at the Machalilla National Park Marine Fauna Rehabilitation Center. The neonate was released in front of its native beach and its route is being analyzed.

Graphics

Images

Reference for access to information

Cristina Miranda/Equilibrio Azul (cristina@equilibrioazul.org)

Firma de responsabilidad:



Ecuador

Annual Report 2020

Title of the project

Monitoring of the green turtle (Chelonia mydas) in the Galapagos Islands season 2020

Season

Start: January 2020 End: March 2020

Area(s)

Quinta Beach (Isabela Island) and Las Bachas (Santa Cruz Island)

Institution

Dirección Parque Nacional Galápagos

Responsible for this report

Participants

Institutional collaborators

EPI, Galapagos Conservancy

Program type

Nesting

General objective

Carry out monitoring of sea turtle (*Chelonia mydas*) nesting on the index beaches Quinta playa (Isabela) and Las Bachas (Santa Cruz) to assess the size and trend of the populations.

Specific objectives

- Estimate the size of the green turtle breeding colony at the most important nesting index beaches in Galapagos.
- Recapture and monitor individuals that come to nest for the first time on the beach (individuals without new tagging) and individuals that were tagged in past seasons.
- Mark and follow up on nests that are previously marked.
- Identify the most common damages and causes.
- Establish administration and management measures, aimed at the protection and conservation of sea turtle species and their habitats in the Galapagos Archipelago.

Question to answer

- To know if there are changes in population size, age structure, sex, factors that cause these changes and the mechanisms that produce them?
- What are the main effects on sea turtles due to anthropogenic effects on their habitats?
- Determine if the population of sea turtles in Galapagos is increasing or decreasing?
- What are the most important sites in the Martina de Galapagos reserve used as nesting, aggregation, resting, and feeding habitats for the sea turtle *Chelonia mydas*?

Methodology

The start of night monitoring is scheduled approximately two hours before high tide, so the



Ecuador

Annual Report 2020

monitoring time will vary continuously. While regulating the start of monitoring with the tidal cycle works most of the time, you can also be guided by the number of lost footprints found at the time you start night monitoring. For the data collection, a group of two people will work, who will have a notebook with the previously printed monitoring form, where they will record the information detailed below: date and time when the turtle begins to work (24-hour format), activity that the turtle is carrying out, if it is making a nest, the following are carried out: measure the depth of the egg chamber, depth of the hollow body, mark the nest for monitoring and future excavation after 70 days, count the fertile and infertile eggs, georeference the nest with GPS, write down the sector and area where the nest is located, measure the distance of the nest with respect to the slope and vegetation cover.

Once the turtle has spawned 30 eggs, you can proceed to check the fins for marks or damage, if there are no marks, proceed to take the morphometric measurements, length and curved width of the shell in centimeters, check the entire shell for of

some damage, measuring, recording its cause and state. Likewise, the species of epibionts that the individual has will be counted and identified. Once the turtle finished laying eggs, if the individual does not have Tags, it should be marked.

Activities

1. NIGHT MONITORING:

During the night monitoring, the hours vary during the season since the individuals leave in greater numbers when the tide is high, so they go to work 2 hours before high tide, carrying out the following activities:

- Marking of nesting females.
- Morphometric data collection of nesting females.
- External visual examination of nesting females (identification of epibionts and damage).
- Possibly obtaining samples from nesting females (epibionts, tissue, etc.)
- Egg count.
- Marking and monitoring of nests.
- Counting and morphometry of neonates.
- Register of natural and introduced predators.

2. DAY MONITORING:

- 6:00 a.m.: Sea temperature record every day.
- 6:00 a.m.: Census of nests and lost tracks.
- 12:00 p.m.: Sea temperature record every day.
- 04:00 p.m.: Excavation of nests.
- 06:00 p.m.: Sea temperature record.
- Once a month: Beach cleaning.
- Once a month: Slope measurement.

Results

The information presented corresponds to the 2020 period. Below is a summary of the main results obtained from the season:



Ecuador

Annual Report 2020

1. Abundance of females:

Fifth beach: A total of 414 records were obtained, of which: 213 were newly tagged turtles, 24 were remigrants from past seasons, and 177.

Las Bachas: A total of 245 records were obtained, of which: 118 were newly tagged turtles, 13 remigrants from past seasons, and 114 recaptured from the same season.

2. Abundance of nests:

Fifth beach: A total of 545 nests were recorded, of which 89 were marked for monitoring. Las Bachas: A total of 460 nests were recorded, of which 68 nests were for monitoring.

3. Mortality:

In the entire 2020 season, no dead individuals were found either before or during the duration of the camps.

4. Environmental Education:

One of the most important components and one that has been worked on a lot in recent years and in conjunction with Ecology Project International (EPI), is environmental education for local youth, involving them in the entire process involved in monitoring nesting. For this, the students participated in an introductory workshop on sea turtle biology and conservation problems of the species at a global and local level, in addition to receiving training on species monitoring techniques. The workshop and training was led by both staff from the Galapagos National Park Directorate's sea turtle project and the EPI environmental education instructor.

Once this theoretical phase was finished, the students went on an excursion to a beach where there is nesting (Las Salinas), for a field experience together with the monitoring team of the sea turtle project.

Once at the nesting site, in addition to learning about nesting monitoring, the students received talks about the different marine ecosystems of the Galapagos and their importance, identified in situ the conservation problems that affect the tortoises in the archipelago, interacted with beach visitors (tourists) to avoid crushing nests, and participated in beach cleanups.

Likewise with the help and guidance of the environmental education instructor and staff from the sea turtle project.

5. Eradication of Introduced Animals:

Likewise, the component of eradication of introduced species, as in previous seasons, was carried out during the daytime censuses, where it is very common to find cat tracks around the nests, for this reason it had the support of the Control area and establishment of Invasive Species, to begin with the eradication of introduced animals on both beaches, with baits and traps, and sometimes hunting.

This season, due to the COVID19 pandemic, the camps had to be closed in the middle of the season, so the data is from January to March 2020.



Ecuador Annual Report 2020

Graphics Images





Photo 1. Environmental education with local students and volunteers from Puerto Villamil

Photo 2. Turtle nesting and biological data collection of the species.

Reference for access to information

rmg@galapagos.gob.ec Contacto del proyecto

eespinoza@galapagos.gob.ec Eduardo Espinoza Dirección Parque Nacional Galápagos

aproano@galapagos.gob.ec Alberto Proaño Dirección Parque Nacional Galápagos.

Responsibility Signature:



Ecuador

Annual Report 2020

Title of the project

Monitoring of the green turtle (*Chelonia mydas*) in foraging sites of the Galapagos Islands **Season**

Start: November 2019 End: March 2020

Area(s)

Western Galapagos

Institution

Dirección Parque Nacional Galápagos

Responsible for this report

Participants

Institutional collaborators

Program type

Monitoring at foraging sites

General objective

Monitor sea turtles (*Chelonia mydas*) at foraging sites to gather information on the resident population of the Galapagos Marine Reserve.

Specific objectives

- Update and identify the main foraging sites in Galapagos.
- Estimate the size of the permanent resident green turtle colony in the Galapagos Islands.
- Recapture and monitor individuals that occupy foraging sites in Galapagos.
- Identify the most common damages and causes.
- Establish administration and management measures, aimed at the protection and conservation of
- sea turtle species and their habitats in the Galapagos Archipelago.
- Identify if there are fibropapilloma-type diseases present in the area.

Question to answer

- To know what is the resident population that remains permanently in the Galapagos Islands?
- What are the main effects on sea turtles due to anthropogenic effects or diseases?
- Determine if the population of sea turtles in Galapagos is increasing or decreasing?
- What are the nesting sites of the females that are sighted in the foraging sites?

Methodology

Using bibliography, the main foraging sites were identified, as well as surveys, once the sites are determined so that the turtles cannot leave, they are trapped and morphometric



Ecuador

Annual Report 2020

measurements are taken Curved carapace length (LCC) and curved carapace width. (ACC), marking with inconel tags is performed, a visual inspection is performed throughout the body for tumors. Likewise, an overflight with a drone is carried out to be able to carry out a visual census from above to determine how many individuals are in the area.

Activities

- Taking morphometric measurements
- Marking with inconel marks.
- Take body temperature.
- Check for the presence of damage and tumors.
- Taking a photo for photo-identification.

Results

- They were monitored to the west of the Galapagos on Fernandina and Isabela islands, at 6 sites: Caleta Webb, Punta Mangrove, Cabo Douglas, Punta Espinoza, Punta Flores and Punta Albermarle.
- A total of 43 individuals were monitored, of which 14 were females and 7 males, all adults, 22 juveniles whose sex could not be determined.
- 22 individuals of the yellow morphotype and 21 of the green were monitored.
- Two individuals were found with the presence of a possible tumor, a sample of the pustules was taken.
- 43 genetic samples were taken to perform disease sampling.
- Likewise, 43 shell scraping samples and 43 tissue samples were taken to perform isotopes.

Graphics

Images





Photo 1. Taking samples from the individual.

Photo 2. Foraging and resting sites



Ecuador Annual Report 2020





Ecuador Annual Report 2020

Part IV: Annexes

Table 1: Species Present

Place an X in the box when the species listed is present in the oceanographic basins of your country as established in Article III of the text of the Convention. Lo = Lepidochelys olivacea; Lk = Lepidochelys kempii; Dc = Dermochelys coriacea; Ei = Eretmochelys imbricata; Cm = Chelonia mydas; Cc = Caretta caretta.

Species	Pacific Ocean	Atlantic Ocean	Caribbean Sea
Lo	X		
Lk	X		
Dc	X		
Ei	X		
Cm	X		
Cc	X		



Ecuador Annual Report 2020

Table 2: Index nesting sites or beaches for sea turtle conservation

- a. This table is intended to report information on index nesting sites or beaches for each species. For beaches that have multiple species nesting, enter that beach under the list for the primary nesting species. When entering information on nesting site or beaches, information is to be entered for each species independently. Indicate the names of index nesting sites. On a separate sheet of paper, indicate the selection criteria used for identifying the index beach, for example, because it hosts a significant proportion of the overall nesting population within a region or other defined unit or genetic importance. Please use the index sites that your country has selected included in the document circulated with this report as Table 4. Also available on the <u>IAC website</u>.
- b. Nesting season: Indicate the starting and finishing date of the nesting season.
- c. Monitoring period: Indicate the starting and finishing date of monitoring efforts.
- *d. Survey frequency*: *Indicate the frequency with which the surveys are done (daily, weekly, bi-weekly, monthly, among others).*
- e. Geographic location: Specify latitude and longitude in decimal degrees.
- f. Extension of beach monitored: Provide the total length (in Kilometers) of the nesting beach.
- g. **Declared protection area**: Indicate (yes or no) if the area is declared as some type of protected area.
- h. Annual nesting abundance: Provide information on the total number of females and/or clutches or nests deposited at the nesting site or beach in real numbers. Provide the exact count of females based on tagged or uniquely identified individuals. If the exact number of clutches is unknown provide a total number of nests.
- *i.* Information from tagging program: Indicate if there have been any tagging activities at the nesting beach by using the letters of the type of tagging being done: flipper tagging (FT), passive integrated transponder (PIT) tagging, and satellite telemetry (ST) programs. If possible, on a separate sheet or as attached reference provide greater detail about the type of tagging efforts conducted. Also, provide satellite telemetry maps or flipper tag recovery information if available.
- *j.* **Tissue sampling**: Indicate if there has been tissue sampling conducted at this site. This includes skin, blood, and other body tissues. On a separate sheet, or as attached references describe these tissue sampling programs in greater detail. For example, were samples collected for genetic, contaminant, and/or stable isotope studies?
- k. Indicate what organization or entity is providing the data.
- 1. When inserting new rows, please copy and paste the drop-down menus when applicable.

Country Annual Report 2020

	Name of Index Nesting Site or Beach	Nesting	g Season	Monitoring Period			Geographic Location (Lat/Lon) in Decimal Degrees		beach (km)	Declared	Annual Nesting Abundance			Tagging		Organization or
Spp		Start	Finish	Start	Finish	Survey Frequency	Latitude	Longitude	Extension of monitored (Protected Area (Yes/No)	Females Exact Count	Clutches Exact Count	Number of Nests	Program (FT, ST, PIT)	Tissue Sampling (Yes, No)	Organization or entity providing data
	San Lorenzo	01/08/ 2019	30/11 / 2019	01/06/ 2019	31/05 /2020	Daily	-1.068554	-80.907768	2,40	Yes			142	0	NO	RVSMC-Pacoche
	La Botada	01/08/ 2019	30/11 / 2019	01/06/ 2019	31/05 /2020	Daily	- 1.050000	-80.904193	1,00	Yes			154	17 (MA)	NO	RVSMCP0-acoche
	Playa Bruja	August	November	August	December	Daily	X: 529859 Y: 9790091	X: 530231 Y: 9788168	1.95 km	Yes	No data	13	13	NO	NO	NO
	Manglaralto	August	December	August	January	Weekly	X: 528047 Y: 9795806	X: 528829 Y: 9793358	2.49 km	No	No data	11	11	NO	NO	NO
Lo	Montañita	August	December	August	January	Weekly	X: 527003 Y: 979886	X: 528047 Y: 9795806	1.99 Km	No	No data	8	8	NO	NO	NO
	Olón	August	December	August	January	Weekly	X: 526970 Y: 9799976	X: 528047 Y: 9802599	2.52 Km	No	No data	14	14	NO	NO	NO
	Las Palmas	June	March	June	March	Daily tours including weekends and holidays	650030	10100037	3 km	No	14	14	11	EC	NO	RVSMERE with the support of the Management Specialist and Coastal of the Directorate of Protected Are
Lk																
Ex																
Dc																
Ei	Playa Rosada	November	March	November	April	Daily	X: 527801 Y:	X: 527870 Y: 9777859	0,68 km	Yes	11	44	44	MA	NO	NO

							9778559									
	San Lorenzo	01/11/ 2019	30/04 / 2020	01/06/ 2019	31/05 /2020	Daily	- 1.068554	80.907768	2,40	Yes			2	0	NO	RVSMC-Pacoche
	Playa Rosada	November	March	November	April	Daily	X: 527801 Y: 9778559	X: 527870 Y: 9777859	0,68 km	Yes	1	2	2	МА	NO	NO
Cm	La Botada	01/11/ 2019	30/04 / 2020	01/06/ 2019	31/05 /2020	Daily	- 1.050000	-80.904193	1,00	Yes			1		NO	RVSMC-Pacoche
	quinta playa	December	June	17/04 /2020	20/0 3/20 20	Daily	- 1.00685 7°	- 91.08454 8°	2.1	Yes	237		545	MA	NO	dpng
	las bachas	December	June	20/01 /2020	18/0 3/20 20	Daily	- 0.49325 4°	- 90.34150 2°	1.6	Yes	131		460	MA	NO	dpng
Ca																

Note from the Secretariat: according to numeral 7 of Resolution CIT-COP9-2019-R2 for the Conservation of the Leatherback Turtle of the Northwest Atlantic, which requests the information included in Table 3 of this annual report (information on industrial longline fisheries), sensitive information will be kept confidential. For any additional information, the procedure established in Resolution CIT-COP9-2019-R4 must be applied.

Table 3: IAC Form to report interactions of sea turtles with industrial longline fisheries

a. This form is intended to report the annual summary of the number of sea turtle incidentally caught by industrial longline vessels (>20 m) during fishing operations in 2019.

b. Countries without this type of fishery will mark with X the "does not apply" box.

c. *Target Species: Indicate the target species (scientific and common name) of the industrial longline fisheries during the last year. Indicate if the catch was using shallow or deep sets. Fleet Information (Examples are provided in blue in the form)*

d. Period covered: Starting and end date of the fishing operations of the year

e. Area fished: Indicate the area coordinates where shallow set and deep sets fishing operations were carried out during the last year.

f. No. of vessels that fished: Indicate the total number of vessels in the fleet in each case (deep set and shallow set), the number of vessels with observers on board, and the corresponding percentage of vessels with observers (% observed)

g. No. of trips: Indicate the total number of trips in each case (deep set and shallow set), the number of trips with observers on board, and the corresponding percentage of trips with observers onboard (% observed)

h. No. of effective fishing days: Indicate the total number of fishing days in each case (deep set and shallow set) when fishing took place, the number of fishing days with observers on board, and the corresponding percentage of fishing days with observers onboard (% observed)

i. No. of sets: Indicate the total annual number of sets in each case (deep set and shallow set), the annual number of sets with observers on board, and the corresponding annual percentage of sets with observers onboard (% observed)

j. No. of hooks (in thousands): Indicate the total annual number of hooks in each case (deep set and shallow set), the annual number of hooks with observers on board, and the corresponding annual percentage of hooks with observers onboard (% observed). It refers to the number of hooks per basket (HPB) or the number of hooks between floats (HBF). If the number is unknown include an approximate number of hooks/sets, using an asterisk (*) to indicate that it is an approximation.

k. **Predominant hook type/size:** Using the <u>IATTC codes</u> indicate the most common hooks (> 50%) used throughout the year as a total, and in vessels with onboard observers in each case (deep sets and shallow sets).

l. **Predominant bait type:** Indicate the most common bait used throughout the year as a total, and in vessels with observers in each case (deep sets and shallow sets) using the following bait codes: SQ - squid (e.g. Cephalopods), M - mackerel (e.g. Scomber spp.), A - artificial lure (e.g. plastic jig), O-other, and specify.

Sea Turtles Species (Units expressed in the number of individuals observed)

m. Released alive: Total number of each sea turtle species released alive in each case (shallow and deep sets)

n. **Released dead:** Total number of individuals of each sea turtle species released dead in each case (shallow and deep sets)

o. **Released condition unknown:** Total number of each sea turtle species released under unknown conditions as the individual could not be brought onboard or close enough to verify the condition dead or alive.

p. Notes: Include additional information such as turtles caught that had tags (flipper tags or satellite transmitter), in each case (shallow and deep sets), if applicable.

Table 3: IAC Form to report interactions of sea turtles with industrial longline fisheries (vessels >20m)										
Member country	Ecuador The form does not apply									
Target Species	es large pelagic fish									

FLEET INFORMATION (vessels >20m)												
	(<15 HPB/H	Shallow sets IBF ¹ or <100n depth)	1 max hook	Deep sets (≥15 HPB/HBF or ≥100m max hook depth)								
Period covered	18/02	date range /2019–7/12/	2019	date range mm/dd/yyyy–mm/dd/yyyy								
Area fished	from 94°51.4 0°37.2	72 W to 101°29 from 272N to 10°49.	9.441 W and 388S	from (XXX)°W to (XXX)°W and from (XXX)°S/N to (XXX)°S/N								
	Total Fleet	Observed	% observed	Total Fleet	Observed	% observed						
No. of vessels that fished	83	21	25.3									
No. of trips	636	36	5.6									
No. of effective fishing days	8886	503	5.6									
No. of sets	8886	503	5.6									
No. of hooks (in thousands) ¹ If unknown, approx. no. of hooks/set, using a^*)	6219.072/ *	345.504/*	0.5									
Predominant ² hook type/size (<u>IATTC code</u>)	C16-J4- J36- J38	J38-J4										
Predominant bait type ³	B - SQ - O	B - SQ										

SEA TURTLE SPECIES (vessels >20m)											
	No. of Individuals Observed										
	(<15 HPB/HBF	Shallow sets ¹⁴ or <100m may	(≥15 HPB/HB	Deep sets /HBF or >100m max hook depth)							
	Released Alive	Released Dead	Released Condition Unknown								
Taxa - Sea turtles											
Leatherback (Dermochelys coriacea)	1										
Loggerhead (Caretta caretta)	1										
Green (Chelonia mydas)	31										
Olive ridley (Lepidochelys olivacea)	18		1								
Kemp's ridley (Lepidochelys kempii)											
Hawksbill (Eretmochelys imbricata)	8										
Notes (e.g. Tagged turtles, etc.)											

¹ Hooks per Basket / Hooks Between Float (HPB/HBF)

² "Predominant" indicates most common, e.g. >50%

³ Bait code: SQ – squid (e.g. Cephalopods), M – mackerel (e.g. Scomber spp.), A – artificial lure (e.g. plastic jig)

⁴ Hooks per Basket / Hooks Between Float (HPB/HBF)

List of index sites for each sea turtle species for each IAC country within which sea turtle nesting occurs. Use the index beaches in this table to provide information for Table 2 index nesting sites.

Name of Beach	DC	СМ	EI	CC	LO	LK	Responsible
Belize (2)		(1)	(1)	(1)			
Gales Point			Х				
Bacalar Chico Marine Reserve		Х		Х			
Brazil (18)	(2)	(1)	(7)	(12)	(3)		
Comboios	Х			Х			
Povoação	Х			Х			
Busca Vida			Х	Х			
Santa Maria				Х			
Barra Jacuipe			Х	Х			
Guarajuba			Х	Х			
Itacimirim			Х	Х			
Praia do Forte			Х	Х			
Barra do Furado				Х			
Farol				Х			
Farolzinho				Х			
Maria Rosa				Х			
Berta			Х				
Pipa			Х				
Mangue Seco					Х		
Coqueiros					Х		
Pirambu					Х		
Trindade Island		Х					

Name of Beach	DC	СМ	EI	CC	LO	LK	Responsible
Caribbean Netherlands (2)	(1)	(2)	(1)	(1)			
Klein Bonaire, Bonaire		Х	Х	Х			Sea Turtle Conservation Bonaire
Zeelandia, St. Eustatius	Х	Х					St Eustatius Sea Turtle Conservation
Costa Rica /Pacific (9)	(1)	(5)			(4)		
Isla Murcielago		Х					
Nancite*					Х		
Naranjo		Х			Х		
Cabuyal		Х					
Nombre de Jesús		Х					
Punta Pargos		Х					
Playa Grande	Х						
Ostional*					Х		
Hermosa					Х		
Costa Rica/Atlantic (4)	(3)	(1)	(1)				
Tortuguero	X	Х					
Pacuare Norte	X						
Mondonguillo	X						
Cahuita			Х				
Ecuador (9)		(6)	(1)		(5)		
San Lorenzo					Х		MAE (Pacoche)
La Botada					Х		MAE (Pacoche)
Playa Chocolatera		Х			Х		MAE (REMACOPSE)
Playa Tres Cruces		Х			Х		MAE(REMACOPSE)
PlayaMar Bravo		Х			Х		MAE(REMACOPSE)
Playita (Machalilla)			Х				MAE (PNM/ Equilibrio
Quinta Playa (Galapagos)		Х					MAE (DPNG)
Barahona (Galapagos)		Х					MAE (DPNG)
Las Bachas (Galapagos)		Х					MAE (DPNG)

Name of Beach	DC	СМ	EI	CC	LO	LK	Responsible
Guatemala (2)	(1)				(2)		
Hawaii	X				Х		ARCAS
La Barrona					Х		
Honduras/Atlantic (3)	(1)		(2)				
Pumkin Hill, Utila			Х				
Plaplaya	Х						
Cayos Cochinos			Х				
Honduras/Pacific (2)					(2)		
Punta Ratón					Х		
El Venado					Х		
México/Atlantic (12)		(11)	(4)	(8)		(7)	
Rancho Nuevo, Tamps		Х		Х		Х	CONANP
Barra del Tordo, Tamps		Х		Х		Х	CONANP
Altamira, Tamps		Х		Х		Х	CONANP
Mirama, Tamps						Х	CONANP
Lechuguillas, Ver		Х	Х			Х	CONANP
Isla Aguada-Xicalango- Victoria, Camp		Х	Х			X	CONANP
Chenkán, Camp		Х	Х			Х	CONANP
Las Coloradas/Rio Lagartos, Yuc		Х	Х	Х			CONANP
Xcacel, Q.Roo		Х		Х			Reserve Estatal
Chemuyil, Q. Roo		Х		Х			
Xel Ha, Q. Roo		Х		Х			
Puerto Aventuras, Q. Roo		Х		Х			
México/Pacific (13)	(6)	(5)			(9)		
El Verde, Sin	Х				Х		CONANP
Platanitos, Nay					Х		CONANP
Nuevo Vallarta, Nay					Х		CONANP
Mismaloya, Jal					Х		CONANP
Chalacatepec, Jal					Х		CONANP
El Chupadero, Col							CONANP

Name of Beach	DC	СМ	EI	CC	LO	LK	Responsible
Mexiquillo, Mich	X	Х			Х		CONANP
Tierra Colorada, Gro	Х	Х			Х		CONANP
Cahuitán, Oax	Х						CONANP
Escobilla, Oax*	X				Х		CONANP
Barra de la Cruz, Oax	X	Х			Х		CONANP
Maruata, Mich		Х					Univ. Michoacana SNH
Colola, Mich		Х					Univ. Michoacana SNH
Panamá/Atlantic (3)	(2)	(1)	(3)	(1)			
Cayos Zapatillas (B. del Toro)			Х				
Playa Chiriqui (B. del Toro)	Х	Х	Х	Х			
Playa Armita o Pito (GunaYala)	Х		Х				
Panamá/Pacific (2)		(2)			(2)		
RVS Isla Cañas		Х			Х		
Playa La Marinera		Х			Х		
United States/Atlantic (7)	(5)	(4)	(3)	(4)		(1)	
Culebra Island, Puerto Rico	Х						
Vieques Island, Puerto Rico	X	Х	Х				
Mona Island, Puerto Rico			Х				
Buck Island Reef National Monument, U.S. Virgin	X	X					
Sandy Point NWR, U.S. Virgin Islands	Х	Х	Х				
Florida Index Beaches	Х	Х		Х			
Georgia Index Beaches				Х			
North Carolina Index Beaches				Х			
South Carolina Index Beaches				Х			
Texas (South Padre Island)						Х	
United States/Pacific (2)		(1)	(1)				
French Frigate Shoals (HI)		X					
Hawaii			Х				

Name of Beach	DC	СМ	EI	CC	LO	LK	Responsible
Venezuela (11)	(6)	(4)	(6)	(6)			
Querepare (Edo. Sucre)	Х			Х			CICTMAR
Cipara (Edo. Sucre)	Х			Х			CICTMAR
Macuro (varias playas cercanas, Edo. Sucre)	Х	Х	X				ONDB-MPPA
El Agua - Parguito Beach (Edo. Nueva Esparta)	X						ONDB-MPPA
Parque Nacional Archipiélago Los Roques (varios cayos)			Х	X			INPARQUES, Fundación Científica
La Sabana (Edo. Vargas)	X						ONDB-MPPA, Consejo de Pescadores
Parque Nacional Henri Pittier (Playas Cuyagua, Uricaro y		X	X	х			INPARQUES, Fundación Ecodiversa, Lideres de la
Playas entre las bocas del Rio Morón Y Rio Yaracuy			X	X			Palmichal S.C.
Parque Nacional Morrocoy (Cayo Borracho, Varadero y Playas Mayorquina)		X	X				CICTMAR, INPARQUES
Paraguana Peninsula	X		X	X			UNEFM (Universidad Nacional
RFS Isla de Aves		X					ONDB-MPPA