NEGATIVE IMPACT OF INVASIVE INDO- PACIFIC BLUESPOTTED CORNET FISH ON THE BIODIVERSITY AND NATIVES FISH STOCKS IN THE SYRIAN AND LEBANESE MARINE WATERS (EASTERN MEDITERRANEAN)

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ABSTRACT

Background: Syria a, just like Lebanon and the neighboring countries, is one of the most influenced countries by the invasive alien species due to its proximity to the Suez Canal and the dense maritime traffic along its coastline. Invasive species, in fact, may alter the evolutionary pathway of native species by competitive exclusion, niche displacement, predation and other ecological and genetic mechanisms. The bluespotted cornet fish *Fistularia Commersonii* (Ruppel,1838) may contribute to increase this alternation, because it is one of the most abundant and dominant Indo-Pacific alien fishes along the Levantine basin of the Mediterranean Sea at the onset of the past decade.**Objective**: In order to know the extent and mechanism of the negative impact of this exotic species on the diversity and the natural stock of native species and her environment, it has been the study of the reproductive cycle and diet of bluespotted cornet fish. **Methods:** The study was performed in the coastal area of Lebanon and Syria along 380 (approximately). A total of 460 specimens of Bluespotted cornet fish were collected by beach seine and trammel net at depth of 2-20 m from October 2012 to September 2013. **Results**: The results of this work were shown a rapid development among the ichtyofauna in the Eastern Mediterranean. *Fistularia commersonii* spawned in the Syrian and Lebanese coast from the second half of May until early August, with greatest intensity in June. Fecundity ranged between 355-697 eggs/g /ovary. This species It is carnivorous, and feed on many small fish species, such as Sardinella spp., *Sprarus spratus, Alosa fallax, Boops bops* .etc. 12-30 individual preys was found in the stomach of every specimen). **Conclusion:** The high fecundity rate, the long period of reproduction, and its rapidly expanding population feeding on fish, make a decline of the biomass and causing damage and loss to fisheries yield and perturbed the marine biodiversity.
Keys words: *Invasive fish, Fistularia, reproductive cycle, feedinghabitat, Syrian coast, marine environment*

1-INTRODUCTION

Six hundred and eighty alien marine multicellular species have been recorded in the Mediterranean Sea [1]. Nearly 100 Indo-Pacific fish species have been introduced through the Suez Canal and have been reported from the Levantine basin of the Mediterranean Sea. The number of alien species increased in the Eastern Mediterranean about 68.42% between years 2002-2010 [2], because of the opening of the Suez Canal, climate changes and international shipping activities. More than twenty five species recorded in the Levantine basin since the beginning of the 21st century [3].
The Mediterranean Sea has been invaded by numerous alien species entering through the Suez Canal, Gibraltar, via human activities such ballast water, mariculture and other [4] The opening of the Suez Canal in 1869 enabled the migration between the Red Sea and the Mediterranean Sea, dramatically affecting the biodiversity of the Mediterranean [5].

During the nineties, a strange fish species of Indo-Pacific origin from family Fistularidae (cornetfishes) appears in the south-east Levantine Basin, the first record was reported by in the Palestinian coastal [6]. In July 2001 three specimens of *Fistularia commersonii* of total length (ST): 35.6; 77.8; 82.3 cm (SL) respectively was caught with beach seine in the seawater south Lattakia (35.44' N; 35.89' E) at a depth of 12 m. It was the first record of this Lessepsian specis in the Syrian waters [7]. It is reported in adjacent Lebanese coastal waters [8,9]. Two years later, it was observed with great number and became strong invader with regard to the increased percentage in the catch.
Given the environmental conditions changes occurring in the Mediterranean and because of the connection between the Levantine Basin and the Red Sea through the Suez Canal, the East Mediterranean was subject to a big invasion of marine species. In the beginning this invasion was very slow because of the big difference in salinity between the both marine environments and because the high salinity of Bitter lake which constituted a natural barrier to the migration of marine organisms. Prior the construction of Aswan High Dam, the freshwater of the Nile during the flood, in reducing the salinity at the entrance Nord of the canal at Port Saïd, contribute to constitute a hypo-saline seawater

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forming a barrier to this migration. After the functioning of the High Dam in 1965 and the stop of the flood, the salinity of the south-east corner of Mediterranean start increasing , making little difference in the salinity between the Red sea and East Mediterranean. The increased navigation through the Canal pathway during the last century and the global warming occurring word wide in the oceans inducing the rise of the Mediterranean water salinity have enhanced the Lessepsian migration process. The number of invasive fish species in the Levantine Basin reach to date 81 [10,11,12] , from which 43 are recorded in the Syrian waters [10,13] *Fistularia commersonii* is the more recent newcomer fish record in our water [7], measuring a total length of 29 cm. Afterwards the caught number by fish training nets increased progressively. In May 2003, 36 individuals measuring between 40 and 108 cm were caught in only one fish net (Figure 1). After this period, we observed increasing frequency of this invading species in the fishermen nets and with high number forming about 2-3% of the total net coastal catch.

Figure 1: General morphology of *Fistularia commersonii.*

Given that the introduction of new species in the environment can surely affect in the marine biodiversity and in the competition of the biocoenoses and food, it is very important to know the behavior of reproduction and feeding of the newcomers in the local ecosystem in order to know it stock management and understand the relationship between themselves and between them and native species and thus knowing its role in the structure of the biodiversity in this ecosystem.

2.Material and methods

The study was performed in the coastal area of Lebanon and Syria along 380 km (approximately) (Fig. 2). A total of 460 specimens of Bluespotted cornet fish (*Fistularia commersonii*) were collected by beach seine and trammel net at depth of 2-20 m from October 2012 to September 2013. For each fish, the total length (TL) and standard length (SL) was measured to the nearest centimeter and total weight (W) to the 0.1 g. Sex and maturity were determined macroscopically. The weight of the gonad (Wg) was recorded to the 0.01 g. Spawning season was determined in using the monthly change of stages of maturation and the gonado-somatic index (GSI). Fecundity was estimated gravimetrically. In addition, the feeding habit was studied by analysis of food content in the digestive tube.

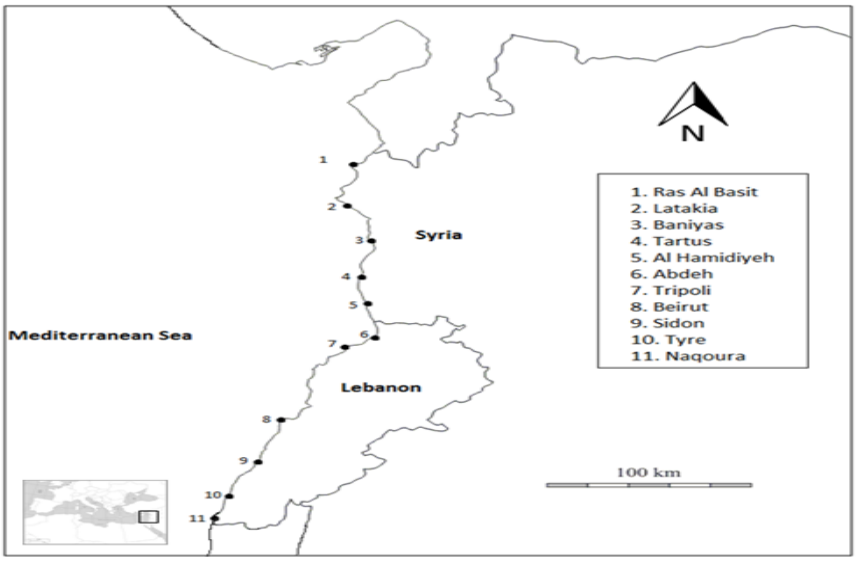

Figure 2: Sampling fishing sites along Syrian and Lebanese coast.

3. RESULT AND DISCUSSION

The GSI values of females were generally higher than those of males, but both indices followed the same pattern. According to the examination of maturation stages and GSI values, *Fistularia commersonii* spawned in the Syrian and Lebanese coast from the second half of May until early August, with greatest intensity in June, but gravid specimens were observed up to November. The gonadosomatic index and condition factors were significantly correlated with water temperature. The first sexual maturity of *F. commersonii* shows that 50% of females and males are sexually mature at standard length of 57.5 and 56 cm respectively (Figure 3). The species is reproductively adapted to the conditions occurring in the Mediterranean Sea and it is suggested that warming conditions could facilitate its success in the Eastern Mediterranean basin.

Males matured at smaller length intervals than females. Fecundity ranged between 355-697 eggs/g /ovary (Figure 4).

Figure 3: Graph showing the first sexual maturity of *Fistularia commersonii.*

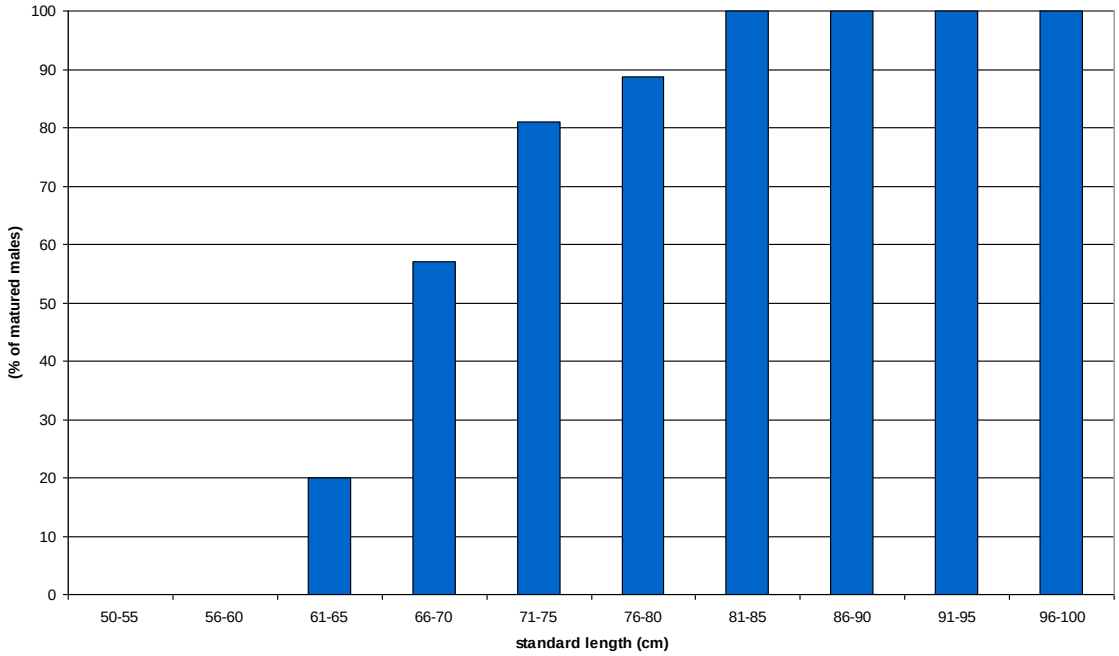

Figure 4(a): Mature ovary inside *Fistularia commersonii.*

Figure 4(b): Mature ovary inside *Fistularia commersonii.*

This high fecundity rate contributes to increase the recruitment and juvenile population invade new ecological niches at the expense of native fish species (Figure 5)

Certain negative impact on local fish stock through predation and feeding on small fishes was noticed.

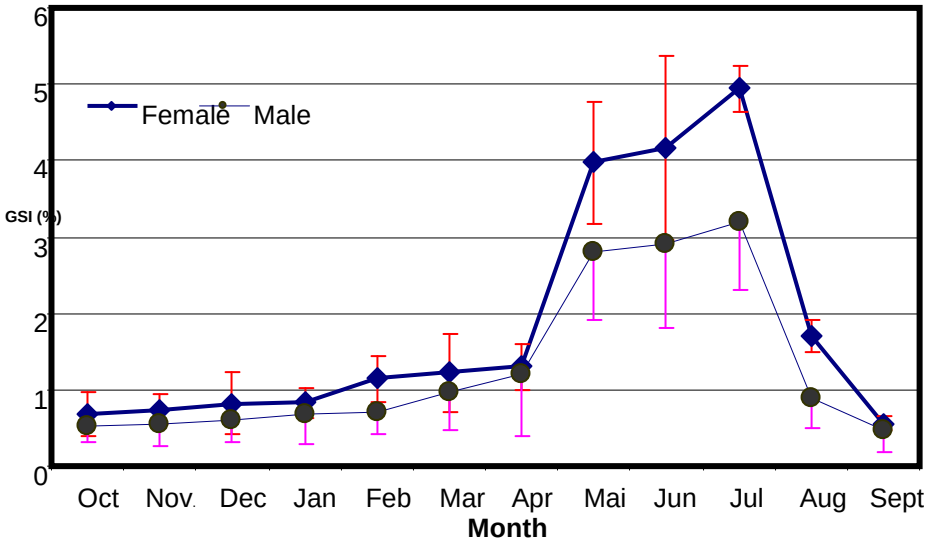

Figure 5: Evolution of sexual maturity of Fistularia (Evolution of gonadosomatic index (GSI) during the Year for *Fistularia commersonii*) in the Syrian- Lebanese coast.

In studying the feeding regime and the dynamics of the reproduction during 2012-2013, we conclude that *Fistularia commersonii* is a carnivorous predator feeding quasi exclusively on local fish, namely *Sardinella aurita, Boops boops* and *Engraulis encrasicolus* the stomach content analysis has shown 20-25 fish individuals in one digestive

Figure 6: Stomat contain of fish preys for one individual of *Fistularia commersonii.*

This may give an idea of the strong negative effect of thousands of Bluespotted cornet fish individuals on local living fish stock. Several species in this recent wave of successful Indo-Pacific invaders have established large populations with considerable effects on the local biota [14]. The definitive intrusion and the expansion of some alien species in the eastern Mediterranean, such as *F. commersonii*, could threat the biodiversity due to the competition pressure with the native species, especially; it's feeding habits which include crustaceans, mollusks and small fishes

4.CONCLUSIONS

Syria and Lebanon is influenced countries by the invasive alien species due to its proximity to the Suez Canal and the dense maritime traffic along its coastline. Invasive species, in fact, may alter the evolutionary pathway of native species by competitive exclusion, niche displacement, predation and other ecological and genetic mechanism.

The bluespotted cornet fish *Fistularia Commersonii* may contribute to increase this alternation, because It is piscivorus species The high fecundity rate, the long period of reproduction and because it is one of the most abundant and dominant Indo-Pacific alien fishes along the Levantine basin of the Mediterranean Sea at the onset of the past decade .

Recommendations

- To protect our Marine Biodiversity and Ecosystem Services, we need to:

extend our marine monitoring efforts; (2) extend our knowledge on the regional factors that determine the vulnerability and resilience of marine communities to climate change;
(3)extend our knowledge on sensitivities and adaptation capabilities of marine key species to climate change;
(4)develop "fit-for-purpose "models to project impacts and adequately manage our marine environment

Acknowledgements

We are grateful to the Syrian Ministry of higher education and to the Lebanese council for Scientific researches for financial support of this work .

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Cite this article: **Adib Saad, and Waad Sabour, Gaby Khalaf, Milad Fakhri.** Negative Impact Of Invasive Indo- Pacific Bluespotted Cornet Fish On The Biodiversity And Natives Fish Stocks In The Syrian And Lebanese Marine Waters (Eastern Mediterranean). *The American Journal of Innovative Research and Applied Sciences*. 2015; 1(2): 123-127.

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