**Electronic Supplementary Material. Isolation by Environment in the Highly Mobile Olive Ridley Turtle (*Lepidochelys olivacea*) in the eastern Pacific.**

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**Figure S7.** Lagrangian particles distribution for olive ridley turtles in the eastern Pacific (a) particles released on 22 nesting sites during the mating season and

tracked back in time 150 days; (b) particles released on 22 nesting sites during nesting season and tracked back in time 185 days; and (c) particles released on 27 nesting sites during nesting season and tracked back in time 185 days. Distribution of particles shows two spatially distinct groups in the eastern Pacific (a northern population: green particles; and a southern population: red particles).

**Figure S8.** Triplot summarizing the first two axes of the statically significant partial redundancy analysis (RDA, P=0.002). Environmental factors are represented as

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 Sampling localities are represented by number and ordered from north to south.

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**Table S2.** Summary statistics of genetic diversity based on ten microsatellite markers for 22 nesting areas of olive ridley turtles in the eastern Pacific.

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**Table S9.** 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.

**Annex 1.** Details on remote sensing environmental data source information.

Environmental data was obtained from remote sensing and float data.

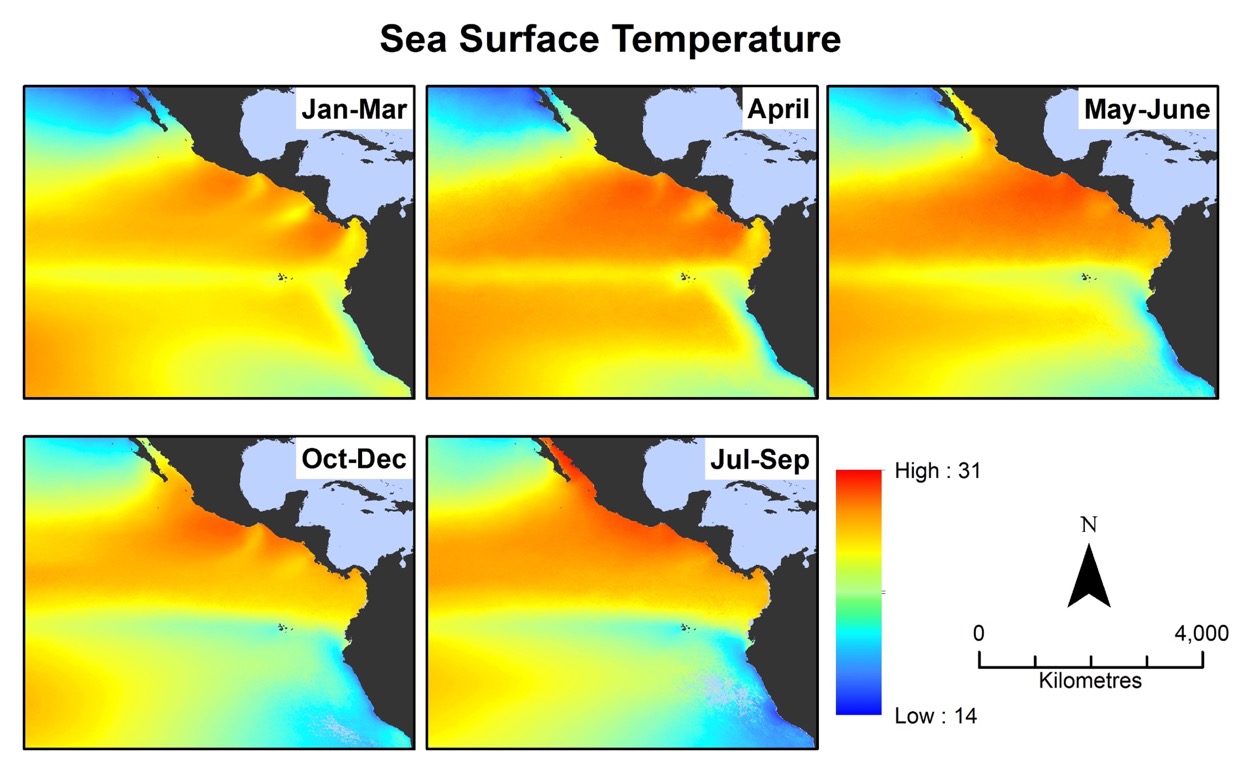
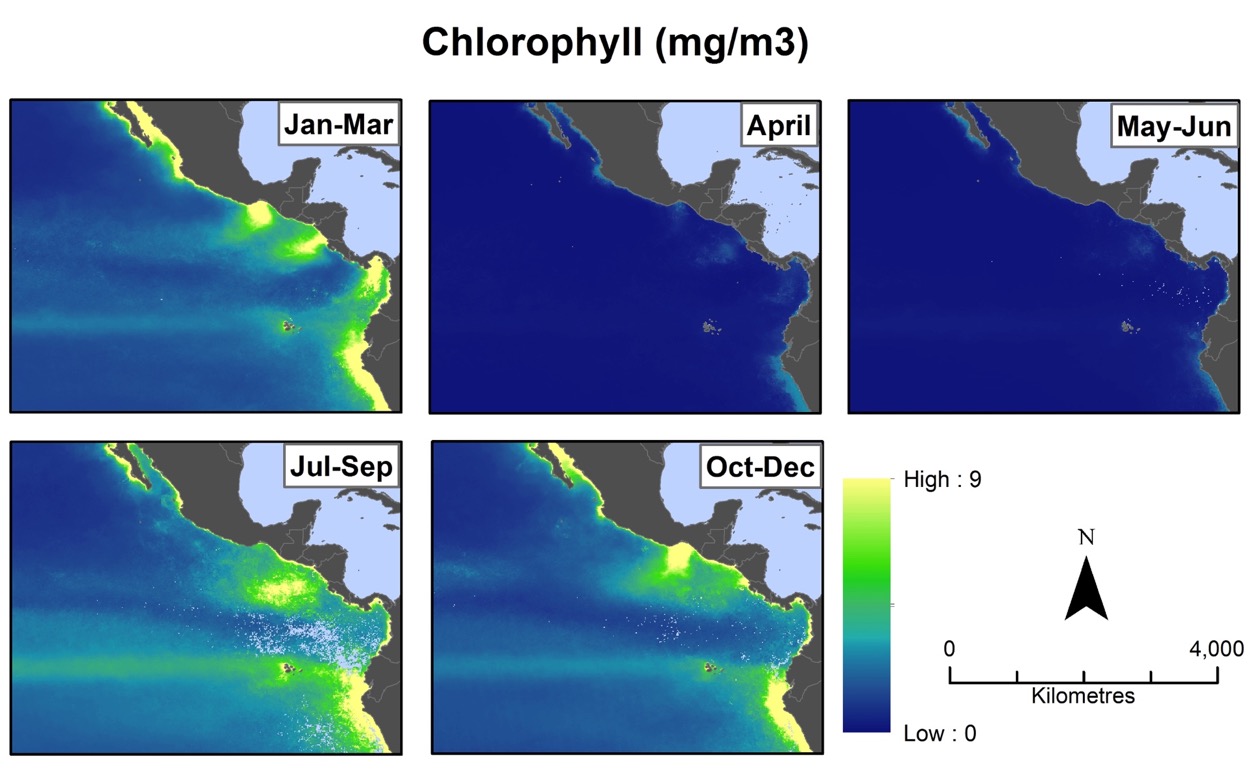
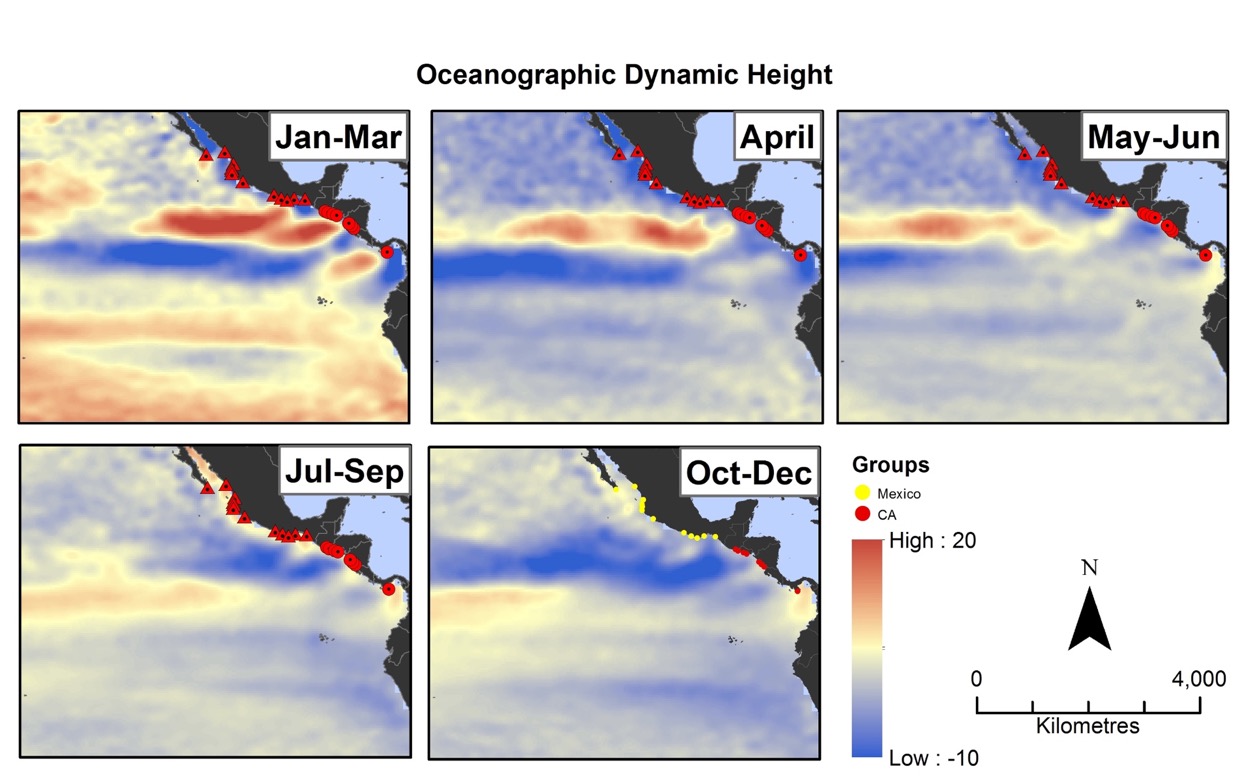
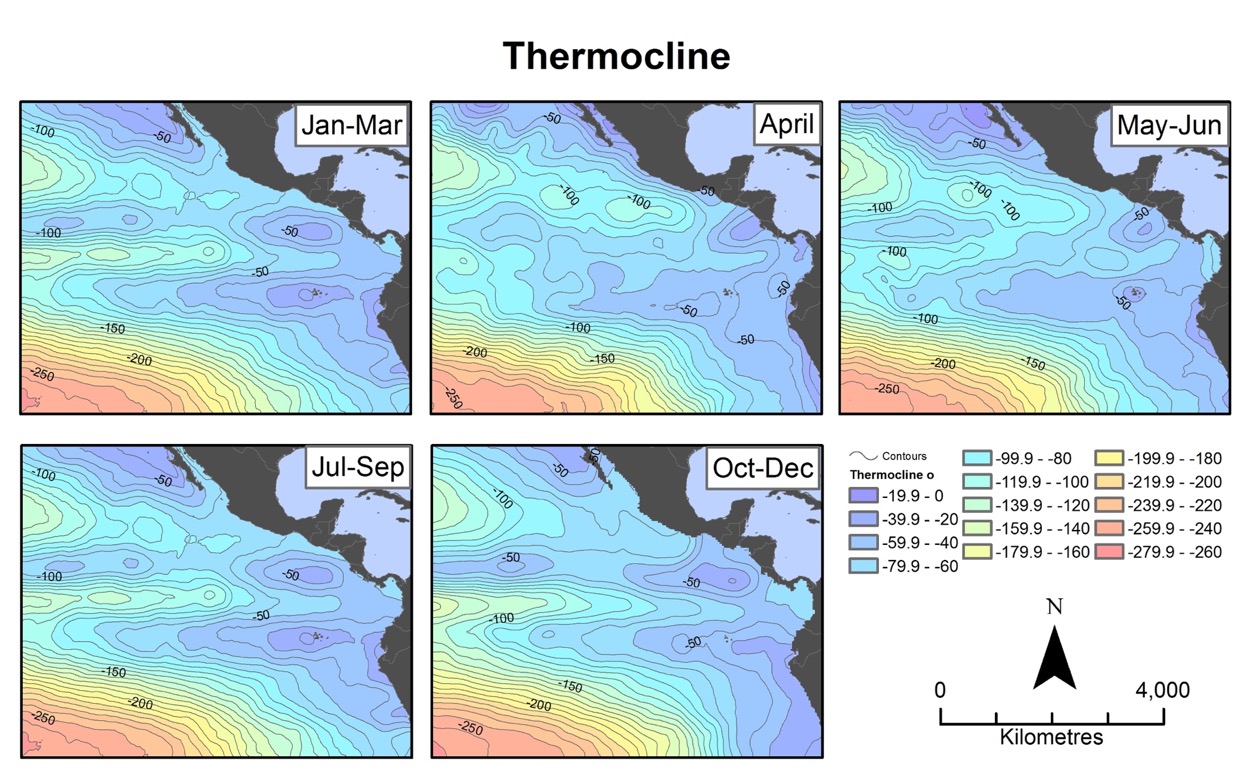
Sources for remote sensing data information included: AVHRR Pathfinder SST data Version 5.2 from US National Oceanographic Data Center and GHRSST (http://pathfinder.nodc.noaa.gov); Chl\_a Ocean Color Data NASA/MODIS-Aqua Sensor (http://oceancolor.gsfc.nasa.gov/); AVISO SSH data (http://www.aviso.oceanobs.com/duacs/); and MBT, XBT, and CTD profiles from World Ocean Database (WOD) 2009 (<http://www.nodc.noaa.gov/OC5/WOD09/pr_wod09.html>) for thermocline data.

**Annex 2.** Details on the BIOENV and pRDA analyses.

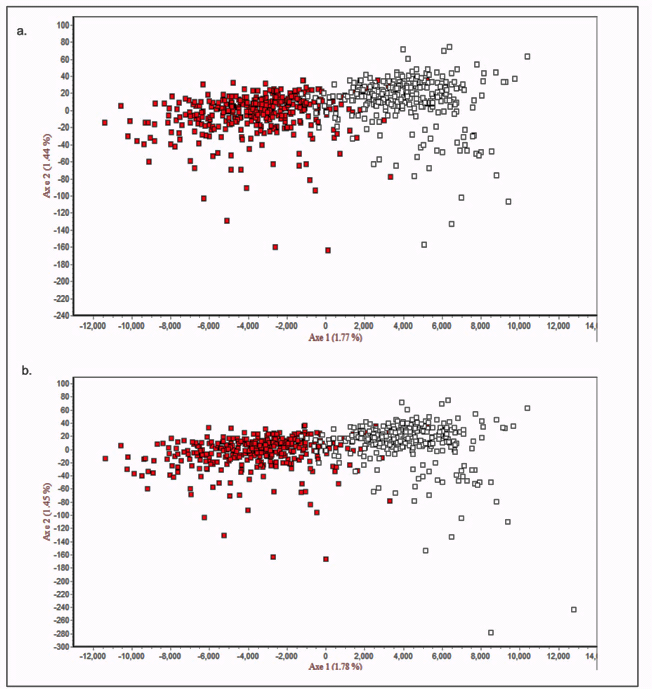
We used the BIOENV procedure in R (Clarke & Ainsworth 1993), which calculates the Spearman’s rank correlation coefficient (r) between predictor and response variables (genetic distances), to select among all possible subsets of environmental variables the ‘best fit’ or combination of predictor variables with the highest value of r.

Additionally, a partial redundancy analysis (pRDA) was included as a complementary use to assess the effect of environmental variation on the patterns of genetic structure while controlling for the effects of isolation by distance. For the explanatory variables, we used the absolute values of four environmental factors (SST, Chla, SSH, and Therm) for each season. In addition, we considered the advection connectivity as the total number of migrants (emigrants and immigrants) per locality, calculated from Lagrangian particle simulation results. The pairwise geographic distances between sampling localities was used to perform multidimensional scaling (MDS) and calculate synthetic coordinates with the R function cmdscale. These synthetic coordinates were then used to control for spatial genetic structure. To avoid collinearity of explanatory variables in the RDA model, variance inflation factor (VIF) analysis was used to exclude highly correlated variables in a stepwise manner until remaining variables were below a VIF threshold of 10 (Dyer et al. 2010). RDA was performed using all variables retained, and the best model was selected using a stepwise model selection by Akaike information criterion implemented in the R package MASS (Venables and Ripley 2002). Significance of the final model was assessed by 1000 ANOVA permutations.

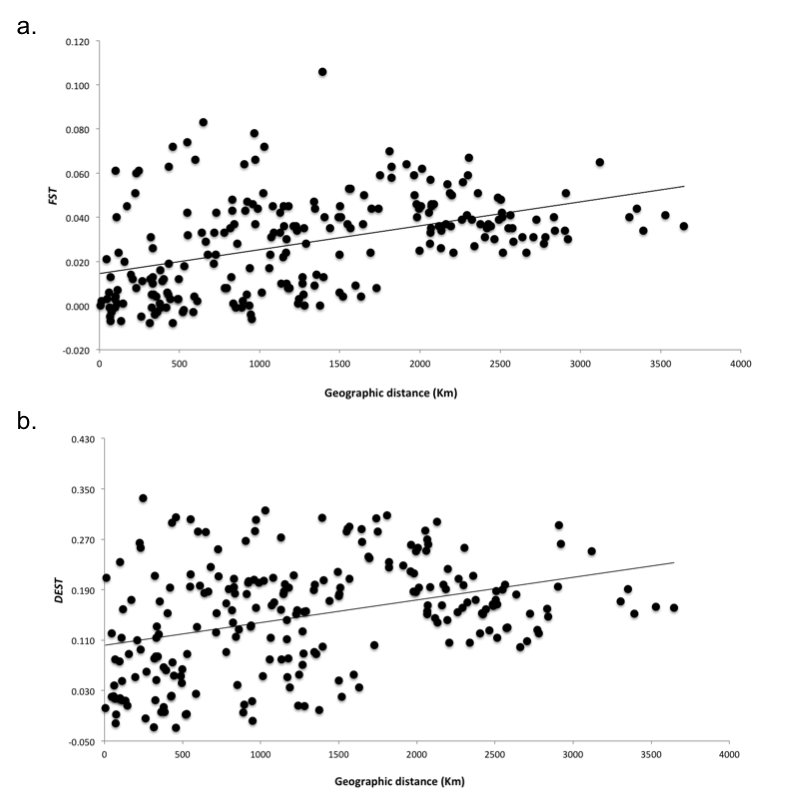
**References for Annex 2:**  
- Clarke, KR & Ainsworth, M (1993) A method of linking multivariate community structure to environmental variables. Marine Ecology Progress Series, 92, 205-219.  
- Dyer RJ, Nason JD, Garrick RC (2010) Landscape modelling of gene flow: improved power using conditional genetic distance derived from the topology of population networks. Molecular Ecology, 19, 3746–3759.  
- Venables, WN & Ripley, BD (2002) Modern Applied Statistics with S. Fourth Edition. Springer, New York.

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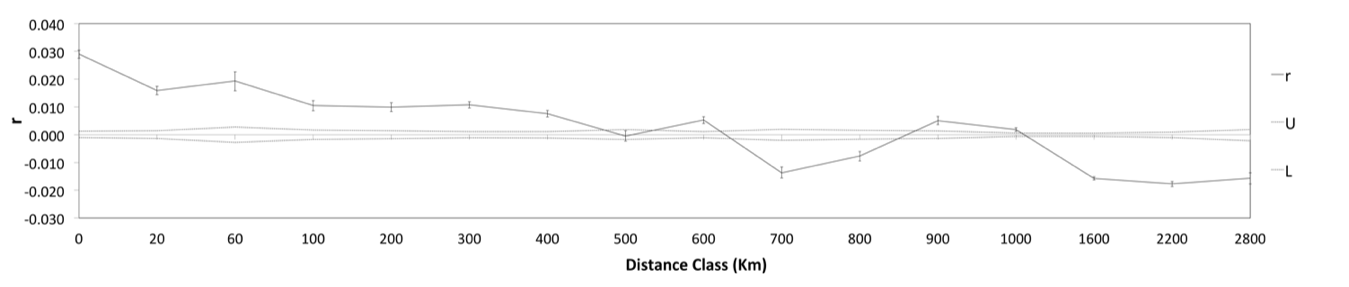
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**Figure S2.** Genetic clusters summarizing population structure. Factorial component analysis (FCA) for 22 (a) and 27 (b) sampling sites, dots of different colours identify individuals from different genetic clusters.



**Figure S3.** Scatter plot of Isolation by Distance (IBD) correlation for olive ridley turtles in the eastern Pacific based on *FST* and *DEST* genetic distances.



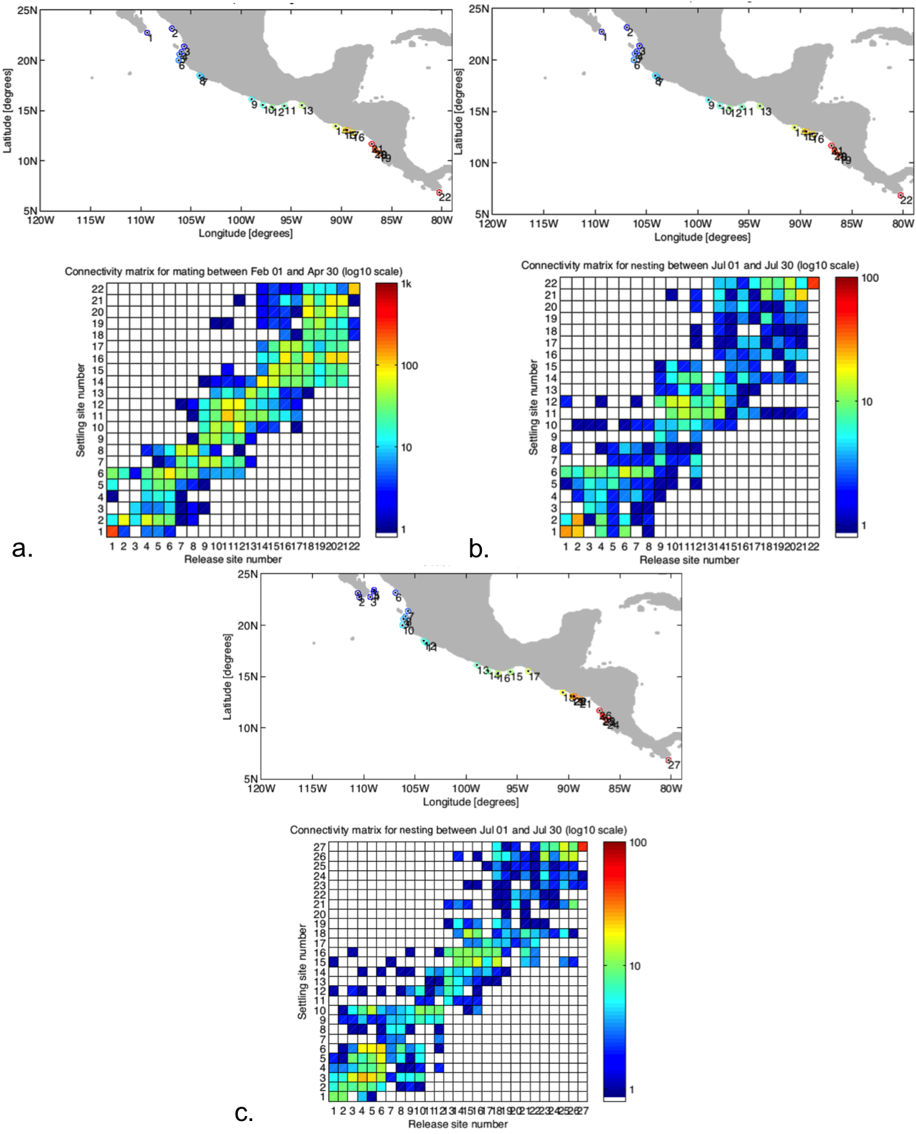
**Figure S4.** Spatial autocorrelation coefficient (*r*) for nesting colonies of olive ridleys in the eastern Pacific over a range of distance classes with 95% confidence level (upper (U) and lower (L) confidence limits).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **(a)** | **(b)** | **(c)** | **(d)** |
| **FEED** | Macintosh HD:Users:clarajrodriguez:Documents:Academia:Doctorate:A_Data_Analysis:Mantel-Partial Mantel_R:Infiles:infiles:SSH:Rplot_Correlogram_SST_Feed_dst.jpeg | Macintosh HD:Users:clarajrodriguez:Documents:Academia:Doctorate:A_Data_Analysis:Mantel-Partial Mantel_R:Infiles:infiles:SSH:Rplot_Correlogram_Chla_Feed_dst.jpeg | Macintosh HD:Users:clarajrodriguez:Documents:Academia:Doctorate:A_Data_Analysis:Mantel-Partial Mantel_R:Infiles:infiles:SSH:Rplot_Correlogram_SSH_Feed_dst.jpeg | Macintosh HD:Users:clarajrodriguez:Documents:Academia:Doctorate:A_Data_Analysis:Mantel-Partial Mantel_R:Infiles:infiles:SSH:Rplot_Correlogram_Therm_Feed_dst.jpeg |
| **MIG** | Macintosh HD:Users:clarajrodriguez:Documents:Academia:Doctorate:A_Data_Analysis:Mantel-Partial Mantel_R:Infiles:infiles:SSH:Rplot_Correlogram_SST_Mig_dst.jpeg | Macintosh HD:Users:clarajrodriguez:Documents:Academia:Doctorate:A_Data_Analysis:Mantel-Partial Mantel_R:Infiles:infiles:SSH:Rplot_Correlogram_Chla_Mig_dst.jpeg | Macintosh HD:Users:clarajrodriguez:Documents:Academia:Doctorate:A_Data_Analysis:Mantel-Partial Mantel_R:Infiles:infiles:SSH:Rplot_Correlogram_SSH_Mig_dst.jpeg | Macintosh HD:Users:clarajrodriguez:Documents:Academia:Doctorate:A_Data_Analysis:Mantel-Partial Mantel_R:Infiles:infiles:SSH:Rplot_Correlogram_Therm_MIG_dst.jpeg |
| **MATE** | Macintosh HD:Users:clarajrodriguez:Documents:Academia:Doctorate:A_Data_Analysis:Mantel-Partial Mantel_R:Infiles:infiles:SSH:Rplot_Correlogram_SST_Mate_dst.jpeg | Macintosh HD:Users:clarajrodriguez:Documents:Academia:Doctorate:A_Data_Analysis:Mantel-Partial Mantel_R:Infiles:infiles:SSH:Rplot_Correlogram_Chla_Mate_dst.jpeg | Macintosh HD:Users:clarajrodriguez:Documents:Academia:Doctorate:A_Data_Analysis:Mantel-Partial Mantel_R:Infiles:infiles:SSH:Rplot_Correlogram_SSH_Mate_dst.jpeg | Macintosh HD:Users:clarajrodriguez:Documents:Academia:Doctorate:A_Data_Analysis:Mantel-Partial Mantel_R:Infiles:infiles:SSH:Rplot_Correlogram_Therm_Mate_dst.jpeg |

**Figure S5.** Mantel correlograms indicating correlation between genetic distance (DEST) and Euclidean environmental distances (a) sea surface temperature (SST), (b) chlorophyll concentration (Chl\_a), (c) sea surface high anomaly (SSH) and (d) thermocline depth (Therm) at different seasons. White and black squares represent non-significant and significant relationships between genetic and Euclidean/environmental distances for the different distance classes, respectively

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **(a)** | **(b)** | **(c)** | **(d)** |
| **NES1** | Macintosh HD:Users:clarajrodriguez:Documents:Academia:Doctorate:A_Data_Analysis:Mantel-Partial Mantel_R:Infiles:infiles:SSH:Rplot_Correlogram_SST_Nes1_dst.jpeg | Macintosh HD:Users:clarajrodriguez:Documents:Academia:Doctorate:A_Data_Analysis:Mantel-Partial Mantel_R:Infiles:infiles:SSH:Rplot_Correlogram_Chla_Nes1_dst.jpeg | Macintosh HD:Users:clarajrodriguez:Documents:Academia:Doctorate:A_Data_Analysis:Mantel-Partial Mantel_R:Infiles:infiles:SSH:Rplot_Correlogram_SSH_Nes1_dst.jpeg | Macintosh HD:Users:clarajrodriguez:Documents:Academia:Doctorate:A_Data_Analysis:Mantel-Partial Mantel_R:Infiles:infiles:SSH:Rplot_Correlogram_Therm_Nes1_dst.jpeg |
| **NES2** | Macintosh HD:Users:clarajrodriguez:Documents:Academia:Doctorate:A_Data_Analysis:Mantel-Partial Mantel_R:Infiles:infiles:SSH:Rplot_Correlogram_SST_Nes2_dst.jpeg | Macintosh HD:Users:clarajrodriguez:Documents:Academia:Doctorate:A_Data_Analysis:Mantel-Partial Mantel_R:Infiles:infiles:SSH:Rplot_Correlogram_Chla_Nes2_dst.jpeg | Macintosh HD:Users:clarajrodriguez:Documents:Academia:Doctorate:A_Data_Analysis:Mantel-Partial Mantel_R:Infiles:infiles:SSH:Rplot_Correlogram_SSH_Nes2_dst.jpeg | Macintosh HD:Users:clarajrodriguez:Documents:Academia:Doctorate:A_Data_Analysis:Mantel-Partial Mantel_R:Infiles:infiles:SSH:Rplot_Correlogram_Therm_Nes2_dst.jpeg |

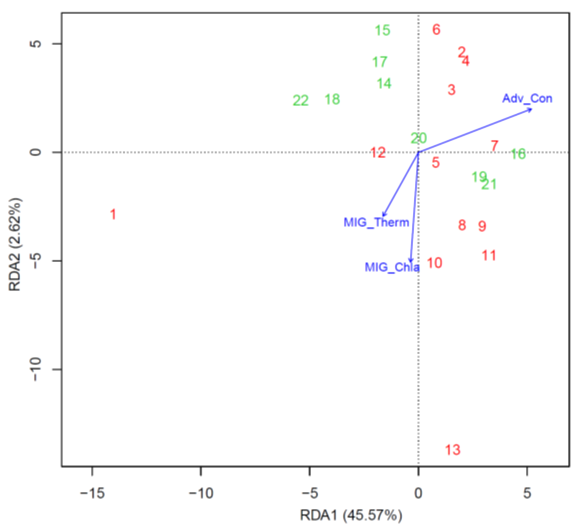
**Figure S5. Cont.** Mantel correlograms indicating correlation between genetic distance (DEST) and Euclidean environmental distances (a) sea surface temperature (SST), (b) chlorophyll concentration (Chl\_a), (c) sea surface high anomaly (SSH) and (d) thermocline depth (Therm) at different seasons. White and black squares represent non-significant and significant relationships between genetic and Euclidean/environmental distances for the different distance classes, respectively.



**Figure S6.** Connectivity matrix for olive ridley turtles in the eastern Pacific based on legrarian particles simulations. (a) particles released on 22 nesting sites during the mating season and tracked back in time 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.



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**Table S1.** Detailed summary statistics of genetic diversity based on ten microsatellite markers for 22 nesting areas of olive ridley in the eastern Pacific.

| **Locus** | | | | | | | | | | | **Location** | | | | |  | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | BCP *N*=80 | EVE *N*=18 | PLA *N*=21 | NVA *N*=20 | PVG *N*=25 | MIS  *N*=25 | PTI  *N*=15 | BAP *N*=21 | TCO *N*=18 | SJC *N*=30 | | BCR *N*=24 | ESC  *N*=40 | PAR *N*=28 | GH  N=40 | SPD  N=38 | SJG  N=15 | SB  N=38 | NC  N=50 | NF  N=52 | NV  N=30 | NS  N=20 | PMA  N=60 | Mean  *NA* |
| OR2 |  |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |
| *NA* | 12 | 6 | 8 | 7 | 6 | 2 | 6 | 5 | 6 | 9 | | 7 | 7 | 5 | 13 | 10 | 6 | 9 | 9 | 6 | 7 | 7 | 9 | 7.2 |
| *Ho* | 0.479 | 0.177 | 0.556 | 0.368 | 0.526 | 0.150 | 0.400 | 0.500 | 0.333 | 0.792 | | 0.200 | 0.364 | 0.214 | 0.649 | 0.790 | 0.83 | 0.842 | 0.796 | 0.550 | 0.733 | 0.70 | 0.804 |  |
| *He* | 0.748 | 0.762 | 0.831 | 0.765 | 0.779 | 0.224 | 0.888 | 0.747 | 0.775 | 0.691 | | 0.787 | 0.765 | 0.484 | 0.739 | 0.787 | 0.79 | 0.835 | 0.792 | 0.776 | 0.705 | 0.78 | 0.729 |  |
| *AR* | 4.581 | 4.431 | 5.335 | 4.442 | 4.401 | 1.783 | 6 | 4.11 | 4.68 | 4.228 | | 4.614 | 4.464 | 3.299 | 4.756 | 4.953 | 4.76 | 5.372 | 5.02 | 4.438 | 4.15 | 4.90 | 4.406 |  |
| *FIS* | 0.362 | 0.774 | 0.339 | 0.525 | 0.331 | 0.337 | 0.579 | 0.339 | 0.581 | -0.14 | | 0.751 | 0.529 | 0.567 | 0.124 | -0.002 | -0.04 | -0.008 | -0.00 | 0.297 | -0.04 | 0.11 | -0.102 |  |
| OR4 |  |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |
| *NA* | 18 | 14 | 15 | 12 | 15 | 14 | 13 | 14 | 14 | 14 | | 16 | 20 | 13 | 15 | 15 | 9 | 16 | 16 | 13 | 15 | 13 | 17 | 14.7 |
| *Ho* | 0.809 | 0.800 | 0.950 | 0.824 | 1.000 | 0.727 | 0.857 | 0.933 | 0.889 | 0.786 | | 0.833 | 0.946 | 0.833 | 0.921 | 0.849 | 0.66 | 0.973 | 0.898 | 0.800 | 0.900 | 0.95 | 0.893 |  |
| *He* | 0.927 | 0.905 | 0.929 | 0.900 | 0.918 | 0.930 | 0.936 | 0.928 | 0.941 | 0.900 | | 0.931 | 0.933 | 0.912 | 0.918 | 0.915 | 0.88 | 0.930 | 0.912 | 0.919 | 0.920 | 0.92 | 0.926 |  |
| *AR* | 7.389 | 7.107 | 7.393 | 6.738 | 7.246 | 7.343 | 7.525 | 7.449 | 7.686 | 6.8 | | 7.462 | 7.612 | 6.966 | 7.1 | 6.977 | 6.26 | 7.411 | 6.997 | 7.184 | 7.176 | 7.10 | 7.31 |  |
| *FIS* | 0.129 | 0.12 | -0.02 | 0.088 | -0.09 | 0.222 | 0.088 | -0.00 | 0.057 | 0.13 | | 0.108 | -0.01 | 0.089 | -0.003 | 0.074 | 0.25 | -0.047 | 0.016 | 0.134 | 0.022 | -0.03 | 0.037 |  |
| OR7 |  |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |
| *NA* | 13 | 6 | 11 | 7 | 8 | 3 | 6 | 5 | 9 | 9 | | 8 | 8 | 7 | 9 | 10 | 7 | 10 | 13 | 7 | 9 | 9 | 12 | 7.7 |
| *Ho* | 0.753 | 0.688 | 0.810 | 0.333 | 0.650 | 0.333 | 0.857 | 0.833 | 0.824 | 0.786 | | 0.792 | 0.816 | 0.600 | 0.737 | 0.686 | 0.50 | 0.730 | 0.796 | 0.579 | 0.700 | 0.80 | 0.786 |  |
| *He* | 0.821 | 0.592 | 0.855 | 0.722 | 0.680 | 0.318 | 0.764 | 0.735 | 0.771 | 0.772 | | 0.753 | 0.745 | 0.811 | 0.744 | 0.770 | 0.67 | 0.763 | 0.774 | 0.692 | 0.773 | 0.81 | 0.73 |  |
| *AR* | 5.325 | 3.801 | 5.958 | 4.098 | 4.008 | 2.667 | 4.243 | 4.134 | 4.813 | 4.96 | | 4.679 | 4.656 | 4.952 | 4.636 | 4.884 | 4.29 | 4.884 | 4.883 | 4.385 | 4.61 | 5.25 | 5.349 |  |
| *FIS* | 0.08 | -0.16 | 0.056 | 0.546 | 0.046 | -0.05 | -0.12 | -0.14 | -0.06 | -0.01 | | -0.05 | -0.09 | 0.267 | 0.011 | 0.112 | 0.27 | 0.045 | -0.02 | 0.168 | 0.007 | -0.03 | 0.032 |  |
| OR11 |  |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |
| *NA* | 22 | 12 | 15 | 13 | 15 | 13 | 12 | 16 | 12 | 18 | | 11 | 18 | 15 | 19 | 19 | 12 | 17 | 17 | 16 | 16 | 15 | 17 | 14.8 |
| *Ho* | 0.908 | 0.722 | 0.800 | 0.800 | 0.920 | 0.957 | 1.000 | 0.857 | 0.778 | 0.900 | | 0.833 | 0.795 | 0.821 | 0.892 | 0.947 | 1.00 | 0.974 | 0.857 | 0.810 | 0.933 | 0.90 | 0.893 |  |
| *He* | 0.929 | 0.905 | 0.923 | 0.906 | 0.934 | 0.909 | 0.913 | 0.923 | 0.900 | 0.936 | | 0.894 | 0.931 | 0.883 | 0.920 | 0.920 | 0.90 | 0.918 | 0.892 | 0.913 | 0.914 | 0.92 | 0.917 |  |
| *AR* | 7.421 | 6.824 | 7.295 | 6.788 | 7.473 | 6.857 | 6.905 | 7.402 | 6.668 | 7.639 | | 6.437 | 7.466 | 6.617 | 7.256 | 7.232 | 6.98 | 7.188 | 6.611 | 7.193 | 7.099 | 7.33 | 7.107 |  |
| *FIS* | 0.023 | 0.206 | 0.136 | 0.12 | 0.015 | -0.05 | -0.09 | 0.073 | 0.139 | 0.039 | | 0.069 | 0.148 | 0.071 | 0.031 | -0.031 | -0.10 | -0.062 | 0.04 | 0.116 | -0.02 | 0.03 | 0.026 |  |
| OR16 |  |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |
| *NA* | 12 | 8 | 10 | 8 | 9 | 7 | 13 | 11 | 10 | 10 | | 8 | 10 | 8 | 10 | 10 | 7 | 9 | 13 | 8 | 9 | 9 | 11 | 9.5 |
| *Ho* | 0.805 | 0.647 | 0.800 | 0.294 | 0.682 | 0.625 | 0.933 | 0.688 | 0.722 | 0.571 | | 1.000 | 0.838 | 0.630 | 0.763 | 0.737 | 0.58 | 0.658 | 0.796 | 0.611 | 0.700 | 0.80 | 0.714 |  |
| *He* | 0.802 | 0.702 | 0.814 | 0.781 | 0.755 | 0.720 | 0.883 | 0.849 | 0.843 | 0.671 | | 0.844 | 0.773 | 0.655 | 0.760 | 0.765 | 0.70 | 0.729 | 0.772 | 0.808 | 0.706 | 0.77 | 0.806 |  |
| *AR* | 5.126 | 4.699 | 5.514 | 4.726 | 4.617 | 4.373 | 6.53 | 6.047 | 5.683 | 4.461 | | 5.615 | 4.97 | 3.636 | 4.871 | 4.818 | 4.31 | 4.554 | 4.82 | 5.35 | 4.632 | 5.25 | 5.195 |  |
| *FIS* | -0.00 | 0.081 | 0.081 | 0.018 | 0.63 | 0.099 | 0.134 | -0.05 | 0.195 | 0.147 | | 0.151 | -0.19 | -0.08 | 0.039 | -0.005 | 0.03 | 0.176 | 0.098 | -0.03 | 0.249 | 0.00 | 0.115 |  |
| OR20 |  |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |
| *NA* | 9 | 7 | 8 | 9 | 9 | 7 | 7 | 10 | 9 | 7 | | 7 | 9 | 8 | 8 | 8 | 6 | 7 | 9 | 7 | 9 | 5 | 7 | 7.2 |
| *Ho* | 0.718 | 0.778 | 0.900 | 0.900 | 0.440 | 0.680 | 0.636 | 0.800 | 0.706 | 0.667 | | 0.643 | 0.649 | 0.679 | 0.790 | 0.790 | 0.75 | 0.790 | 0.755 | 0.600 | 0.633 | 0.50 | 0.673 |  |
| *He* | 0.835 | 0.849 | 0.844 | 0.824 | 0.826 | 0.816 | 0.848 | 0.865 | 0.845 | 0.821 | | 0.815 | 0.791 | 0.826 | 0.803 | 0.776 | 0.82 | 0.816 | 0.804 | 0.776 | 0.811 | 0.80 | 0.771 |  |
| *AR* | 5.215 | 5.32 | 5.407 | 5.286 | 5.236 | 5.145 | 5.37 | 5.866 | 5.504 | 4.915 | | 4.832 | 4.667 | 5.17 | 4.865 | 4.594 | 5.01 | 4.788 | 4.859 | 4.546 | 4.895 | 4.47 | 4.291 |  |
| *FIS* | 0.141 | 0.086 | -0.06 | -0.09 | 0.473 | 0.17 | 0.259 | 0.077 | 0.169 | 0.191 | | 0.217 | 0.182 | 0.181 | 0.017 | -0.017 | 0.09 | 0.033 | 0.062 | 0.231 | 0.222 | 0.38 | 0.129 |  |
| OR1 |  |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |
| *NA* | 18 | 10 | 11 | 11 | 12 | 14 | 12 | 11 | 12 | 14 | | 9 | 12 | 13 | 11 | 10 | 8 | 9 | 11 | 10 | 11 | 11 | 13 | 9.7 |
| *Ho* | 0.923 | 0.777 | 0.809 | 0.944 | 0.84 | 0.92 | 0.846 | 0.95 | 0.888 | 0.928 | | 0.736 | 0.891 | 0.888 | 0.868 | 0.789 | 0.833 | 0.789 | 0.938 | 0.937 | 0.866 | 0.95 | 0.857 |  |
| *He* | 0.907 | 0.890 | 0.878 | 0.911 | 0.900 | 0.900 | 0.898 | 0.906 | 0.924 | 0.906 | | 0.882 | 0.911 | 0.883 | 0.872 | 0.886 | 0.855 | 0.882 | 0.884 | 0.903 | 0.902 | 0.873 | 0.884 |  |

**Table S1** **cont.** Detailed summary statistics of genetic diversity based on ten microsatellite markers for 22 nesting areas of olive ridley turtles in the eastern Pacific.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Locus | Location | | | | | | | | | | | | | | | | | | | | | |  |
| BCP *N*=80 | EVE *N*=18 | PLA *N*=21 | NVA *N*=20 | PVG *N*=25 | MIS  *N*=25 | PTI  *N*=15 | BAP *N*=21 | TCO *N*=18 | SJC *N*=30 | BCR *N*=24 | ESC  *N*=40 | PAR *N*=28 | GH  N=40 | SPD  N=38 | SJG  N=15 | SB  N=38 | NC  N=50 | NF  N=52 | NV  N=30 | NS  N=20 | PMA  N=60 | Mean  *NA* |  |
| *AR* | 6.882 | 6.349 | 6.078 | 6.79 | 6.556 | 6.785 | 6.731 | 6.666 | 7.17 | 6.787 | 6.088 | 6.813 | 6.303 | 6.075 | 6.187 | 5.884 | 6.094 | 6.208 | 6.592 | 6.542 | 6.191 | 6.263 |  |
| *FIS* | -0.01 | 0.13 | 0.08 | -0.03 | 0.068 | -0.02 | 0.06 | -0.04 | 0.039 | -0.02 | 0.168 | 0.021 | -0.00 | 0.004 | 0.11 | 0.02 | 0.106 | -0.06 | -0.03 | 0.039 | -0.09 | 0.031 |  |
| OR9 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| *NA* | 8 | 4 | 5 | 4 | 5 | 4 | 4 | 5 | 4 | 5 | 5 | 7 | 5 | 6 | 5 | 3 | 5 | 4 | 3 | 4 | 7 | 5 | 5.0 |
| *Ho* | 0.304 | 0.278 | 0.286 | 0.263 | 0.360 | 0.208 | 0.267 | 0.286 | 0.222 | 0.600 | 0.231 | 0.308 | 0.250 | 0.500 | 0.342 | 0.16 | 0.316 | 0.367 | 0.286 | 0.300 | 0.35 | 0.286 |  |
| *He* | 0.332 | 0.257 | 0.305 | 0.245 | 0.322 | 0.445 | 0.303 | 0.265 | 0.259 | 0.567 | 0.600 | 0.518 | 0.263 | 0.480 | 0.306 | 0.30 | 0.285 | 0.369 | 0.261 | 0.273 | 0.36 | 0.302 |  |
| *AR* | 2.44 | 2.191 | 2.51 | 2.138 | 2.453 | 2.744 | 2.386 | 2.282 | 2.246 | 3.426 | 3.678 | 3.367 | 2.241 | 3.22 | 2.386 | 2.23 | 2.286 | 2.573 | 2.136 | 2.222 | 2.88 | 2.339 |  |
| *FIS* | 0.085 | -0.08 | 0.066 | -0.07 | -0.12 | 0.537 | 0.125 | -0.08 | 0.145 | -0.05 | 0.625 | 0.409 | 0.05 | -0.04 | -0.11 | 0.45 | -0.10 | 0.005 | -0.09 | -0.10 | 0.03 | 0.056 |  |
| OR14 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| *NA* |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 19.9 |
| *Ho* | 0.896 | 0.889 | 0.952 | 0.889 | 0.960 | 0.917 | 0.933 | 0.905 | 0.875 | 0.933 | 0.875 | 0.921 | 0.857 | 0.947 | 0.974 | 0.72 | 0.895 | 0.918 | 0.947 | 0.900 | 0.89 | 0.891 |  |
| *He* | 0.946 | 0.962 | 0.951 | 0.946 | 0.944 | 0.947 | 0.968 | 0.954 | 0.952 | 0.949 | 0.934 | 0.960 | 0.933 | 0.942 | 0.940 | 0.95 | 0.935 | 0.950 | 0.882 | 0.943 | 0.95 | 0.942 |  |
| *AR* | 7.986 | 8.387 | 8.114 | 7.9 | 7.983 | 7.938 | 8.611 | 8.172 | 8.077 | 8.047 | 7.752 | 8.389 | 7.607 | 7.916 | 7.798 | 8.01 | 7.737 | 8.091 | 6.474 | 7.915 | 8.19 | 7.835 |  |
| *FIS* | 0.053 | 0.078 | -0.00 | 0.062 | -0.01 | 0.033 | 0.037 | 0.052 | 0.083 | 0.017 | 0.064 | 0.041 | 0.083 | -0.00 | -0.03 | 0.24 | 0.043 | 0.034 | -0.07 | 0.046 | 0.06 | 0.055 |  |
| OR22 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| *NA* | 13 | 9 | 8 | 9 | 9 | 7 | 9 | 9 | 9 | 11 | 7 | 10 | 9 | 8 | 9 | 6 | 9 | 12 | 8 | 8 | 8 | 13 | 9.2 |
| *Ho* | 0.785 | 0.833 | 0.800 | 0.368 | 0.680 | 0.750 | 1.000 | 0.714 | 0.833 | 0.690 | 0.783 | 0.825 | 0.654 | 0.684 | 0.684 | 0.45 | 0.703 | 0.796 | 0.600 | 0.586 | 0.73 | 0.714 |  |
| *He* | 0.792 | 0.716 | 0.787 | 0.787 | 0.760 | 0.761 | 0.841 | 0.825 | 0.775 | 0.723 | 0.716 | 0.779 | 0.793 | 0.672 | 0.731 | 0.61 | 0.733 | 0.742 | 0.738 | 0.632 | 0.70 | 0.789 |  |
| *AR* | 5.104 | 4.58 | 5.018 | 4.796 | 4.599 | 4.515 | 5.547 | 5.309 | 4.898 | 4.849 | 4.15 | 5.045 | 5.035 | 4.065 | 4.47 | 3.78 | 4.635 | 4.531 | 4.757 | 4.073 | 4.69 | 5.117 |  |
| *FIS* | 0.009 | -0.17 | -0.01 | 0.538 | 0.107 | 0.014 | -0.19 | 0.137 | -0.07 | 0.047 | -0.09 | -0.05 | 0.179 | -0.01 | 0.065 | 0.27 | 0.041 | -0.07 | 0.191 | 0.073 | -0.04 | 0.096 |  |
| *Multilocus* |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| *NA* | 15.4 | 9.4 | 11 | 9.7 | 11.1 | 9 | 10 | 10.6 | 10.2 | 11.8 | 9.8 | 12.5 | 10.4 | 12.3 | 12 | 7.7 | 11.4 | 13.1 | 9.2 | 11 | 10.3 | 12.9 |  |
| *He* | 0.798 | 0.732 | 0.791 | 0.757 | 0.764 | 0.680 | 0.789 | 0.777 | 0.774 | 0.78 | 0.793 | 0.800 | 0.727 | 0.775 | 0.769 | 0.72 | 0.772 | 0.781 | 0.746 | 0.738 | 0.76 | 0.781 |  |
| *AR* | 5.747 | 5.369 | 5.862 | 5.370 | 5.457 | 5.015 | 5.985 | 5.744 | 5.743 | 5.611 | 5.531 | 5.745 | 5.183 | 5.476 | 5.430 | 5.15 | 5.495 | 5.459 | 5.306 | 5.331 | 5.63 | 5.521 |  |
| *FIS* | 0.037 | 0.095 | 0.015 | 0.168 | 0.030 | 0.049 | -0.07 | -0.04 | 0.056 | -0.00 | 0.016 | 0.029 | 0.017 | 0.007 | 0.004 | 0.12 | 0.013 | -0.00 | 0.027 | 0.032 | 0.02 | 0.044 |  |
| *Multilocus excluding locus* | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| *OR2* |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| *NA* | 15.8 | 9.8 | 11.3 | 10.0 | 11.7 | 9.8 | 10.4 | 11.2 | 10.7 | 12.1 | 10.1 | 13.1 | 11.0 | 12.2 | 12.2 | 7.9 | 11.7 | 13.6 | 9.6 | 11.4 | 10.7 | 13.3 |  |
| *He* | 0.811 | 0.755 | 0.810 | 0.785 | 0.784 | 0.751 | 0.818 | 0.806 | 0.803 | 0.806 | 0.821 | 0.816 | 0.775 | 0.790 | 0.779 | 0.75 | 0.777 | 0.789 | 0.768 | 0.757 | 0.78 | 0.795 |  |
| *AR* | 6.537 | 6.094 | 6.599 | 6.057 | 6.207 | 5.961 | 6.675 | 6.606 | 6.536 | 6.421 | 6.218 | 6.567 | 5.962 | 6.167 | 6.072 | 5.75 | 6.101 | 6.098 | 5.983 | 6.077 | 6.36 | 6.257 |  |
| *FIS* | 0.054 | 0.056 | 0.025 | 0.205 | 0.074 | 0.095 | 0.004 | 0.040 | 0.067 | 0.054 | 0.090 | 0.049 | 0.110 | 0.001 | 0.031 | 0.16 | 0.024 | -0.00 | 0.108 | 0.043 | 0.03 | 0.063 |  |

(*N*) sample size, (*NA*)number of alleles, (*Ho*) observed heterozygosity, (*He*) expected heterozygosity, (*AR*) allelic richness, (*FIS*) coefficient of inbreeding.

**Table S2** Summary statistics of genetic diversity based on ten microsatellite markers for 22 nesting areas of olive ridley turtles in the eastern Pacific.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Country | Site Number | Nesting Colony | Site Code | Sample Size | NA | Ho | He | AR | FIS |
| Mexico | 1-5 | (1)Todos Santos-Pescadero (PES)  (2)San Cristobal (SAC)  (3)San José del Cabo (SJC)  (4)Cabo Pulmo (CP)  (5)Punta Colorada-Punta Arenas (PCA) | (BCP) | 80 | 15.3 | 0.738 | 0.803 | 6.436 | 0.087 |
|  | 6 | El Verde | (EVE) | 18 | 9.4 | 0.658 | 0.732 | 5.957 | 0.130 |
|  | 7 | Platanitos | (PLA) | 21 | 11.1 | 0.770 | 0.789 | 6.519 | 0.049 |
|  | 8 | Nuevo Vallarta | (NVA) | 20 | 9.7 | 0.598 | 0.757 | 5.928 | 0.237 |
|  | 9 | PuertoVallarta / La Gloria | (PVG) | 25 | 11.3 | 0.703 | 0.690 | 6.098 | 0.103 |
|  | 10 | Mismaloya | (MIS) | 25 | 9.2 | 0.626 | 0.690 | 5.610 | 0.118 |
|  | 11 | Ticuiz | (PTI) | 15 | 10 | 0.781 | 0.781 | 6.491 | 0.040 |
|  | 12 | Boca de Apiza | (BAP) | 21 | 10.7 | 0.743 | 0.779 | 6.426 | 0.074 |
|  | 13 | Tierra Colorada | (TCO) | 18 | 10.2 | 0.712 | 0.776 | 6.390 | 0.114 |
|  | 14 | San Juan de Chacahua | (SJC) | 30 | 11.5 | 0.738 | 0.777 | 6.194 | 0.068 |
|  | 15 | Barra de la Cruz | (BCR) | 24 | 9.8 | 0.697 | 0.795 | 6.116 | 0.151 |
|  | 16 | Escobilla | (ESC) | 40 | 12.7 | 0.737 | 0.801 | 6.434 | 0.094 |
|  | 17 | Puerto Arista | (PAR) | 28 | 10.7 | 0.650 | 0.743 | 5.856 | 0.148 |
| Guatemala | 18 | Parque el Hawaii | (GH) | 40 | 12.3 | 0.775 | 0.775 | 5.476 | 0.013 |
| El Salvador | 19 | Playa Dorada | (SPD) | 38 | 12.0 | 0.759 | 0.769 | 5.430 | 0.027 |
|  | 20 | San Juan del Gozo | (SJG) | 15 | 7.7 | 0.652 | 0.720 | 5.155 | 0.139 |
|  | 21-22 | (21)Las Bocanitas, (22)SanDiego | (SB) | 38 | 11.4 | 0.767 | 0.772 | 5.495 | 0.021 |
| Nicaragua | 23 | Chacocente | (NC) | 50 | 13.1 | 0.792 | 0.781 | 5.459 | -0.003 |
|  | 24 | La Flor | (NF) | 52 | 9.2 | 0.672 | 0.746 | 5.306 | 0.127 |
|  | 25 | Playa Veracruz | (NV) | 30 | 11.0 | 0.725 | 0.738 | 5.331 | 0.035 |
|  | 26 | Playa Salamina | (NS) | 20 | 10.3 | 0.758 | 0.768 | 5.630 | 0.039 |
| Panama | 27 | La Marinera | (PMA) | 60 | 12.9 | 0.751 | 0.781 | 5.521 | 0.047 |

(NA)number of alleles, (Ho) observed heterozygosity, (He) expected heterozygosity, (AR) allelic richness, (FIS) coefficient of inbreed. Biopsy samples were collected from 27 nesting sites and beaches with less than 15 samples were assigned to major nesting areas (n = 22) using the criterion of the geographically closest neighbour.

**Table S3.** Pairwise comparisons of *FST* (below the diagonal) and *DEST* (above the diagonal) for 22 nesting areas of olive ridley turtles in the eastern Pacific. Bold indicate significant values (*P*<0.05).

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | BCP | EVE | PLA | NVA | PVG | MIS | PTI | BAP | TCO | SJC | BCR | ESC | PAR | GH | SPD | SJG | SB | NC | NF | NV | NS | PMA |
| BCP | - | **0.08** | **0.04** | **0.06** | **0.08** | **0.19** | **0.19** | **0.09** | **0.10** | 0.02 | **0.10** | **0.03** | **0.26** | **0.17** | **0.15** | **0.16** | **0.12** | **0.14** | **0.19** | **0.16** | **0.12** | **0.16** |
| EVE | 0.01 | - | **0.06** | **0.11** | **0.06** | **0.07** | **0.22** | **0.18** | **0.07** | **0.08** | **0.05** | **0.04** | **0.23** | **0.14** | **0.16** | **0.12** | **0.10** | **0.15** | **0.12** | **0.10** | **0.09** | **0.16** |
| PLA | 0.004 | 0.01 | - | **0.07** | 0.04 | **0.17** | **0.19** | **0.15** | 0.05 | **0.07** | **0.09** | **0.05** | **0.29** | **0.15** | **0.16** | **0.15** | **0.10** | **0.13** | **0.18** | **0.12** | **0.11** | **0.15** |
| NVA | 0.01 | 0.03 | 0.01 | - | **0.12** | **0.23** | **0.11** | **0.13** | **0.13** | **0.07** | **0.12** | **0.05** | **0.21** | **0.18** | **0.16** | **0.19** | **0.14** | **0.16** | **0.19** | **0.16** | **0.15** | **0.17** |
| PVG | 0.01 | 0.01 | 0.001 | 0.02 | - | **0.11** | **0.17** | **0.08** | 0.01 | **0.11** | **0.08** | **0.08** | **0.18** | **0.18** | **0.19** | **0.19** | **0.13** | **0.18** | **0.19** | **0.17** | **0.15** | **0.19** |
| MIS | -0.00 | -0.00 | -0.01 | 0.02 | 0.01 | - | **0.33** | **0.25** | **0.11** | **0.20** | **0.14** | **0.16** | **0.30** | **0.22** | **0.22** | **0.19** | **0.21** | **0.25** | **0.21** | **0.19** | **0.20** | **0.25** |
| PTI | -0.01 | -0.00 | -0.01 | -0.02 | -0.01 | -0.01 | - | **0.20** | **0.19** | **0.25** | **0.13** | **0.18** | **0.08** | **0.28** | **0.28** | **0.30** | **0.24** | **0.25** | **0.29** | **0.28** | **0.25** | **0.26** |
| BAP | -0.00 | 0.02 | -0.00 | 0.004 | 0.006 | **0.03** | -0.02 | - | **0.13** | **0.12** | **0.20** | **0.13** | **0.18** | **0.28** | **0.26** | **0.28** | **0.24** | **0.26** | **0.27** | **0.27** | **0.25** | **0.29** |
| TCO | 0.01 | 0.009 | 0.006 | 0.01 | -0.01 | -0.00 | -0.005 | -0.01 | - | **0.15** | **0.08** | **0.09** | **0.21** | **0.20** | **0.20** | **0.19** | **0.15** | **0.19** | **0.20** | **0.18** | **0.17** | **0.17** |
| SJC | 0.003 | 0.01 | 0.009 | 0.01 | 0.01 | 0.000 | 0.006 | 0.009 | 0.02 | - | **0.11** | 0.01 | **0.29** | **0.19** | **0.20** | **0.20** | **0.16** | **0.19** | **0.20** | **0.18** | **0.15** | **0.22** |
| BCR | -0.02 | -0.01 | -0.01 | -0.00 | -0.02 | -0.05 | -0.02 | -0.02 | -0.03 | -0.01 | - | **0.07** | **0.21** | **0.18** | **0.21** | **0.20** | **0.16** | **0.19** | **0.21** | **0.18** | **0.17** | **0.21** |
| ESC | 0.004 | 0.007 | 0.004 | 0.01 | 0.005 | -0.01 | -0.00 | 0.003 | 0.009 | 0.002 | -0.02 | - | **0.26** | **0.15** | **0.15** | **0.18** | **0.12** | **0.15** | **0.15** | **0.15** | **0.11** | **0.15** |
| PAR | **0.01** | **0.03** | 0.01 | 0.01 | 0.009 | **0.05** | 0.004 | 0.01 | -0.00 | **0.03** | -0.03 | 0.01 | - | **0.30** | **0.30** | **0.28** | **0.28** | **0.30** | **0.31** | **0.28** | **0.26** | **0.30** |
| GH | **0.03** | **0.03** | **0.03** | **0.04** | **0.03** | 0.007 | 0.003 | **0.03** | **0.03** | **0.03** | -0.00 | **0.02** | **0.02** | - | 0.01 | 0.05 | 0.006 | -0.00 | 0.02 | -0.00 | -0.02 | -0.00 |
| SPD | **0.03** | **0.04** | **0.03** | **0.04** | **0.04** | 0.01 | 0.004 | **0.03** | **0.03** | **0.04** | 0.009 | **0.03** | **0.03** | 0.002 | - | 0.01 | 0.02 | 0.02 | **0.05** | 0.02 | -0.00 | 0.005 |
| SJG | **0.04** | 0.03 | **0.04** | **0.06** | **0.04** | 0.02 | 0.01 | 0.04 | **0.04** | **0.04** | 0.02 | **0.04** | 0.04 | 0.01 | 0.004 | - | 0.02 | 0.04 | 0.06 | 0.01 | -0.01 | 0.03 |
| SB | **0.02** | 0.02 | **0.02** | **0.03** | **0.02** | 0.009 | -0.01 | 0.02 | **0.02** | **0.03** | 0.001 | **0.02** | 0.01 | 0.001 | 0.003 | 0.007 | - | -0.00 | **0.05** | 0.004 | -0.02 | 0.006 |
| NC | **0.03** | **0.03** | **0.02** | **0.03** | **0.03** | 0.01 | -0.00 | **0.02** | 0.03 | **0.03** | 0.001 | **0.02** | **0.01** | -0.00 | 0.003 | 0.01 | -0.00 | - | 0.03 | 0.002 | -0.00 | -0.00 |
| NF | **0.02** | 0.03 | **0.02** | **0.04** | **0.03** | 0.01 | -0.00 | **0.03** | 0.02 | **0.03** | 0.01 | 0.02 | **0.03** | -0.01 | -0.00 | 0.009 | -0.00 | -0.01 | - | 0.01 | 0.01 | 0.03 |
| NV | **0.04** | **0.02** | **0.03** | **0.04** | **0.03** | 0.01 | 0.007 | **0.03** | **0.03** | **0.04** | 0.01 | **0.03** | **0.03** | -0.00 | 0.006 | 0.006 | 0.002 | 0.000 | -0.01 | - | -0.02 | 0.008 |
| NS | **0.02** | 0.02 | **0.02** | **0.03** | 0.02 | 0.004 | -0.00 | **0.02** | **0.02** | **0.03** | 0.003 | **0.02** | 0.01 | -0.00 | -0.00 | -0.00 | -0.00 | -0.00 | -0.01 | -0.00 | - | -0.01 |
| PMA | **0.03** | **0.03** | **0.03** | **0.03** | **0.03** | 0.008 | -0.00 | **0.02** | **0.02** | **0.04** | 0.007 | **0.02** | 0.01 | 0.000 | -0.00 | 0.008 | 0.001 | -0.00 | -0.01 | 0.002 | -0.00 | - |

**Table S4.** First generation migrants of olive ridley turtle based on likelihood probabilities among nesting areas in the eastern Pacific.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  |  | M29 | V60 |
| Assigned Sample | **Home** | **-log(L\_home / L\_max)** | **Probability** | **-log(L)** | **-log(L)** |
| A32 | **M29** | **1.395** | **0.0016** | **23.361** | **21.966** |
| A59 | **M29** | **0.635** | **0.0069** | **17.881** | **17.246** |
| F3 | **M29** | **0.063** | **0.0085** | **14.926** | **14.863** |
| F5 | **M29** | **3.536** | **0.0000** | **18.552** | **15.016** |
| J3 | **M29** | **0.356** | **0.0067** | **16.065** | **15.708** |
| J17 | **M29** | **0.812** | **0.0040** | **21.216** | **20.404** |
| L4 | **M29** | **0.336** | **0.0084** | **18.181** | **17.844** |
| L11 | **M29** | **0.640** | **0.0061** | **22.246** | **21.605** |

Home = northern population (M29); southern population (V60). Potential first generation migrants (red); most likely population (green).

**Table S5.** Summary of isolation by distance tests conducted on nesting colonies of olive ridley turtles at different geographic scales. Results of partial Mantel tests corrected by regional population clustering are also shown. Significant tests are denoted in bold.

|  |  |  |  |
| --- | --- | --- | --- |
|  | *P* | *r* (slope) | *R2* |
| All eastern Pacific |  |  |  |
| *FST* | **<0.0001** | 0.4399 | 0.1935 |
| *DEST* | **0.0003** | 0.3618 | 0.1309 |
| *Partial Mantel* |  |  |  |
| *FST* | 0.7600 | -0.0030 | - |
| *DEST* | 0.3533 | 0.0189 | - |
|  |  |  |  |
| Within Cluster 1 |  |  |  |
| *FST* | 0.3510 | 0.0270 | 0.0092 |
| *DEST* | 0.4003 | 0.0255 | 0.0006 |
| Within Cluster 2 |  |  |  |
| *FST* | 0.4460 | 0.0078 | 0.0012 |
| *DEST* | 0.5580 | -0.0615 | 0.0040 |

**Table S6.** 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.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | GESTE analysis | | | | | |  | BIOENV procedure | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  | *DEST* |  |  |  |  | *FST* |  |  |
| Season | Model number | Variables included | Probability | Coefficient | Mean | Mode | 95% HPDI |  | Variable | ***Spearman rho*** | ***r* (slope)** | ***P*** |  | Variable | ***Spearman rho*** | ***r* (slope)** | ***P*** |
| MIG | 9 | Therm | 0.519 | α0 | -3.9 | -3.89 | --4.8:-3.9 |  | Chl\_a**, SSH, Therm** | 0.318 | 0.287 | **0.003** |  | Therm | 0.157 | 0.091 | 0.159 |
|  |  |  | α 4 | 0.314 | 0.33 | 0.09: 0.533 |  |  |  |  |  |  |  |  |  |  |
|  |  |  | σ | 2.98E-01 | 2.48E-01 | 0.18: 0.52 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| MATE | 9 | Therm | 0.53 | α 0 | -3.9 | -3.9 | -4.16: -3.64 |  | Chl\_a**, SSH, Therm** | 0.318 | 0.237 | **0.029** |  | SSH, Therm | 0.154 | 0.085 | 0.209 |
|  |  |  | α 4 | 0.31 | 0.306 | 0.09: 0.55 |  |  |  |  |  |  |  |  |  |  |
|  |  |  | σ | 0.226 | 0.181 | 0.10: 0.39 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| NES1 | 1 | Null | 0.59 | α 0 | -3.89 | -3.9 | -4.14: -3.62 |  | Chl\_a**, SSH** | 0.3 | 0.21 | **0.014** |  | Therm | 0.175 | 0.079 | 0.176 |
|  |  |  | σ | 2.94E-01 | 2.30E-01 | 0.119: 0.512 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| NES2 | 1 | Null | 0.67 | α 0 | -3.9 | -3.9 | -4.16; -3.64 |  | Chl\_a, SSH | 0.132 | 0.012 | 0.451 |  | SST, SSH, Therm | 0.216 | 0.139 | 0.062 |
|  |  |  | σ | 3.01E-01 | 2.48E-01 | 0.128:0.542 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| FEED | 1 | Null | 0.55 | α 0 | -3.9 | -3.8 | -4.16; -3.63 |  | Therm | 0.198 | 0.116 | 0.133 |  | SST, Therm | 0.178 | 0.08 | 0.195 |
|  |  |  | σ | 2.98E-01 | 2.43E-01 | 0.126:0.526 |  |  |  |  |  |  |  |  |  |  |

Sea surface temperature (SST), chlorophyll concentration (Chl\_a), sea surface high anomaly (SSH) and thermocline depth (Therm). Migration to breeding areas (MIG); mating period (MATE); beginning of nesting season (NES1); ending of nesting season (NES2); and migration and residence on feeding areas (FEED). Regression coefficient (α); estimate of the variation that remains unexplained by the regression model (σ); highest probability density interval (HPDI). Significant correlations for BIOEV procedure are shown in bold.

**Table S7.** Sum of posterior probabilities of models that include a given factor. These results are from all seasonal GESTE analyses that included those six factors. Shown in bold are the values from tests with a posterior probability > 0.1, which were selected for the final GESTE run.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Factors | MIG | MATE | NES1 | NES2 | FEED |
| SST | 0.057 | 0.070 | 0.0448 | 0.0600 | 0.063 |
| Chl\_a | 0.048 | 0.053 | 0.0492 | **0.219** | 0.043 |
| SSH | 0.050 | 0.041 | 0.0514 | 0.0390 | 0.061 |
| Therm | **0.653** | **0.664** | **0.104** | **0.110** | 0.069 |
| AdvCon | 0.057 | 0.045 | 0.0848 | 0.102 | 0.070 |
| GeoDist | 0.062 | 0.052 | 0.0740 | 0.0666 | 0.067 |

Sea surface temperature (SST), chlorophyll concentration (Chl\_a), sea surface high anomaly (SSH), thermocline depth (Therm), advection connectivity (AdvCon) and geographic distance (GeoDist). Migration to breeding areas (MIG); mating period (MATE); beginning of nesting season (NES1); ending of nesting season (NES2); and migration and residence on feeding areas (FEED).

**Table S8.** 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.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Season | Response variable |  |  | Exploratory variable | | | | | | | | | | | | | | |
|  |  |  |  | SST | SST Geodist | SST Scluster |  | Chl\_a | Chl\_a Geodist | Chl\_a Scluster |  | SSH | SSH Geodist | SSH Scluster |  | Therm | Therm Geodist | Therm Scluster | |
| MIG | *FST* | *P* |  | 0.635 | 0.813 | 0.398 |  | 0.568 | 0.783 | 0.623 |  | 0.585 | 0.923 | 0.747 |  | **0.029** | 0.880 | 0.519 | |
| (April) |  | *r* |  | -0.03 | -0.11 | 0.055 |  | -0.01 | -0.08 | -0.02 |  | -0.01 | -0.15 | -0.07 |  | 0.158 | -0.12 | 0.001 | |
|  |  | *P* |  | 0.423 | 0.753 | 0.387 |  | 0.082 | 0.095 | 0.070 |  | **0.027** | 0.065 | **0.028** |  | **0.001** | **0.046** | **0.023** | |
|  |  | *r* |  | 0.011 | -0.11 | 0.000 |  | 0.149 | 0.189 | 0.254 |  | 0.198 | 0.174 | 0.259 |  | 0.326 | 0.197 | 0.269 | |
| MATE | *FST* | *P* |  | 0.233 | 0.853 | 0.578 |  | 0.563 | 0.924 | 0.825 |  | 0.105 | 0.635 | 0.329 |  | 0.156 | 0.944 | 0.616 | |
| (MJ) |  | *r* |  | 0.082 | -0.15 | -0.00 |  | -0.00 | -0.19 | -0.13 |  | 0.100 | -0.03 | 0.052 |  | 0.092 | -0.18 | -0.00 | |
|  | *DEST* | *P* |  | 0.197 | 0.791 | 0.481 |  | **0.011** | **0.046** | **0.023** |  | 0.197 | 0.457 | 0.299 |  | **0.003** | 0.072 | 0.019 | |
|  |  | *r* |  | 0.094 | -0.12 | -0.03 |  | 0.276 | 0.243 | 0.323 |  | 0.068 | 0.001 | 0.055 |  | 0.312 | 0.177 | 0.282 | |
| NES1 | *FST* | *P* |  | **0.036** | 0.890 | 0.602 |  | 0.173 | 0.959 | 0.852 |  | 0.388 | 0.906 | 0.879 |  | **0.019** | 0.977 | 0.236 | |
| (JAS) |  | *r* |  | 0.146 | -0.14 | -0.17 |  | 0.079 | -0.20 | -0.12 |  | 0.022 | -0.13 | -0.13 |  | 0.175 | -0.19 | 0.081 | |
|  | *DEST* | *P* |  | 0.245 | 0.972 | 0.840 |  | 0.061 | 0.278 | 0.167 |  | **0.009** | **0.050** | 0.056 |  | **0.017** | 0.446 | 0.076 | |
|  |  | *r* |  | 0.057 | -0.18 | -0.12 |  | 0.156 | 0.051 | 0.119 |  | 0.248 | 0.185 | 0.201 |  | 0.212 | 0.005 | 0.166 | |
| NES2 | *FST* | *P* |  | **0.026** | 0.946 | 0.252 |  | 0.972 | 0.873 | 0.901 |  | 0.128 | 0.608 | 0.753 |  | **0.021** | 0.766 | 0.198 | |
| (OND) |  | *r* |  | 0.178 | -0.19 | 0.094 |  | -0.21 | -0.16 | -0.22 |  | 0.092 | -0.02 | -0.07 |  | 0.171 | -0.07 | 0.090 | |
|  | *DEST* | *P* |  | 0.263 | 0.989 | 0.614 |  | 0.292 | 0.613 | 0.687 |  | 0.176 | 0.635 | 0.810 |  | **0.016** | 0.194 | 0.044 | |
|  |  | *r* |  | 0.058 | -0.23 | -0.05 |  | 0.052 | -0.06 | -0.09 |  | 0.077 | -0.04 | -0.10 |  | 0.197 | 0.089 | 0.204 | |
| FEED | *FST* | *P* |  | 0.434 | 0.689 | 0.269 |  | 0.699 | 0.728 | 0.691 |  | 0.716 | 0.901 | 0.675 |  | 0.100 | 0.987 | 0.419 | |
| (JFM) |  | *r* |  | 0.022 | -0.04 | 0.103 |  | -0.04 | -0.06 | -0.04 |  | -0.04 | -0.13 | -0.04 |  | 0.113 | -0.24 | 0.030 | |
|  | *DEST* | *P* |  | 0.349 | 0.662 | 0.350 |  | 0.324 | 0.398 | 0.365 |  | 0.093 | 0.219 | 0.097 |  | **0.029** | 0.456 | 0.123 | |
|  |  | *r* |  | 0.031 | -0.08 | 0.010 |  | 0.031 | 0.010 | 0.025 |  | 0.120 | 0.082 | 0.163 |  | 0.198 | 0.004 | 0.151 | |

Migration to breeding areas, April (MIG, A); mating period, May-June (MATE, MJ); beginning of nesting season July to August (NES1, JAS); ending of nesting season, October to December (NES2, OND); and migration and residence on feeding areas, January to March (FEED, JFM).

**Table S9.** 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.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | *DEST* | | | | |  | *FST* | | | | |  |
| Season |  | Model | Variables included | *β* | *R2* | *P* |  | Model | Variables included | *β* | *R2* | *P* |  |
| MIG |  | 1 | Constant, Therm | 0.304 | 0.093 | <0.001 |  | 1 | Constant, Therm | 0.19 | 0.036 | 0.004 |  |
|  |  | 2 | Constant, Therm  Chl\_a | 0.264  0.155 | 0.115 | <0.001  0.017 |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| MATE |  | 1 | Constant,  Chl\_a | 0.278 | 0.073 | <0.001 |  | 1 | Constant,  SSH | 0.176 | 0.031 | 0.007 |  |
|  |  |  |  |  |  |  | 2 | Constant,  SSH, Therm | 0.304  0.235 | 0.070 | <0.001  0.002 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| NES1 |  | 1 | Constant,  SSH | 0.349 | 0.122 | <0.001 |  | 1 | Constant, SST | 0.165 | 0.027 | 0.012 |  |
|  |  |  |  |  |  |  | 2 | Constant, SST  SSH | 0.136  0.132 | 0.044 | 0.042  0.047 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| NES2 |  | 1 | Constant,  SSH | 0.361 | 0.126 | <0.001 |  | 1 | Constant,  SSH | 0.289 | 0.084 | <0.001 |  |
|  |  |  |  |  |  |  | 2 | Constant,  SSH  SST | 0.268  0.141 | 0.103 | <0.001  0.027 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| FEED |  | 1 | Constant,  Therm | 0.215 | 0.046 | 0.001 |  | 1 | Constant,  Therm | 0.147 | 0.022 | 0.025 |  |
|  |  |  |  |  |  |  | 2 | Constant,  Therm  SSH | 0.197  -0.16 | 0.047 | 0.004  0.015 |  |

Sea surface temperature (SST), chlorophyll concentration (Chl\_a), sea surface high anomaly (SSH) and thermocline depth (Therm). Migration to breeding areas (MIG); mating period (MATE); beginning of nesting season (NES1); ending of nesting season (NES2); and migration and residence on feeding areas (FEED). Standardized regression coefficient (*β*) measured in standard deviation units that provide insights of the importance of a predictor in the model; multiple regression coefficient (*R2*); level of marginal significance of the model or *P-*value (*P*)