

## The First Report of Oral Tumors Associated with Fibropapillomatosis in Florida, USA

Michael J. Bresette<sup>1</sup>, Allen M. Foley<sup>2</sup>, David A. Singewald<sup>1</sup>, Karrie E. Singel<sup>3</sup>,  
Richard M. Herren<sup>1</sup> & Anthony E. Redlow<sup>4</sup>

<sup>1</sup>Quantum Resources Inc., 6451 South Ocean Drive, Jensen Beach, FL 34957 (E-mail: michael.bresette@jpl.com)

<sup>2</sup>Florida Fish and Wildlife Conservation Commission, Florida Marine Research Institute, Jacksonville Field Laboratory, 6134 Authority Avenue, Building 200, Jacksonville, FL 32221, USA (E-mail: allen.foley@fwc.state.fl.us)

<sup>3</sup>Florida Fish and Wildlife Conservation Commission, Florida Marine Research Institute, Tequesta Field Laboratory, Post Office 3478, Tequesta, FL 33469, USA (E-mail: karrie.singel@fwc.state.fl.us)<sup>4</sup>Florida Fish and Wildlife Conservation Commission, Florida Marine Research Institute, 100 8<sup>th</sup> Avenue Southeast, St. Petersburg, FL 33701, USA (E-mail: tony.redlow@fwc.state.fl.us)

Fibropapillomatosis (FP) is a debilitating and sometimes fatal disease found in marine turtle populations worldwide (George 1997). Although FP has recently been reported in other cheloniids (George 1997), it was first described in green turtles (*Chelonia mydas*) more than 60 years ago (Smith and Coates 1938) and is most commonly associated with this species. The disease is manifested externally by benign tumors (typically fibropapillomas) that are most often found on soft integumentary tissue (Jacobson *et al.* 1989). FP can hinder locomotion, occlude vision, and interfere with feeding and breathing (Balazs *et al.* 1997; Herbst 1994).

In the past 20 years, researchers in Hawaii and Florida have documented the occurrence and prevalence of FP in local green turtle populations (Balazs 1991; Bresette *et al.* 2002; Ehrhart *et al.* 1996; Fick *et al.* 2000; Herbst *et al.* 1999; Murakawa *et al.* 2000; Provanha *et al.* 1998; Schroeder *et al.* 1998). The only difference that had been detected in the way this disease is expressed in these two widely separated populations was that tumors were common in the oral cavities of afflicted green turtles from Hawaii but seemed to be absent in the oral cavities of afflicted green turtles from Florida (Balazs *et al.* 1997). We present here the first two known cases of oral tumors associated with FP in green turtles from Florida.

On 28 March 1998, a live green turtle stranded on the beach at Patrick Air Force Base (Brevard County, 28° 22.5'N and 80° 36.1'W). The straight line carapace length (SCL, from the nuchal notch to the posterior marginal tip) of this turtle was 33.3 cm. It had numerous large (> 4 cm) tumors (unless otherwise specified these were always masses that were consistent in gross appearance with marine turtle fibropapilloma) on many areas of the body (but not on the eyes) and an approximately 6-cm-diameter tumor along the right side of the mouth. The attachment point of the tumor was

on the dorsal surface of the oral cavity, on the soft tissue immediately posterior to the alveolar surface on the right side of the rhamphotheca. The base of the tumor was flattened and elongated so that the bulk of it rested outside the mouth and the mouth could close. This turtle was not emaciated when it was found, so we do not believe it had chronic difficulty in feeding. Because the bulk of the tumor was outside the mouth, it did not appear to interfere with breathing. The external appearance of this tumor was typical of a fibropapilloma, but it was not examined histologically.

On 5 March 2002, a live green turtle was captured at the St. Lucie Power Plant's intake canal located on Hutchinson Island in St. Lucie County (27° 22.3'N and 80° 14.9'W). The SCL of this turtle was 63.2 cm. It had numerous small (< 4 cm) tumors on many areas of the body (including the eyes) and an approximately 7-mm-diameter tumor completely inside the oral cavity. The attachment point of this tumor was on the right side of the oral cavity where the maxilla meets the mandible. The tumor did not appear to interfere with feeding or breathing. The turtle was in good condition and of normal body weight (33.0 kg). Dr. Nancy Mettee of the MarineLife Center of Juno Beach removed the entire tumor, and a sample was sent to Dr. Elliott Jacobson of the College of Veterinary Medicine at the University of Florida for histological evaluation. Dr. Jacobson reported that the histology of the tumor was compatible with FP.

The rarity of the two oral tumors reported here is significant given the large number of green turtles with FP that have been examined in Florida. The Florida Sea Turtle Stranding and Salvage Network (FLSTSSN) documented the oral tumor found in 1998. From January 1980 through July 2002, participants in the FLSTSSN examined 989 dead or debilitated (i.e., stranded) green turtles with FP in Florida. Of those turtles examined, only one (0.1%) was reported to have a tumor-like mass



in the oral cavity. Because the oral cavities of stranded green turtles may not have always been carefully and consistently examined, it may be more appropriate to consider only those green turtles that were necropsied and thus exposed to much greater scrutiny. Of the 280 green turtles with FP that were necropsied, only the one reported here (0.4%) had any findings suggestive of oral tumors.

Biologists from the sea turtle research program at the St. Lucie Power Plant documented the oral tumor found in 2002. This research program has been ongoing for more than 25 years, and more than 3000 green turtles have been captured (Bresette *et al.* 1998). Beginning in 1994, green turtles captured at the power plant were specifically examined for the presence of tumors associated with FP. When tumors were found externally on a turtle, the measurements and location of each tumor were noted and the oral cavity was examined. From January 1994 through July 2002, 127 green turtles were found with FP and only one of those (0.8%) was found to have an oral tumor.

Because oral tumors can interfere with breathing and feeding (Balazs *et al.* 1997), these two recent cases in Florida are cause for concern. Nevertheless, the occurrence of oral tumors among green turtles with FP in Florida is still far less than the occurrence of oral tumors documented for green turtles in Hawaii. (0.4%-0.8% vs. 40%-74%, respectively; Balazs 1997, Murakawa *et al.* 2000).

To better assess the frequency of oral tumors and to detect any future increase in their prevalence, it is vital that a standardized protocol for examining the oral cavities of green turtles be adopted by researchers throughout Florida. As is already practiced by some researchers, we recommend using an avian speculum to hold the jaws open and a narrow-beam light to illuminate the surfaces of the oral cavity. We also recommend using a standard search pattern to examine all the surfaces of the oral cavity.

*Acknowledgments:* We are grateful for the dedicated efforts of the participants in the FLSTSSN. We thank Dr. Nancy Mettee of the MarineLife Center of Juno Beach and Dr. Elliott Jacobson of the College of Veterinary Medicine at the University of Florida for their efforts in removing and analyzing the tumor taken from the turtle at the power plant. We also thank George Balazs, who encouraged us to take a better look into the oral cavities of green turtles in Florida. This report was improved by reviews from Anne Meylan, Andrea Mosier, Judy Leiby, and Jim Quinn. The work was authorized by the National Marine Fisheries Service and the Florida Fish and Wildlife Conservation Commission. The work

was funded by the Florida Game and Freshwater Fish Commission (grant NG92-100), Florida's Sea Turtle License Plate, the National Marine Fisheries Service, and Florida Power and Light Company.

BALAZS, G. H. 1991. Current status of fibropapillomas in the Hawaiian green turtle, *Chelonia mydas*. In: G. H. Balazs and S. G. Pooley (Eds.). Research Plan for Marine Turtle Fibropapilloma. NOAA Technical Memorandum NMFS-SWFSC-156. pp. 47-57.

BALAZS, G. H., A. A. AGUIRRE, & S. K. K. MURAKAWA. 1997. Occurrence of oral fibropapillomas in the Hawaiian green turtle: differential disease expression. Marine Turtle Newsletter 76:1-2.

BRESETTE, M. J., J. C. GORHAM & B. D. PEERY. 1998. Site fidelity and size frequencies of juvenile green turtles (*Chelonia mydas*) utilizing near shore reefs in St. Lucie County, Florida. Marine Turtle Newsletter 82:5-7.

BRESETTE, M. J., J. C. GORHAM & B. D. PEERY. 2002. Initial assessment of sea turtles in the southern Indian River Lagoon System, Ft. Pierce, Florida. In: A. Mosier, A. Foley and B. Brost (Compilers). Proceedings of the Twentieth Annual Symposium on Sea Turtle Biology and Conservation. NOAA Technical Memorandum NMFS-SEFSC-477. pp. 271-273.

EHRHART, L.M., W. E. REDFOOT, & D. A. BAGLEY. 1996. A study of the population ecology of in-water marine turtle populations on the east-central Florida coast from 1982-96. Comprehensive Final Report to U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, 75 Virginia Beach Drive, Miami, Florida, 33149. 164 pp.

FICK, K., T. REDLOW, A. FOLEY, & K. SINGEL. 2000. The distribution of stranded green turtles with fibropapillomas in the eastern United States, 1980-1998. In: H. Kalb and T. Wibbels (Compilers). Proceedings of the Nineteenth Annual Symposium on Sea Turtle Biology and Conservation. NOAA Technical Memorandum NMFS-SEFSC-443. pp. 236-237.

GEORGE, R.H. 1997. Health problems and disease of sea turtles. In: P. L. Lutz and J. A. Musick (Eds.). The Biology of Sea Turtles. CRC Press, Boca Raton, Florida. pp. 363-385.

HERBST, L. H. 1994. Fibropapillomatosis of marine turtles. Annual Review of Fish Diseases 4:389-425.

HERBST, L. H., E. R. JACOBSON, P. A. KLEIN, G. H. BALAZS, R. MORETTI, T. BROWN & J. P. SUNDBERG. 1999. Comparative pathology and pathogenesis of experimentally induced and spontaneous fibropapillomas of green turtles (*Chelonia mydas*). Veterinary Pathology 36:551-564



- JACOBSON, E. R., J. L. MANSELL, J. P. SUNBERG, L. HAJARR, M. E. REICHMANN, L. M. EHRHART, M. WALSH, & F. MURRU. 1989. Cutaneous fibropapillomas of green turtles, *Chelonia mydas*. *Journal of Comparative Pathology* 101:39-52.
- MURAKAWA, S. K. K., G. H. BALAZS, D. M. ELLIS, S. HAU, & S. M. EAMES. 2000. Trends in fibropapillomatosis among green turtles stranded in the Hawaiian Islands, 1982-98. In: H. Kalb and T. Wibbels (Compilers). *Proceedings of the Nineteenth Annual Symposium on Sea Turtle Biology and Conservation*. NOAA Technical Memorandum NMFS-SEFSC-443. pp. 239-241.
- PROVANCHA, J. A., M. J. MOTA, R. H. LOWERS, D. M. SCHEIDT & M.A. CORSELLO. 1998. Relative abundance and distribution of marine turtles inhabiting Mosquito Lagoon, Florida, USA. In: S. P. Epperly and J. Braun (Compilers). *Proceedings of the Seventeenth Annual Sea Turtle Symposium*. NOAA Technical Memorandum NMFS-SEFSC-415. pp. 78-79.
- SCHROEDER, B.A., A. M. FOLEY, B. E. WITHERINGTON & A.E. MOISER. 1998. Ecology of marine turtles in Florida Bay: population structure, distribution, and occurrence of fibropapilloma. In: S. P. Epperly and J. Braun (Compilers). *Proceedings of the Seventeenth Annual Sea Turtle Symposium*. NOAA Technical Memorandum NMFS-SEFSC-415. pp. 265-267
- SMITH, G.M., & C.W. COATES 1938. Fibro-epithelial growths of the skin in large marine turtles, *Chelonia mydas* (Linnaeus). *Zoologica* 23:93-98.

## The First Records of Olive Ridleys in Florida, USA

Allen M. Foley<sup>1</sup>, Peter H. Dutton<sup>2</sup>, Karrie E. Singel<sup>3</sup>, Anthony E. Redlow<sup>4</sup> & Wendy G. Teas<sup>5</sup>

<sup>1</sup>Florida Fish and Wildlife Conservation Commission, Florida Marine Research Institute, Jacksonville Field Laboratory, 6134 Authority Avenue, Building 200, Jacksonville, FL 32221, USA (E-mail: allen.foley@fwc.state.fl.us) <sup>2</sup>NOAA-NMFS, Southwest Fisheries Science Center, 8604 La Jolla Shores Drive, La Jolla, CA 92038, USA (E-mail: peter.dutton@noaa.gov) <sup>3</sup>Florida Fish and Wildlife Conservation Commission, Florida Marine Research Institute, Tequesta Field Laboratory, Post Office 3478, Tequesta, FL 33469, USA (E-mail: karrie.singel@fwc.state.fl.us) <sup>4</sup>Florida Fish and Wildlife Conservation Commission, Florida Marine Research Institute, 100 8<sup>th</sup> Avenue Southeast, St. Petersburg, FL 33701, USA (E-mail: tony.redlow@fwc.state.fl.us) <sup>5</sup>National Marine Fisheries Service, Southeast Fisheries Science Center, 75 Virginia Beach Drive, Miami, FL 33149, USA (E-mail: wendy.teas@noaa.gov)

Although olive ridleys (*Lepidochelys olivacea*) occur worldwide in tropical and warm-temperate ocean waters, their distribution in the western North Atlantic is limited mostly to the northern coast of South America and adjacent waters. Regular nesting occurs only in Guyana, Suriname, and French Guiana, and the bulk of the foraging grounds are probably nearby (Reichert 1989). In rare cases, olive ridleys are known to occur as far north as Puerto Rico (Horta *et al.* 2000), the Dominican Republic (Carr *et al.* 1982), and Cuba (Moncada-G. 2000). We now report three recent records of olive ridleys from Florida. These become the northernmost known occurrences of olive ridleys in the western North Atlantic and the first reports of olive ridleys in the eastern United States. All specimens were photographed.

On 21 December 1999, a live olive ridley was found floating near Marathon (in the Florida Keys, Monroe County, 24° 41.2'N and 81° 02.1'W). It was entangled in approximately 15 kg of trawl net but otherwise appeared to be in good condition. The straight-line carapace length (CLSL, from the nuchal notch to posterior marginal tip) of the turtle was 62.6 cm. It had

seven pairs of costal scutes and was presumed to be an adult male because the tail extended well beyond the carapace. The turtle was taken to a rehabilitation facility but died about a month later. The presumed sex of the turtle was confirmed during necropsy.

On 10 September 2000, another live olive ridley was found floating just offshore of Key Largo (also in the Florida Keys, Monroe County, 25° 03.9'N and 80° 28.7'W). It was missing its left front flipper, had numerous large abrasions on the left side of the carapace, and was emaciated and lethargic. The CLSL of the turtle was 66.0 cm. It had at least six pairs of costal scutes on the right side (the scute lines were difficult to distinguish in the photographs because of the carapace damage) and was presumed to be an adult male because the tail extended well beyond the carapace. The turtle was taken to a rehabilitation facility but died about ten days later. The presumed sex of the turtle was confirmed during necropsy.

On 11 October 2001, a dead olive ridley was found washed-up on the beach of Sunny Isles (just north of Miami, Miami-Dade County, 25° 54.2'N and 80° 07.3'W). It was mostly covered with tar but did not