

Identifying Individual Nassau Grouper, *Epinephelus striatus*, from Natural Markings

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ABSTRACT

Nassau groupers, *Epinephelus striatus*, have patterns of dark spots around their eyes. This study investigated whether these spots could be used as natural markers to identify individuals from digital photographs taken *in situ*. In order to serve as useful natural tags, markings need to be unique, to persist over time and to be distinguishable from photographs without the need to capture individuals. Photographs were taken of juvenile Nassau groupers ranging in size from an estimated 9 to 40 cm TL in a seagrass area in South Caicos, Turks and Caicos Islands. Individuals appeared to display unique patterns of spots. Individuals were recognisable by the spots around their eyes which persisted over the study period. These natural markers were recognizable from photographs taken with an unsophisticated underwater digital camera whilst SCUBA diving and snorkelling. The use of natural markings of Nassau groupers has the potential to enhance information collected during underwater visual census of this species.

KEY WORDS: Nassau grouper, photo-identification, natural marking, seagrass

Identificación de Individuos de Mero de Nassau, *Epinephelus striatus*, por Marcas Naturales

Los meros de Nassau, *Epinephelus striatus*, tienen marcas alrededor de sus ojos. Este estudio investigó si pueden utilizar marcas naturales para identificar individuos por fotografías digitales hechas *in situ*. Para servir bien como etiquetas naturales, marcas tienen que ser únicas, durar, y ser distinguidas por fotografías sin atrapar a los individuos. Saquemos fotografías de jóvenes de *E. striatus* (de 9 a 40 cm TL) en unáreas de pastos marinos, South Caicos, Turks & Caicos Islands. Las marcas de individuos registrados fueron únicas. Distinguimos individuos por sus marcas en fotografías, y las marcas duraron por el tiempo de estudio. Las marcas fueron registradas bien por una máquina fotográfica rudimentaria, buceando con SCUBA y snorkel. El uso de las marcas naturales de *E. striatus* puede mejorar la información durante el censo visual submarino de esta especie.

PALABRAS CLAVE: Mero de Nassau, identificación con foto, marcas naturales, pastos marinos

Identification d'Individus de Mérrou Rayé, *Epinephelus striatus*, par Marques Naturelles

Les mérours rayés, *Epinephelus striatus*, ont des taches autour des yeux. Nous avons étudié si on peut identifier les individus par leurs taches dans photographies digitales prise *in situ*. Pour servir comme marqueurs naturels utiles, les taches doivent être uniques, durer, et être identifiables par photographies sans le besoin d'attraper les individus. Nous avons photographié mérours rayés jeunes de 9 à 40 cm TL dans les herbiers en South Caicos, les Îles Turks & Caicos (TCI). Les mérours ont eu les taches uniques. On a pu identifier les individus par les taches qui avont duré jusqu'au fin de l'expérience. Les marqueurs naturels ont été identifiables par les photographies prises par un appareil sous-marin peu sophistiqué pendant qu'on a plongé avec SCUBA et avec tuba. L'utilisation des marques naturels des mérours rayés peut améliorer les renseignements enregistrée pendant les recensements sous-marins de cette espèce.

MOTS CLÉS: Mérours rayé, photo-identification, marqueur naturel, herbiers

INTRODUCTION

Natural markings have been used extensively in wildlife research to identify individuals. This approach has been applied to marine and terrestrial species of various sizes as an alternative to tagging (Speed et al. 2007). Individual recognition from unique patterns is preferable when tagging is logistically difficult or considered too stressful for the animal (Stevick et al. 2001). The regionally endangered Nassau grouper, *Epinephelus striatus* (Serranidae), have patterns of dark spots around their eyes (Figure 1). This study investigated whether these markings can be used as natural tags for identifying individuals from digital photographs taken *in situ*. In order to serve as effective tags, markings need to be:

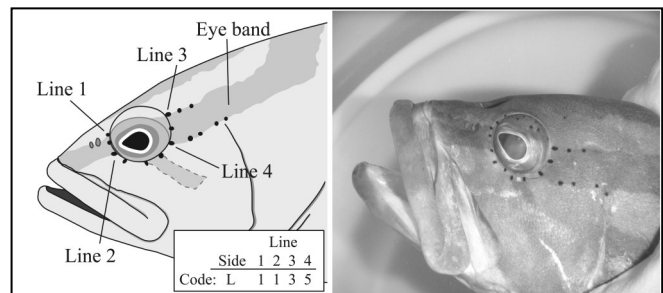


Figure 1. Nassau grouper, *Epinephelus striatus*, displaying spot pattern around its left eye. Spot pattern code was calculated from the number of spots falling along four landmark lines.

- i) Unique,
- ii) Distinguishable from photographs, and
- iii) Persist over time.

METHODS

The study was conducted on a contiguous dense seagrass bed in Cockburn Harbour, South Caicos, Turks and Caicos Islands (Figure 2). Prior to data collection, juvenile Nassau groupers had been observed in high densities sheltering in blowouts in the study area. Sampling occurred on five occasions over a four week period in March 2010. Blowout areas were systematically searched on SCUBA and photographs of juvenile Nassau groupers were taken using a 3.2 mega pixel Konica Minolta Dimage XG digital camera with MC-DG300 housing. In order to match the arrangements of spots between photographs, the patterns were transformed into a descriptive code by

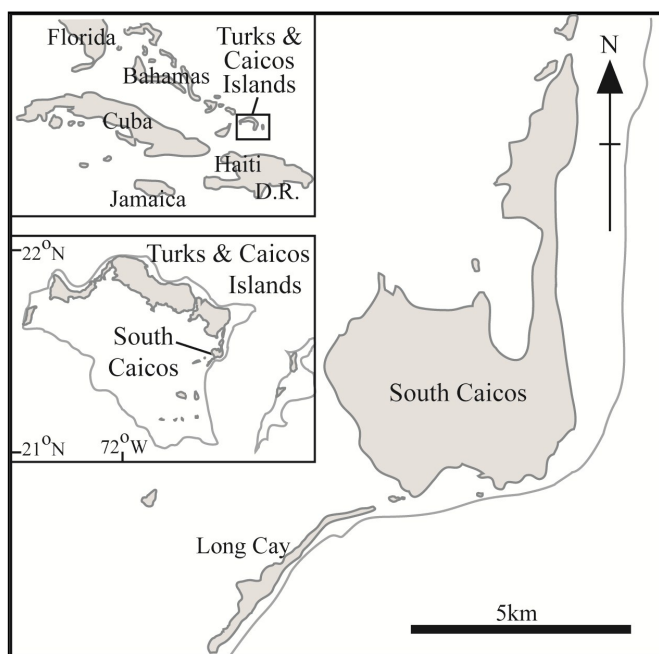


Figure 2. South Caicos (N 21°29' W71°31'), Turks & Caicos Islands.

RESULTS

Photographs were taken of 78 juvenile Nassau groupers. Whilst all appeared to have spots around their eyes, the quality of images allowed patterns to be determined for 59 (76%), with 10 having both left and right sides photographed. Spot patterns differed widely between individuals and appeared to be unique. Within individuals, patterns on the left and right side were similar but not identical. Spot pattern codes were determined for 36 right sides and 33 left. The codes were successfully matched between sampling days for 24 right sides and 11 left. It was calculated that there were a minimum of 27 individuals observed with 8 seen on multiple days, and 1 individual

observed on all five sampling days. The patterns of spots on the re-sighted individuals remained identical.

CONCLUSION

Using natural markings to identify juvenile Nassau groupers appears to be feasible: patterns were unique, they could be distinguished from photographs taken *in situ*, and they persisted over time. Identifying individuals by their eye spot patterns could be used in mark-recapture studies. Such studies could complement traditional underwater visual census techniques and thus enhance the understanding of this regionally endangered species.

Much of the complexity of the spatial arrangement of spots was not used to distinguish between individuals in this study. For example, it was not necessary to determine the relative distances between spots. However, as the number of images in the database library increases, it may be necessary to rely on these additional data and develop a more sophisticated technique (e.g. using software such as I3S; Van Tienhoven et al. 2007).

The present study focused on a limited range of size classes (c. 9 to 40 cm total length) of Nassau grouper and was conducted over a relatively short period of time (four weeks). Therefore, further research is needed to:

- i) Establish whether this technique is suitable for all sizes including adults and recently settled juveniles, and
- ii) Assess the extent to which patterns may change over longer timeframes.

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