Text S1. Derivation of the algorithms used to predict embryonic development rate and hatchling sex ratios from incubation temperature.

1. Embryo development rate algorithm.

Data on the relationship between constant temperature incubation and incubation was obtained from publish literature of the southern Great Barrier Reef nesting population of green turtles (Bustard and Greenham 1968; Miller and Limpus 1981; Booth and Astill 2001; Booth et al. 2004; Burgess et al. 2006) and a second order polynomial fitted to this data by least squares regression because of its excellent empirical fit ($r^2 = 0.99$, Fig. A1). This relationship was converted from a daily to an hourly time scale by dividing by 24, and the inverse taken, so that the amount of embryonic development per hour could be calculated (where the amount of development at laying is defined as 0.00, and the amount of development at hatching is defined as 1.00):

Amount of embryonic development = $1/(24 \times (0.7609t^2 - 49.444t + 851.85))$

Where t = temperature (^{o}C).

Note this relationship is only valid for temperatures between 25^{o}C and 33^{o}C.

Total amount of embryonic development to any point of time during incubation is then calculated as the sum of all hourly development increments until that point. The sex determining period is defined as the development between 0.333 and 0.6667 of development.

2. Incubation temperature – hatchling sex ratio algorithm.

Data on the relationship between constant temperature incubation and hatchling sex ratio determined by gonadal histology was obtained from the literature (Miller and Limpus 1981; Burgess et al. 2006) and a logistic relationship fitted to this data (Fig. A2). The relationship between incubation temperature and the proportion of female hatchlings can be calculated using the relationship:

Proportion of females = $(e^y)/(1 + e^y)$

Where $y = 11.1422t - 312.5039$ and t = temperature (^{o}C).

References

Booth, D.T., and Astill, K., 2001. Incubation temperature, energy expenditure and hatchling size in the green turtle (*Chelonia mydas*), a species with temperature-sensitive sex determination. *Australian Journal of Zoology* 49, p 389–396

Booth, D.T., Burgess, E., McCosker, J., and Lanyon, J.M., 2004. The influence of incubation temperature on post-hatching fitness characteristics of turtles. *International Congress Series* 1275, p 226–233

Burgess, E., D.T. Booth, and J.M. Lanyon. (2006). Swimming performance of hatchling green turtles is affected by incubation temperature. *Coral Reefs* 25, p 341–349

Bustard, H.R, and Greenham, P., 1968. Physical and chemical factors affecting hatching in the green sea turtle, *Chelonia mydas* (L.) *Ecology* 49(2), p 269–276.

Miller, J.D., and Limpus, C.J., 1981. Incubation period and sexual differentiation in the green turtle Chelonia mydas. In: Banks C, Martin A (eds*) Proceedings of the Melbourne Herpetological Symposium*. The Zoological Board of Victoria, Parkville, p 66–73

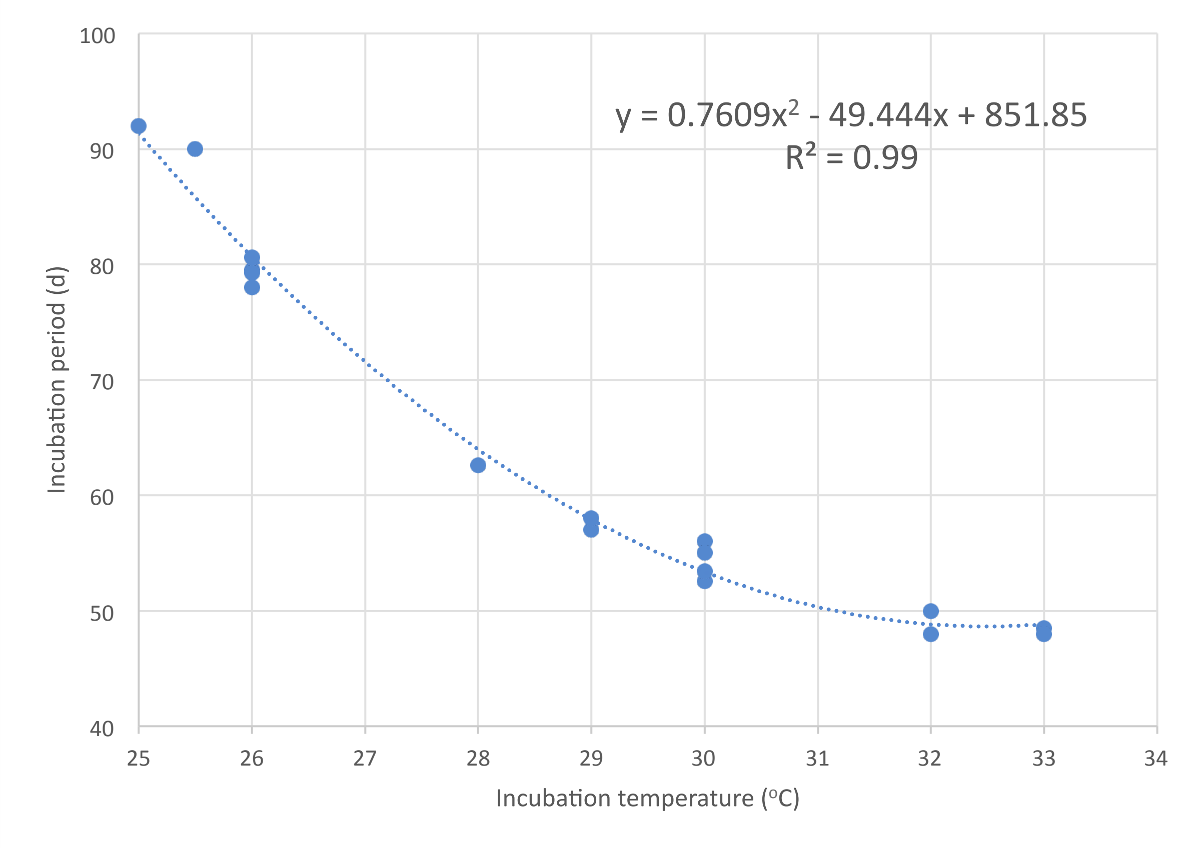

Figure S1. The relationship between incubation period and constant incubation temperature for the southern Great Barrier Reef (sGBR) green turtle nesting population. Second order polynomial fitted by least squares regression.

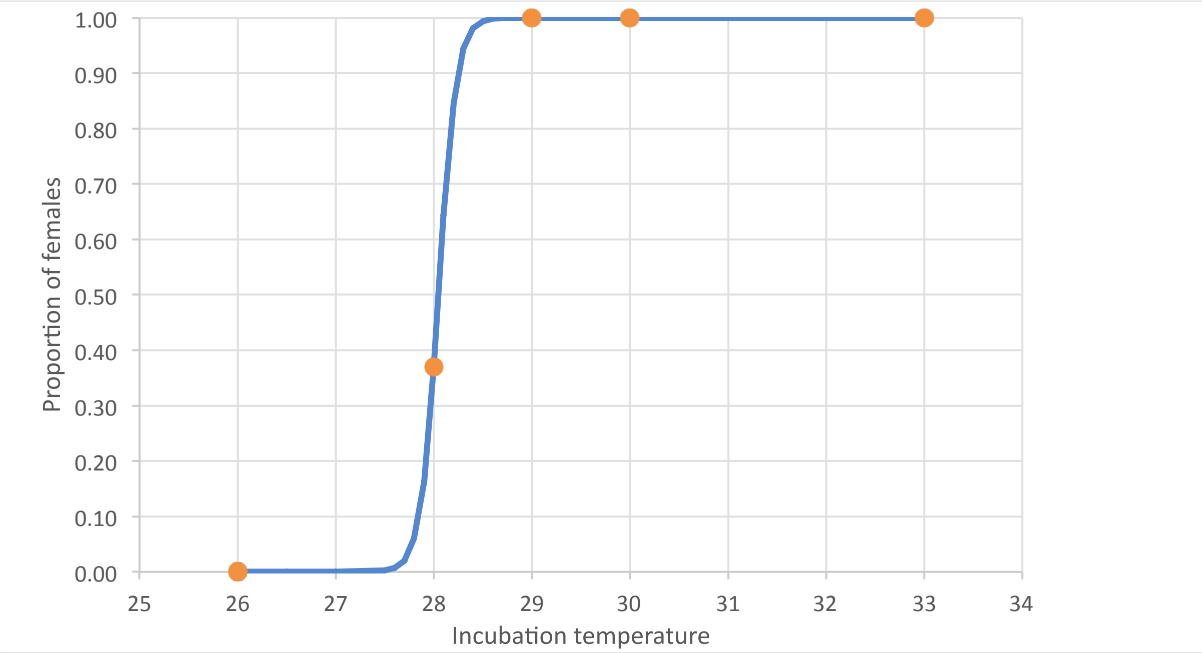

Figure S2. The relationship between incubation period and constant incubation temperature for the southern Great Barrier Reef (sGBR) green turtle nesting population. Logistic regression fitted.