Variation in nest temperatures of the American Alligator found on the Kennedy Space Center / Merritt Island National Wildlife Refuge

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56,656 ha or 140,000 acres
32,374 ha (80,000 acres) land
24,281 ha (60,000 acres) water
WHY ARE NESTING TEMPERATURES IMPORTANT?

- Temperature Sexual determination
  - FEMALES 29 deg C  50/50 31.5 deg C  MALES 34 deg C

- Recruitment / Population structure

- Sea level rise / Global warming

- Provide information for long term management decisions

MINWR
NASA
CNS
Other agencies
OBJECTIVES

- Implant 3 thermistors in egg cavity next to the eggs, recording depth, location and time
- Put a thermister in the air next to the nest
- Pull eggs for staging
- Thermisters set to log every 5 minutes
- Record time when they are picked up
THERMISTER NESTS THAT DID NOT HATCH
2010 - 2015

- DEPREDATED: 10
- DEAD NEST: 2
- UNKNOWN: 5
Average TSD Temperatures

Temp (°C)

Substrate

Fern  Grass  Pine Needle  Spartina  Typha  Wood
THERMISTERS 2013
GRAPH 6
(HATCHED)
FERN 90%

DATE

TEMPERATURE °C

7

TOP THERMISTER 18CM
MIDDLE THERMISTER 20CM
BOTTOM THERMISTER 27CM
AVERAGE TEMPERATURE DURING TSD

YEAR

TEMPERATURE C

AMBIENT AIR THERMISTOR
TOP THERMISTOR
MIDDLE THERMISTOR
BOTTOM THERMISTOR
DAY AND TIME OF HATCHING
2010 - 2014

DATE
9-Aug 14-Aug 19-Aug 24-Aug 29-Aug 3-Sep 8-Sep 13-Sep

TIME OF DAY (24HR)
0 200 400 600 800 1000 1200 1400 1600 1800 2000 2200 2400

Symbols:
- 2010
- 2011
- 2012
- 2013
- 2014
DAY AND TIME OF HATCHING
2010 - 2014

TIME OF DAY (24HR)

DATE

9-Aug  14-Aug  19-Aug  24-Aug  29-Aug  3-Sep  8-Sep  13-Sep

2010
2011
2012
2013
2014
DAY AND TIME OF HATCHING
2010 - 2014
WILD NEST TEMPERATURE RESULTS

- 58 Nests with temperature data loggers
- 41 Nests hatched (71%)
- Average temperature in the alligator nests at TSD was 31.8 deg. C. indicating our recruitment here is close to 50/50
- Range between the three different depth temperatures at sexual determination was only .27 deg. C
- Rain had a big influence on the alligator nests dropping the temperature up to eight deg. C.
- Highest temperature recorded was 78.5 deg C (173 deg F). Was a thermistor on the ground after hatching. Yes the swamp is HOT!
Overall summary

- High nesting success on KSC/MINWR
- TSD temperatures close to 50:50 for male to female ratio
Publications

Heather J Hamlin1,2,*, Russell H Lowers3,*, Satomi Kohno1,10, Naoko Mitsui-Watanabe4, Haruna Amano5,6, Akihiko Hara5, Yasuhiko Ohta7, Shinichi Miyagawa8,9, Taisen Iguchi8,9 and Louis J Guillette Jr. 2014 The reproductive hormone cycle of adult female American alligators from a barrier island population. Reproduction (2014) 147 855–863


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ANY QUESTIONS?