



FULL LENGTH ARTICLE

Illegal shrimp fishing in Hormozgan inshore waters of the Persian Gulf



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Abstract An observer program was conducted to study and quantify the dimensions of illegal shrimp fishing in Hormozgan inshore waters (the northern Persian Gulf). Catches were sampled from 54 replicate landings of three boats from July to October 2014. The catch composition by weight included 55.37% shrimp and 44.63% by-catch (25.90% discards and 18.73% incidental catch). Forty-one species belonging to 27 families constituted the by-catch species, which Portunidae and Leionathidae families had the highest contribution of by-catch composition with 24.71% by weight and 16.71% in number, respectively. The catch rate ($\text{kg boat}^{-1} \text{day}^{-1}$) of shrimps and by-catches were estimated as 16.056 ± 4.412 and 12.653 ± 2.686 using the non-parametric bootstrap method ($\alpha = 0.05$). A randomized *t*-test comparison, with 1000 replicates, of by-catch species weight with weight of shrimps was not significant ($P > 0.05$). Using a Monte Carlo procedure through combining data of catch rate and the number of boats and fishing days, we estimated the annual IUU shrimp catch between 461.118 and 523.251 tons ($\alpha = 0.05$), which is valued between 2.6 and 3 U.S. million dollars approximately. These results consider the first study on the illegal shrimp fisheries in the Persian Gulf, and could be helpful for marine fisheries managers in the region.

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Introduction

Sustainable exploitation of ecosystems is confronted with critical challenges. In the case of fisheries, illegal, unreported and

unregulated (IUU) fishing has been recognized as one of the severe threats to sustainable fisheries worldwide (Osterblom et al., 2011; Polacheck, 2012). As a global concern, IUU fishing jeopardizes marine ecosystems, food security, and livelihoods (Pramod et al., 2014). Agnew et al. (2009) argued that IUU catches are between 13% and 31% of global reported catches, and over 50 percent in some areas, which was estimated between 10 and 23.5 billion dollars per year.

The Persian Gulf, located in 24° to 30° 30' N latitude and 48° to 56° 25' E longitude, lies between Iran (Islamic Republic of) to the northeast and the Arabian Peninsula to the

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southwest. Statistics submitted annually by the Persian Gulf countries to the United Nations Food and Agriculture Organization (FAO) mostly disregard or under-report the proportion of illegal catches and discards (Al-Abdulrazzak and Pauly, 2013). Therefore, there is not adequate information to estimate the extent of IUU fishing or its negative consequences in the region.

Iranian parliament adopted the Law of Protection and Exploitation of the Fisheries Resources in 1995. The aim of this law is to promote sustainable development and exploitation of Iranian fisheries through responsible management (Salari shahrbabaki, 1995). Based on it, the Iranian government has made an effort to eliminate IUU fishing in territorial waters. However, illegal shrimp fishing represents one type of IUU fishing in Iranian waters of the Persian Gulf. In this paper we set out a detailed study which represents substantial information on shrimp catch and by-catch by this fishing method in Hormozgan inshore waters of Iran. Illegal shrimp fishing is one of the most difficult problems facing fisheries management in Hormozgan province. In recent years, total marine shrimp catch has been decreased due to (a) increasing the illegal shrimp fishing, (b) oil pollutions, (c) habitat destruction and (d) reduction in inlet of freshwater to estuaries (Mohebi, 2014).

Marine shrimp resources in Hormozgan are exploited by industrial and artisanal fisheries in the open fishing season (October and November), but the small out-board engine powered boats equipped with drift gill nets (locally named Semari), in some cases also bottom trawl nets, capture the shrimp at the closed season (late July to October). A report on illegal shrimp fishing in Hormozgan estimated that the number of illegal fishing boats were more than eight-hundred (Aalizade and Oliyae, 2015). Because information on this serious concern is not detailed enough for promoting sustainable development of fisheries in the region, the present research identifies the

catches and by-catch species composition from illegal shrimp fisheries in the Hormozgan province. It could be a prelude to inform administrators to mitigate the biological, social and environmental threats posed by this fishery.

Materials and methods

Study area and data collection

This research was carried out in the shrimp fishing grounds of Hormozgan, which is the most important fishery province in Iranian waters of the Persian Gulf (Fig. 1). The research program was conducted from July to October 2014 to assess IUU catch and catch composition produced by illegal shrimp fisheries. Sampling operation was performed by three small out-board engine powered boats with 3.5–4 m length and 40–60 horse power engine (Fig. 2). The cruises were done during day time from 5 AM to 2–3 PM. Vessels were equipped with two or three drift gill nets (locally named Semari) with a 55 fathom float line and lead line (1 fathom = 183 cm), 3.5 fathom height, and 20 mm mesh size (Bar). The monofilament nets were also made of knotted polyamide with a twine size of 1 mm Ø (Fig. 3). A total of 54 landings were censused. A fishery dependant survey was done with: (I) sampling catch composition for each landing and (II) oral interviews with IUU fishers, in partnership with HFO (Hormozgan Fisheries Organization), to estimate the fishing effort (Ambrose et al., 2005). The catch of landings was quantified and identified to the lowest possible taxonomical level (Asadi and Dehghani, 1996; Fischer and Bianchi, 1984; Froese and Pauly, 2015; Palomares and Pauly, 2015). In some cases, such as small species, sub-samples were separated to estimate the number of individuals. The following data were collected from all

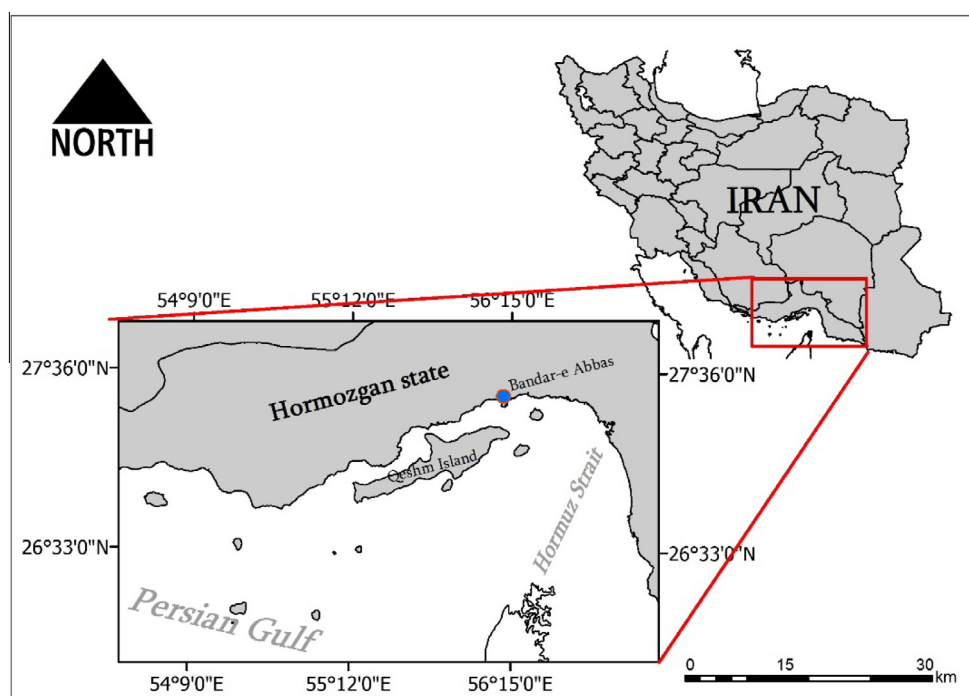


Figure 1 Location of the Hormozgan province in the Persian Gulf.

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