*Presenting Author: Stephen G. Dunbar, sdunbar@llu.edu
Date: ???
Session: In-Water Biology
Type of Presentation: Prefer Oral
Student paper award consideration: Yes
Consideration for Grass Roots Award: No

PHOTO RECOCOGNITION FOR IN-WATER IDENTIFICATION OF HAWKSBILLS IN A MARINE PROTECTED AREA OF HONDURAS

Baeza, Linda[1,2]
Hayes, Christian, T.[1,3]
Wright, Marsha[1,4]
Salinas, Lidia, A.[1,5]
Dunbar, Stephen G.[1,3,5,*]

[1]Protective Turtle Ecology Center for Training, Outreach, and Research, Inc. (ProTECTOR). Colton, CA 92324
[2]Department of Biological Sciences, Moorpark College, Moorpark, CA 93021
[3]Marine Research Group, Department of Earth and Biological Sciences, Loma Linda University, Loma Linda, CA 92350
[4]Department of Biological Sciences, Oakwood University, Huntsville, AL 35896
[5]Protective Turtle Ecology Center for Training, Outreach, and Research, Inc., Honduras (ProTECTOR-H), Tegucigalpa, Honduras

ABSTRACT

The hawksbill sea turtle (*Eretmochelys imbricata)* can be found in the Atlantic, Pacific and Indian Oceans. As with other sea turtles species, hawksbills have a cluster of scales on the dorsal and lateral surfaces of the head that form unique scale patterns. Following a previous study using Interactive Individual Identification System (I^3S) *Spot*, we used the *Pattern* version of I^3S to compare and identify in-water photographs of turtles within the Roatán Marine Park (RMP) on the western end of Roatán, Honduras from May to September, 2014. The *Pattern* program is designed to annotate individual 'fingerprints' for species with complex markings by identifying key points and assigning a descriptor area around each point using the Open Source Computer Vision (CV) implementation of Speeded-Up Robust Features (SURF). Points and areas are delineated within a user specified polygon using an automatic key point extraction algorithm. The 'fingerprint' on one photograph is then compared to 'fingerprints' on other photographs in the database and potential individual matches are selected, thus reducing the number of photographs that require review by manual comparison. Through daily underwater dives, we photographed turtles on 78 occasions and created a database of 182 photographs. New photographs were then cross referenced with photographs in the I^3S photo database to determine whether turtles had been previously encountered. We visibly assessed potential matches for

similarities and successfully identified 68 different hawksbill individuals. Nine individuals were re-identified from pictures on later dives and one individual was re-identified twice. I^{3}S *Pattern* failed to recognize actual matches (false negatives) four times (40%), and identified two (20%) false positives. However, these false matches may have been dependent on the quality of the photographs used. We were unable to use I^{3}S *Pattern* to match any dorsally oriented photographs and recommend that future studies use I^{3}S *Spot*, rather than the current version of I^{3}S *Pattern*, to match photographs taken of the dorsal view of the head. The I^{3}S *Pattern* program successfully aided our research by facilitating accurate counts of hawksbill sea turtles re-sighted in the RMP over the period of the study. Automated photo identification can help provide long-term data on turtle migrations, movements, and life-history stages, and can thus be a valuable tool for conservation of marine turtles.