



**Seascape Genetics and Conservation
Management of the Olive Ridley Turtle
(*Lepidochelys olivacea*) in the Eastern Pacific**

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to the divine energy that creates and sustains all within us
to my mum that accompanied every moment of this journey

TABLE OF CONTENTS

Table of contents	v
List of figures	x
List of tables	xiii
List of Appendix	xvi
Declaration	xxi
Acknowledgments	xxiii
Statement of Authorship	xxvii
SUMMARY	xxviii
List of Publications and Collaborations Developed During this Thesis	xxx
Chapter I: General Introduction	1
<i>1.1. Cheloniids</i>	<i>4</i>
<i>1.1.1. Sea Turtles Life History and Biological Traits</i>	<i>4</i>
<i>1.1.2. The Olive Ridley Turtle</i>	<i>8</i>
1.1.2.1. Distribution and reproduction modes	8
1.1.2.2. Long distance migrations and habitat utilization	12
1.1.2.3. Phylogeography and population structure	14
1.1.2.4. Human induced impacts on olive ridley turtles	15
1.1.2.5. Conservation status in the eastern Pacific	17
<i>1.2. The Eastern Pacific</i>	<i>18</i>
<i>1.2.1. Olive ridley turtle nesting sites of study in the eastern Pacific</i>	<i>20</i>
<i>1.3. Conservation Genetics</i>	<i>22</i>
<i>1.3.1. Genetic markers in sea turtles</i>	<i>22</i>
<i>1.3.2. Population connectivity in the sea and definition of units for conservation</i>	<i>24</i>
<i>1.3.3. The seascape genetics approach</i>	<i>25</i>

<i>1.4. Aims</i>	27
<i>1.5. Thesis Structure</i>	27
Chapter II: (Article 1) Genetic Signature of a Recent Metapopulation Bottleneck in the Olive Ridley Turtle (<i>Lepidochelys Olivacea</i>) After Intensive Commercial Exploitation in Mexico	29
<i>2.1. Abstract</i>	31
<i>2.2. Introduction</i>	32
<i>2.3. Materials and Methods</i>	36
<i>2.3.1. Sample collection</i>	36
<i>2.3.2. DNA purification, amplification and genotyping</i>	36
<i>2.3.3. Genetic diversity and detection of bottlenecks</i>	38
<i>2.3.4. Analysis of spatial population structure</i>	41
<i>2.4. Results</i>	42
<i>2.4.1. Genetic variation and bottlenecks</i>	42
<i>2.4.2. Population differentiation</i>	46
<i>2.5. Discussion</i>	48
<i>2.5.1. Genetic diversity and the effect of commercial fishery</i>	49
<i>2.5.2. High connectivity along the Mexican coast</i>	53
<i>2.5.3. Conservation implications for olive ridleys in Mexico</i>	54
<i>2.6. Acknowledgments</i>	56
<i>2.7. Appendix</i>	58

Chapter III: (Article 2) Population Divergence in the Sea: A New Paradigm of Isolation by Ecological Distance for the Highly Mobile Olive Ridley Turtle (<i>Lepidochelys olivacea</i>) in the Eastern Pacific	65
<i>3.1. Abstract</i>	67
<i>3.2. Introduction</i>	68
<i>3.3. Materials and Methods</i>	72
<i>3.3.1. Study area - The eastern tropical Pacific</i>	72
<i>3.3.1.1. Variability of the main meso-scale features in the eastern tropical Pacific</i>	73
<i>3.3.2. Sample collection and microsatellite genotyping</i>	75
<i>3.3.3. Genetic diversity and analysis of spatial population structure</i>	75
<i>3.3.4. Environmental heterogeneity profiles</i>	77
<i>3.3.5. Analysis of environmental heterogeneity</i>	79
<i>3.3.6. Seascape genetics</i>	80
<i>3.4. Results</i>	81
<i>3.4.1. Regional assessment of population structure and genetic diversity</i>	81
<i>3.4.2. Influences of environmental heterogeneity on genetic structure</i>	88
<i>3.4.3. A biophysical model for sea turtles: environmental barriers to dispersal over the seascape</i>	93
<i>3.5. Discussion</i>	96
<i>3.5.1. Dispersal, connectivity and population configuration over the seascape</i>	96
<i>3.5.2. Genetic population divergence and environmental heterogeneity</i>	98
<i>3.5.3. Application of a biophysical model to infer connectivity in Sea turtles</i>	100
<i>3.5.4. Conservation implications and future directions</i>	103
<i>3.6. Acknowledgments</i>	106

<i>3.7. Appendix</i>	107
----------------------	-----

Chapter IV: (Article 3) New Insights on Sea Turtle Conservation: State of Progress and Reframing of Management Approaches Based on Latest Genetic

Findings in the Eastern Pacific Region	117
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<i>4.1. Abstract</i>	119
----------------------	-----

<i>4.2. Introduction</i>	120
--------------------------	-----

<i>4.3. Methodology</i>	123
-------------------------	-----

<i>4.4. Results and Discussion</i>	126
------------------------------------	-----

<i>4.4.1. Reframing Managements Units according to recent findings for the eastern Pacific</i>	126
--	-----

<i>4.4.2. Regional capacity to perform large-scale conservation</i>	132
---	-----

4.4.2.1. Legal and institutional capacity	132
---	-----

4.4.2.2. Stakeholders for sea turtles management and implementation of actions	136
--	-----

- Inter-governmental stakeholders	136
-----------------------------------	-----

- Governmental stakeholders (environmental dependencies, species-specific offices, environmental police and other guards)	136
---	-----

- Non-governmental stakeholders (local and regional)	138
--	-----

4.4.2.3. Perceptions on sea turtle conservation	140
---	-----

- On legal instruments and enforcement	140
--	-----

- On the performance of management strategies on the ground	140
---	-----

- On the performance of actions within the region	142
---	-----

4.4.2.4. Identifying implementation capacity	143
--	-----

<i>4.5. Conclusion and Final Remarks</i>	146
--	-----

<i>4.6. Acknowledgments</i>	147
-----------------------------	-----

Chapter V: Conclusions	176
<i>5.1. Conclusions</i>	178
<i>5.2. Future Research Directions</i>	186
References	188

LIST OF FIGURES

Figure 1. 1 Generalized life cycle for sea turtles. Adapted from Lanyon *et al.*, (1989). Illustration designed by Rodolfo Rodriguez Blandon 2013. **8**

Figure 1. 2 The olive ridley turtle (*Lepidochelys olivacea*, Eschscholtz, 1829) guide to morphometric characteristics. Adapted from Pritchard and Mortimer, 1999. Illustration designed by Rodolfo Rodriguez Blandon 2013. **9**

Figure 1. 3 Olive ridley turtles *arribada* (mass nesting). Illustration designed by Rodolfo Rodriguez Blandon 2013. **10**

Figure 1. 4 Location of current (circle) and former (star) *arribada* nesting sites of olive ridley turtles in the eastern Pacific. Shown from north to south they are: Mismaloya, Ixtapilla, Piedra de Tlacoyunque, San Juan de Chacagua, Escobilla and Morro Ayuta (Mexico), Chacocente and La Flor (Nicaragua), Nancite and Ostional (Costa Rica), La Marinera and Isla Caña (Panama). **12**

Figure 1. 5 Surface schematic ocean circulation of the eastern Pacific. Oceanographic features: Tehuantepec Bowl (TB), Costa Rica Dome (CRD), Costa Rica Coastal Current (CRCC). Inter-isthmus wind jets are represented with black arrows. **20**

Figure 1. 6 Study area showing sampling sites of olive ridley turtles in the eastern Pacific. Sampling sites from north to south along Baja California Peninsula are:

Todos Santos, Pescadero, San Cristobal, San José del Cabo, Cabo Pulmo, Punta Colorada and Punta Arenas. Continental sampling sites are: El Verde, Platanitos, Nuevo Vallarta, Puerto Vallarta-La Gloria, Mismaloya, Boca de Apiza, Playa Ticuiz, Tierra Colorada, San Juan de Chacahua, Escobilla, Barra de la Cruz, Puerto Arista, Hawaii, Playa Dorada, San Diego, Bocanitas, San Juan del Gozo, Salamina, Veracruz, Chacocente, La Flor, La Marinera. **22**

Figure 2. 1 Sampling sites of olive ridleys in Mexico. (1) Baja California Peninsula: (star) Todos Santos, (grey dot) Pescadero, (white dot) San Cristobal, (striped dot), San José del Cabo, (crossed dot) Cabo Pulmo, (black dot) Punta Colorada and Punta Arenas. In the continent: (2) El Verde, (3) Platanitos, (4) Nuevo Vallarta, (5) Puerto Vallarta-La Gloria, (6) Mismaloya, (7) Boca de Apiza, (8) Playa Ticuiz, (9) Tierra Colorada, (10) San Juan de Chacahua, (11) Escobilla, (12) Barra de la Cruz and (13) Puerto Arista. **37**

Figure 2. 2 Spatial autocorrelation coefficient (r) for nesting colonies of olive ridleys in Mexico over a range of distance classes. The permuted 95% confidence interval (dashed lines; upper (U) and lower (L) confidence limits) and the bootstrapped 95% confidence error bars are also shown. **48**

Figure 3. 1 Study area showing sampling sites of olive ridley turtles in the eastern Pacific and schematic ocean surface circulation. Sampling sites from north to south along Baja California Peninsula are: Todos Santos, Pescadero, San Cristobal, San José del Cabo, Cabo Pulmo, Punta Colorada and Punta Arenas. Continental sampling sites are: El Verde, Platanitos, Nuevo Vallarta, Puerto Vallarta-La Gloria,

Mismaloya, Boca de Apiza, Playa Ticuiz, Tierra Colorada, San Juan de Chacahua, Escobilla, Barra de la Cruz, Puerto Arista, Hawaii, Playa Dorada, San Diego, Bocanitas, San Juan del Gozo, Salamina, Veracruz, Chacocente, La Flor, La Marinera. Oceanographic features: Tehuantepec Bowl (TB), Costa Rica Dome (CRD), Costa Rica Coastal Current (CRCC). **74**

Figure 3. 2 Estimated probabilities of membership coefficients for each individual turtle in the inferred clusters estimated by STRUCTURE based on two STRUCTURE admixture models: (a, c) standard; and (b, d) LocPrior. Each bar represents an individual from a total of 22 (a,b) and 27 (d,c) sampling sites with the proportion of colour representing assignment to cluster 1 or 2. **86**

Figure 3. 3 Genetic clusters summarizing population structure. Factorial component analysis (FCA) for 22 (a) and 27 (b) sampling sites, dots of different colours identify individuals from different genetic clusters. **87**

Figure 4. 1 Management Units for olive ridley turtles in the eastern Pacific based on seascape genetic analysis of 27 nesting sites along the region. The map shows MUs proposed in Chapter III: northern population (green lines), and southern population (yellow lines). The geographic area delimited with yellow lines corresponds to nesting sites (located in Colombia and Ecuador) not included in this study. **130**

LIST OF TABLES

Table 2. 1 Categories of olive ridley nesting areas in Mexico.	38
Table 2. 2 Summary statistics of genetic diversity based on ten microsatellite markers for 13 nesting areas of olive ridleys in Mexico.	44
Table 2. 3 Results of significant tests of genetic bottlenecks based on the M-ratio for olive ridley turtles in Mexico. Values are shown across a range of parameter conditions and mutational models for both the entire population and subpopulation (nesting colonies) levels.	45
Table 2. 4 Pairwise comparisons of <i>FST</i> (below the diagonal) and <i>D EST</i> (above the diagonal) for 13 nesting areas of olive ridley turtles in Mexico. Bold indicate significant values ($P<0.05$).	47
Table 3. 1 Summary statistics of genetic diversity based on ten microsatellite markers for 22 nesting areas of olive ridley turtles in the eastern Pacific.	84
Table 3. 2 Pairwise comparisons of <i>FST</i> (below the diagonal) and <i>DEST</i> (above the diagonal) for 22 nesting areas of olive ridley turtles in the eastern Pacific. Bold indicate significant values ($P<0.05$).	85
Table 3. 3 Analysis of hierarchical variance (AMOVA) results obtained for olive ridley turtle populations in the eastern Pacific.	87

Table 3. 4 Results of Mantel tests and partial Mantel tests between genetic differentiation of olive ridley turtle nesting colonies in the eastern Pacific and pairwise differences in sea surface temperature (SST), chlorophyll concentration (Chl_a), sea surface high anomaly (SSH) and thermocline depth (Therm) at different seasons. The controlled variable in the partial Mantel tests is indicated in parentheses. Significant tests are denoted in bold. **90**

Table 3. 5 Results of stepwise multiple regression analysis indicating associations between environmental heterogeneity and genetic structure for olive ridley turtles in the eastern Pacific in different seasons. Results are shown for two different estimators of genetic differentiation *DEST* and *FST* as response variables. **91**

Table 3. 6 Results of associations between environmental heterogeneity and genetic structure showing posterior probabilities of the most probable model for the GESTE analysis and the best fit obtained with the BIOENV procedure for olive ridley turtles in the eastern Pacific in different seasons. Population structure for GESTE analysis is based on population specific's *FST* only. **92**

Table 4. 1 Summary of characteristics of respondents. **124**

Table 4. 2 Summary of information on genetic stocks and resilience index of proposed Regional Managements Units (RMUs) for species of sea turtles present in the Mesoamerican region. **129**

Table 4. 3 State of progress of key element considered for the Inter-American Convention (IAC) for the Protection and Conservation of sea Turtles for the Mesoamerican countries. **134**

Table 4. 4 Description of stakeholders present at different scales of action in the Mesoamerican region. **137**

LIST OF APPENDIX

A 1 Survey distributed among stakeholders on their perception on conservation management of sea turtles in Mesoamerica. **148**

Figure A 2. 1 Estimated probabilities of detection of bottlenecks for solitary sites (A), *arribada* sites (B) and the entire metapopulation plus Mismaloya Beach (C) of olive ridley turtles in Mexico based on 10 microsatellite markers and sampling sizes (15, 25, 50,100, 350). Scenario on metapopulation level is based on total sample size (n=334) and total sample size for mainland nesting colonies (n=258). Scenarios can be read from left to right as follows: scenario number, Pre-Bottleneck N_e , N_e during Bottleneck, Pre-Bottleneck N_e , constant population size for the null hypothesis, number of loci, number of sampled individuals. **59**

Figure A 2. 2 Estimated probabilities of membership coefficients for each individual turtle in the inferred clusters based on STRUCTURE. Each bar represents an individual with the proportion of color representing assignment to cluster 1 or 2. **60**

Figure A 3. 1 Annual variability of sea surface temperature in the eastern Pacific for different seasons: migration to feeding grounds (Jan-Mar, FEED); migration to breeding areas (April, MIG); mating (May-Jun, MATE); start of nesting season (Jul-Sep, NES1); ending of nesting season (Oct-Dec, NES2). **107**

Figure A 3. 2 Annual variability of chlorophyll_a in the eastern Pacific for different seasons: migration to feeding grounds (Jan-Mar, FEED); migration to breeding areas (April, MIG); mating (May-Jun, MATE); start of nesting season (Jul-Sep, NES1); ending of nesting season (Oct-Dec, NES2). **108**

Figure A 3. 3 Annual variability of sea surface height dynamic in the eastern Pacific for different seasons: migration to feeding grounds (Jan-Mar, FEED); migration to breeding areas (April, MIG); mating (May-Jun, MATE); start of nesting season (Jul-Sep, NES1); ending of nesting season (Oct-Dec, NES2).

109

Figure A 3. 4 Annual variability of Thermocline depth in the eastern Pacific for different seasons: migration to feeding grounds (Jan-Mar, FEED); migration to breeding areas (April, MIG); mating (May-Jun, MATE); start of nesting season (Jul-Sep, NES1); ending of nesting season (Oct-Dec, NES2). **110**

Figure A 3. 5 Scatter plot of isolation by distance (IBD) correlation for olive ridley turtles in the eastern Pacific based on *FST* and *DEST* genetic distances. **111**

Figure A 3. 6 Spatial autocorrelation coefficient (r) for nesting colonies of olive ridley turtles in the eastern Pacific over a range of distance classes with 95% confidence level (upper (U) and lower (L) confidence limits). **112**

Figure A 3. 7 Connectivity matrix for olive ridley turtles in the eastern Pacific based on Lagrangian particle simulations. (a) particles released on 22 nesting sites

during the mating season and tracked back 150 days; (b) particles released on 22 nesting sites during nesting season and tracked back in time 120 days; and (c) particles released on 27 nesting sites during nesting season and tracked back in time 120 days. **113**

Figure A 4. 1 Summary of responses indicating stakeholders perceptions in regards to Penalties (a) and law enforcement and prosecution (b) in Mesoamerican countries. **158**

Figure A 4. 2 Summary of responses indicating stakeholders perceptions in regards to strengths in each Mesoamerican country and a summary across countries. **159**

Figure A 4. 3 Summary of responses indicating stakeholders perceptions in regards to weaknesses in each Mesoamerican country and a summary across countries. **163**

Figure A 4. 4 Summary of responses indicating stakeholders perceptions in regards to limitations in each Mesoamerican country and a summary across countries. **167**

Figure A 4. 5 Summary of responses indicating stakeholders perceptions in regards to non-attended threats for sea turtles in each Mesoamerican country and a summary across countries. **172**

Table A 2. 1 Detailed summary statistics of genetic diversity based on ten microsatellite markers for 13 nesting areas of olive ridley in Mexico. **61**

Table A 2. 2 Genetic bottleneck tests based on the M-ratio for olive ridley turtles in Mexico. Values are shown across a range of parameter conditions and mutational models for the entire population and the subpopulation (nesting colonies) levels.

62

Table A 2. 3 Genetic bottleneck tests based on heterozygosity excess for olive ridley turtles in Mexico. Values are shown for the Two-Phase Mutational model (TPM) across a range of parameter conditions and for the entire population and the subpopulation (nesting colonies) levels. **64**

Table A 3. 1 Detailed summary statistics of genetic diversity based on ten microsatellite markers for 22 nesting areas of olive ridley turtles in the eastern Pacific. **114**

Table A 3. 2 First generation migrants of olive ridley turtle based on likelihood probabilities among nesting areas in the eastern Pacific. **116**

Table A 4. 1 Characteristics of respondents. **155**

Table A 4. 2 Summary of studies showing the influence of ocean currents on dispersal of sea turtles. **156**

DECLARATION

I certify that this thesis does not incorporate without acknowledgment any material previously submitted for a degree or diploma in any university; and that to the best of my knowledge and belief it does not contain any material previously published or written by another person except where due reference is made in the text.

Clara Jimena Rodríguez Zárate

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I consent to this thesis being made available for photocopying and loan under the appropriate Australian copyright laws.

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Chapter V

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SUMMARY

The assessment of the conservation status of olive ridley turtles (*Lepidochelys olivacea*) in the eastern Pacific remains poorly known due to a lack of information about solitary nesting sites and due to inadequate definition of population boundaries. This dissertation contributes to the evaluation of the status of olive ridley nesting colonies in the eastern Pacific, including those that experienced substantial demographic declines. The main aims of the thesis are to use nuclear DNA datasets from a large sample ($n = 634$ individuals collected at 28 nesting sites) and a combination of population and seascape genetics approaches to (i) clarify population structure and recent demographic history in olive ridley turtles at various spatial scales and (ii) assess environmental factors influencing population connectivity in this species. In addition, the genetic findings of this work are combined with information from the literature and from data of interviews with relevant stakeholders to review current conservation practices and propose ways to tackle challenges associated with large-scale conservation management. The analysis of the genetic consequences of demographic declines revealed signatures of a recent bottleneck along Mexico's eastern Pacific coast. The bottleneck signal was strong across the highly connected metapopulation and also apparent in six nesting sites in a pattern consistent with the history of demographic disequilibria produced by their overexploitation. This likely represents the first report of recent signatures of anthropogenic-driven population declines in sea turtles based on genetics. On a much larger geographic extent, olive ridley turtles were used as a model system to investigate the role of space in assessing and understanding processes shaping population divergence in highly mobile marine species. The

prevailing hypothesis of panmixia for this species in the eastern Pacific was rejected. A seascape genetics approach showed that meso-scale features and associated oceanographic variability likely promote and maintain population divergence in olive ridley turtles, allowing us to propose a new paradigm of isolation-by-ecology for sea turtles. The combined results highlight the importance of reframing management policies and actions to pursue large-scale conservation actions for this taxon. They also provide a framework that enables reconciliation between biological phenomena and conservation management. The Mesoamerican region has the opportunity to assume the challenges of large-scale conservation management based on the multiple capacities developed in recent decades. To achieve this target, a list of perceived limitations that must be sufficiently addressed is presented and a series of management recommendations are made.

Keywords: conservation genetics, isolation-by-ecology, seascape genetics, anthropogenic harvest, sea turtles, eastern Pacific.

