

Republic of Sudan
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**Some Biological Aspects of *Acanthurus* spp. in
Abu- Hashish Fishing area, Sudanese Red Sea
2016 - 2017**

**Thesis submitted in accordance with the requirements for the degree of
Master Science in Fisheries**

by

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Abstract:

This study was undertaken to determine Some Biological aspects of *Acanthurussohal* in Abu Hashish Fishing area, Sudanese Red Sea. A total of 161 specimens of *A. sohal* were collected from study area in the period between February 2016 and February 2017, with sizes ranging from 15.40 - 31.80 cm (Fork length). All fish samples were collected monthly for the determination of the reproductive biological characteristics, growth parameters and mortality rates, and analyzed to examine the status of *A. sohal*. Vertebrae, operculum and otoliths of *A. sohal* were removed and examined for the determination age structure of the fish stock, also support these results by age frequency distribution. The overall female-male sex ratios for species was significantly different from 1:1. Monthly distribution of maturity stages and fluctuations gonadosomatic index (GSI), indicated that the spawning season for *A. sohal* was from May to August. hepatosomatic index (HIS) increased in September and decreased in October. So that condition factor had the highest value in September.

Length at first maturity for *A. sohal* started from 26 cm and 24.5 cm fork length for females and males respectively. The absolute fecundity found for *A. sohal* was between 100723 – 2010284 eggs with an average of 686806 eggs per mature female.

The vertebrae clearly showed annuli as opaque zones that appeared darker than the adjacent hyaline or translucent zones. Seven age groups were identified for *A. sohal* between 0⁺ and 6⁺ years with an average length between 15.75 – 30.98. Otoliths relationships were analyzed, and was found that the fork length, total weight and age showed highly significant correlation with otolith weight and significant with otolith length and otolith width.

The value of total mortality based on catch curve analysis was 0.45 yr^{-1} for *A. sohal*. Natural mortality rate (M) obtained reached a value of 0.308 yr^{-1} . the fishing mortality rate (F) reached a value of 0.142 yr^{-1} . In addition, the exploitation rate (E) was determined and reached a value of 0.316. Value of exploitation rate for *A. sohal* was less than 0.5, this indicated that species was under exploited.

The study recommended that it would be useful to do more studies for *A. sohal* along the Sudanese Red Sea Coast.

المستخلص:

تناولت هذه الدراسة بعض الجوانب البيولوجية لاسماك السهل في منطقة ابو حشيش. جمعت 161 عينة من منطقة الدراسة في الفترة من فبراير 2016م الى فبراير 2017 م، باطوال تراوحت بين 15,40 _ 30,80 سم (الطول الشوكي). حيث جمعت العينات شهرياً لتقدير معدل النمو والوفيات و التكاثر، وحللت هذه البيانات لمعرفة الوضع الراهن لاسماك السهل. ازيلت الفقرات والغطاء الخيشومي وصخرة الاذن ووزنت، تم اختبارها لتقدير عمر الاسماك، ايضاً دعمت هذه النتائج بالتوزيع التكراري للعمر. قدر معدل النضج الجنسي لاناث وذكور هذا لاسماك بنسبة 1:1. توصلت الدراسة الى ان قيمة معامل الدليل المنسلي تشير الى ان موسم التكاثر لهذا النوع في الفترة ما بين شهر مايو الى شهر اغسطس، معامل الدليل الكبدي يزداد في سبتمبر وينخفض في اكتوبر. وسجلت اعلى قيمة لمعامل الحالة في سبتمبر. بلغ طول اصغر ذكر ناضج 24,5 سم واصغر انثى ناضجة 26 سم. تراوحت الخصوبة المطلقة لاسماك السهل بين 100723 _ 2010284 بيضة بمتوسط 686806 بيضة ناضجة. تمت قراءة حلقات العمر في العمود الفقري بوضوح، سبع فئات عمرية تم تحديدها، تراوحت اعمار عينات اسماك السهل تحت الدراسة بين اقل من عمر سنة وست سنوات بمتوسط طول تراوح بين 15,75 الى 30,98 سم. حللت علاقات عظمة الاذن حيث اظهر الطول الشوكي، الوزن الكلي والعمر لهذا النوع علاقة قوية وذات دلالة احصائية عالية مع وزن عظمة الاذن، وكانت العلاقة اقل قيمة احصائية مع طول وعرض عظمة الاذن.

توصلت الدراسة الى ان قيمة النفوق الكلي لاسماك السهل وصل الى 0.45 في السنة، معدل النفوق الطبيعى 0.308 في السنة و معدل النفوق من الصيد وصل الى 0.142 في السنة. بالاضافة الى ذلك حدد معدل استغلال اسماك السهل 0.316 في السنة، هذه القيمة اقل من 0.5 وهذا يدل على ان هذا النوع اقل استغلالاً.

اوصت الدراسة بضرورة عمل مزيد من الدراسات للنوع على طول الساحل السوداني.

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RECOMMENDATIONS:

- It would be useful to do more studies for *A.sohal* along the Sudanese Red Sea Coast.
- *A. sohal* represents the most exported species in the period from 2012 to 2014. Therefore, it is necessary to work on feasibility study of exports for ornamental fish.
- We must not catch from May to August.
- Focus should be on larg sizes.
- Sustainable management for this species is essential.