INFLUENCE OF TIME OF RELEASE TO AVOID REVERSE TIDAL MOVEMENT DURING HATCHLING OFFSHORE MIGRATION AT PUNTA RATÓN, HONDURAS.

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Background

- Punta Ratón is the main nesting beach for Olive Ridley sea turtles on the Pacific coast of Honduras.
- This beach is located on the eastern end of the Gulf of Fonseca (GOF), a shallow inlet of the Pacific Ocean 50 km wide (E-W) and 80 km long (N-S) (*Fig.1*).
- Hatchlings from Punta Raton must swim more than 30 km towards the Southwest before reaching the open sea.
- Tides in the GOF are extreme and tidal currents very strong.
- In 2012 we showed that hatchlings released at Punta Ratón moved Southwest during outgoing tide, but were pulled back to shore (Northeast) during incoming tide, covering very short net distances (Duran and Dunbar, 2012).
- **To assess if time of release influenced the final outcome, we released hatchlings at two different times respective to high tide and compared their trajectories.**

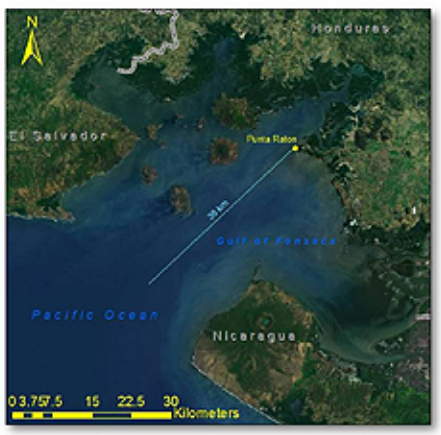

Figure 1: The Gulf of Fonseca. The yellow dot indicates the study site.

Methods

- We attached the hatchlings to a modified Witherington float (*Fig.2*) by 1.5 m of sewing thread and followed them visually with a fishing skiff, taking GPS positions every 30 minutes.

- We released 6 hatchlings at mid outgoing tide (Group 1) and 5 hatchlings at high tide (Group 2), and followed them the same time during outgoing tide as during incoming tide.

Figure 2: Witherington float

- Hatchlings released at mid outgoing tide were tracked 4-8 hours. Hatchlings released at high tide were tracked 8-12 hours.
- We plotted our data in a GIS and calculated total distances, net distances, main direction during outgoing and incoming tide, and distances from the start and end points to the mouth of the GOF.

Results

- *Figures 3* and *4* show the trajectories of the hatchlings of Group 1 and Group 2 , respectively.
- Hatchlings from Group 1 covered an average distance of 7.33 ± 0.96 km while hatchlings from Group 2 covered an average of 11.3 ± 1.4 km. Mean swimming speeds were 1.17 ± 0.11 km/h and 1.23 ± 0.14 km/h (mean ± SE), respectively.
- In both groups most turtles were pulled back to the East during the incoming tide but **net distances for Group 2 were significantly longer than for Group 1** (7.3 ± 1.6 km vs. 1.7 ± 0.7 km, $t(9) = -3.5$, $p = 0.007$).
- **The final position of the Group 2 hatchlings respective to the start point was significantly closer to the mouth of the GOF than for Group 1 hatchlings** (4.5 ± 1.1 km vs. 1.1 ± 0.9 km, $t(9) = -2.6$, $p = 0.029$).

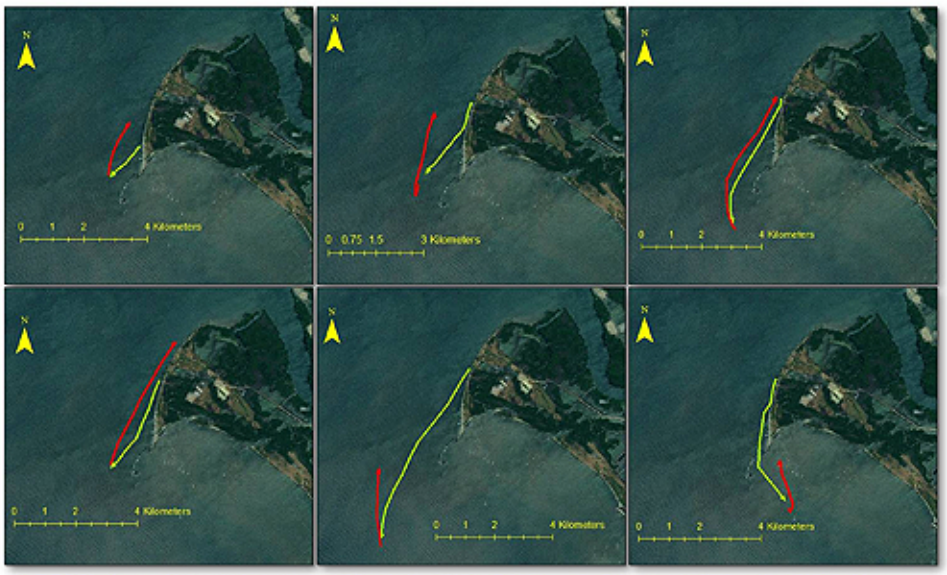

Figure 3: Trajectories of Group 1 hatchlings (released at mid outgoing tide). Green arrows indicate movement during outgoing tide, red arrows indicate movement during incoming tide. Total tracking time ranged between 3.47 and 7.58 h. Observation time for outgoing tide was equal to observation time for incoming tide for all hatchlings.

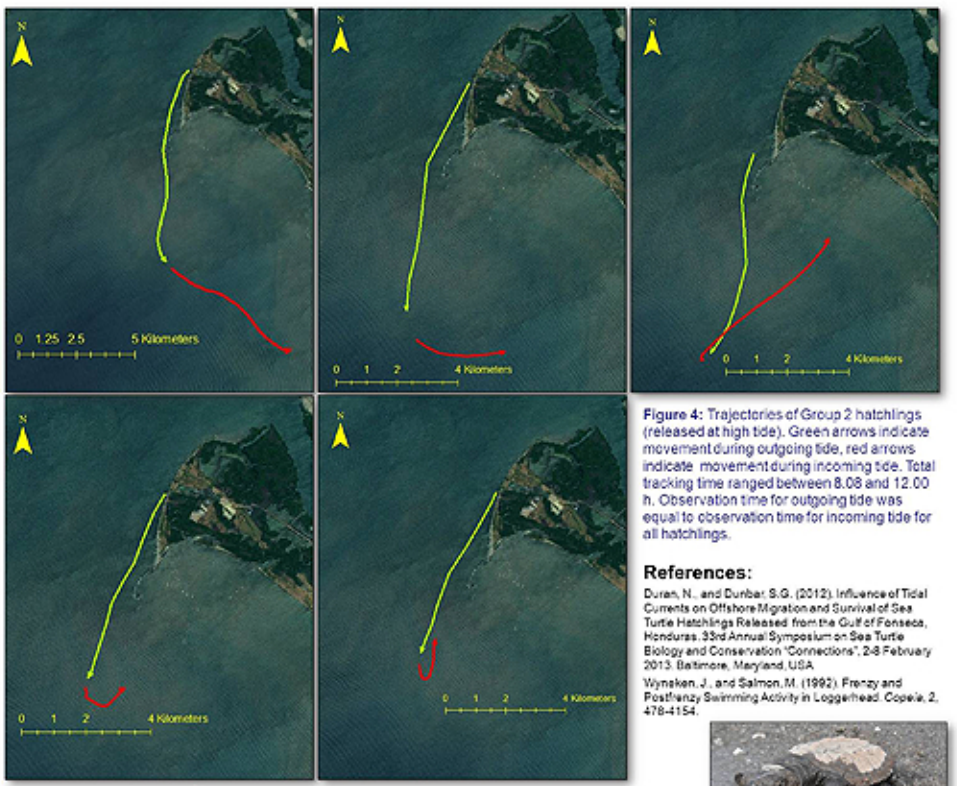

Figure 4: Trajectories of Group 2 hatchlings (released at high tide). Green arrows indicate movement during outgoing tide, red arrows indicate movement during incoming tide. Total tracking time ranged between 8.08 and 12.00 h. Observation time for outgoing tide was equal to observation time for incoming tide for all hatchlings.

Discussion

- In order to leave the nearshore shallow waters as soon as possible, sea turtle hatchlings engage in a period of continuous swimming (the *frenzy*) during the first 24 hours of their offshore migration (Wyneken and Salmon, 1992). In locations with strong tidal currents, such as the Gulf of Fonseca (Honduras), hatchlings may be pulled back to the shore by incoming tides, wasting most of their energy reserves without significant advance.
- Our results show that the time of release respective to the tidal cycle impacts the success of the hatchlings offshore migration. The Punta Ratón hatchlings released just after high tide covered a longer net distance and ended up significantly closer to the mouth of the Gulf than those released at mid-outgoing tide. Two additional hours swimming away with the outgoing tide allowed the hatchlings to lessen the influence of the strongest tidal currents that predominate in the shallow waters.
- To improve hatchling survival and their potential for reaching the open ocean, we recommend that hatchling releases take place immediately following high tide, during the first hour of the outgoing tide.

References:

Duran, N., and Dunbar, S.G. (2012). Influence of Tidal Currents on Offshore Migration and Survival of Sea Turtle Hatchlings Released from the Gulf of Fonseca, Honduras. 33rd Annual Symposium on Sea Turtle Biology and Conservation "Connections", 2-8 February 2013. Baltimore, Maryland, USA.

Wyneken, J., and Salmon, M. (1992). Frenzy and Postfrenzy Swimming Activity in Loggerhead. Copeia, 2, 478-4154.

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