Assessment of the sturgeon catches and seal bycatches in an IUU fishery in the Caspian Sea

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ABSTRACT

The paper presents a quantitative assessment of sturgeon catches and related Caspian Seals' by-catches of the illegal sturgeon fishery in the region of Dagestan and the Volga River Delta in Russia. The study uses semi structured interviews, direct observations and informal conversations to collect data and estimates that about 10,491 kg of sturgeons were caught with 788 seals of by-catch during 35 trips conducted by 15 boats in the period of 2013–2016. The results show that both IUU sturgeon catch and the rate of bycatch seals have not demonstrated significant change since 2013. However, the rates of seals by-catch have increased since the studies in 2008 – 2009 and may be recognized as the one of the biggest entanglements of pinnipeds as by-catch.

1. Introduction

Illegal harvesting of natural resources is one of the most crucial issues in modern conservation theory and practice [12,25]. Some of the most challenging systems to study are artisanal, small-scale, fisheries where illegal activities have become the only livelihood strategy for local fishermen [23,28], since in contrast to legal fisheries, it is seldom possible to directly quantify catches and by-catch by independent observers, either on board or at landings.

This article presents the data gathered on illegal sturgeon fishing and related Caspian seal by-catch in the artisanal small-scale fisheries of Caspian Sea. Recently it has been recognized that illegal, unregulated and unreported (IUU) catches have driven rapid depletion of all six Caspian sturgeon species [30,33], and that by-catch in illegal sturgeon fisheries is a major cause of mortality for the endangered Caspian seal (*Pusa caspica*) [6]. However, to date there has been little attempt to estimate IUU sturgeon fishing based on field data. Therefore this article should be considered as a response to an urgent need to obtain a rigorous assessment of IUU sturgeon fishing activities in the Caspian in order to help in rebuilding the local sturgeon stocks [43].

Thus, the goals of the present study were: (i) to quantify the rates of illegal sturgeon catches caught by sturgeon fishing brigades (SFBs) and seal by-catch in the Caspian illegal fisheries, i.e. to identify the high-risk gear for sturgeons and seals, to identify the rates of sturgeon catches and seal by-catch in relation to season, type of fishing gear and type of

the SFB; (ii) to evaluate potential changes in seal by-catch rates to those reported by Dmitrieva et al. [6] for 2008-9.

The paper begins by introducing the conceptual frameworks, then describing the structure of illegal sturgeon fishing activities in the studied regions and methodology, focusing primarily on the use of anthropological and sociological set of methods. It then sets out the main results, before discussion and concluding remarks close the article.

2. Conceptual frameworks

There are two approaches in the current scientific literature on how to calculate illegal catches and what data one needs to collect in order to obtain more appropriate information on entanglement. The first approach suggests that the use of law enforcement reports, scientific surveys of species abundance, historical data on legal catches, data on catch per unit effort (CPUE) in commercial and amateur fishing and size composition of longline catches, allow bioeconomists and biologists to build statistical models of fish stock biomass, and legal fishing effort [15,24,26,31,32,4,5]. This approach will generally only be viable for quantifying illegal catch activity in well documented, large-scale official fisheries. As Babayan noted, such methods can accurately estimate changes in stock level only if they are based on an initial set of high quality data and free from abnormally evolved values (outliers) [2].

A second type of methodological approach has been developed by

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social scientists pre-occupied with studying artisanal fisheries. Gavin et al. [12] identified eight different techniques on how to study illegal resource use: law-enforcement records, indirect observation, self-reporting, direct observation, direct questioning, randomized response technique, forensics, and modeling [12]. Some of them coincide with methods usually used by bioeconomists (law-enforcement records and modeling), but others are completely new for researchers, who only recently paid attention to the use of such techniques when studying the covert nature of illegal fisheries [22,23].

Catastrophic declines of all six Caspian sturgeon species and related high rate of Caspian seal by-catch gave a rise to the interest in how to find appropriate methods in order to estimate at least approximate scale of IUU catches in the case of the Caspian. Babayan et al. based on initial field research done by Zykova et al. [1,2,44] generated the index of "poaching fishing effort" comprising total length of confiscated gillnets reflected in law-enforcement reports. These authors argued that such data complemented by data on biomass of fish stock, obtained through scientific surveys of species abundance, would allow researchers to better use the statistical models when estimating the scale of the IUU catches (Ibid., p. 24).

However, since the middle of 1990s all law-enforcement authorities in the Caspian have been involved into the local criminal networks that resulted in forming tight corruptive linkages between fishing communities and regulative bodies. Despite the fact that the state tried to improve the situation by implementing the reforms, corruption has remained to be the strong obstacle for researchers limiting access to information bases including the law-enforcement reports.

To overcome such an obstacle Dmitrieva et al. [6] deployed an interview – based approach in order to estimate minimum by-catch rates of Caspian seals in artisanal Caspian fisheries, evaluating seasonal variation and the impacts of different fishing gear. They found that 93% of by-catch occurred in sturgeon fishing gear. With at least several thousand seals being entangled each year, by-catch is likely to be the biggest current source of anthropogenic associated mortality for Caspian seals, potentially compromising the long-term existence of the population [13,6].

This paper suggests that if artisanal small-scale fisheries are considered as socially embedded phenomena [41], then understanding the social context of illegal fishing is key to targeting quantification of IUU catches and examining how sociocultural and economic factors, such as migration and transfer of artisanal technologies, influence the structure of IUU catches arising from illegal fishing.

3. Illegal sturgeon fishing in the Caspian: structure and state policy responses

The recent attempts made by the governments of Russia, Azerbaijan and Kazakhstan to reform the sector has reshaped the organisational structures of fisheries. Thus, the current affairs in the Caspian Sea fisheries could be represented by a threefold model: 1) the regulated fisheries for fresh-water fish, driven by licensed private or state/owned enterprises, in agreement with existing fishing regulations, fishing seasons, issued quota and etc.; 2) hard forms of organised poaching that target sturgeon for meat and caviar; 3) soft forms of poaching, unregulated fishing, typically inshore, conducted without required licenses [9]. The second model of organised poaching is the most important when dealing with sturgeon poaching. Sturgeon fishermen are typically conceived of as, unregulated, representing artisanal small-scale fisheries, comprising a single boat owner, 3–4 members of crew, operating on self-manufactured small boats (bayda) with lengths up to 11 m, powered by outboard engines up to 500 hp (see Fig. 1) (not 1000 hp as mentioned by Dmitrieva et al. [6]. Organised sturgeon poaching consists of two social organisations: SFB and bayda as a part of SFB. All SFBs could be subdivided into two types: international (multiethnic) that includes fishermen with different ethnic background and kinship (monoethnic) that consists of fishermen with their origins

Fig. 1. Self-manufactured boat, so-called bayda is the small open motor boat between 3 and 11 m in length powered by outboard engine up to 1000 hp.

mainly from the same ethnic group.

Taking into consideration that SFB is a social organisation within a local fishing community [9], authors of this paper point out that changes occurred in the local social structure since the middle of 2000s, have indirectly influenced their fishing activities in the Caspian and, accordingly, the rates of sturgeon catches and seal by-catch. The main changes that have led to critical depletion of sturgeon population resulted from the mass migration of fishers from Azerbaijan to Russian Dagestan started immediately after the USSR collapsed and just increased after economic crisis hit Azeri economy in 1998 [7], and, consequently, introduction of bayda and self-made fishing gears into local fishing practices. Thus, Azeri fishers have become the founders of international (multiethnic) type of SFB. The number of international SFBs is a subject of continuous changes and highly depends on specific seasons. Many fishers have part-time jobs in other regions of Russia or in localities close to fishing settlements and do sturgeon fishing from time to time [18]. Some members are often attracted by higher incomes and move to other SFBs. Kinship (monoethnic) SFBs are formed by local Nogais, who were deported there from steppe areas during the 1940s. Currently, researchers see kinship SFBs as more coherent and tightly knit than international one in that their members are fully engaged with their work and are able to use remittances transferred from Nogai labor migrants working in the far north of Russia as investments into illegal fishing activities that allow kinship SFBs to constantly renovate fishing equipment and local fleet [8].

The members of SFB use different types of fishing gears. According to our study, the most common type of gear were gillnets with mesh-sizes ranging from 30 mm to 250 mm depending on target fish species. Sturgeon fishing is usually conducted with nets of 110–250 mm mesh-size, set in water depths from 1 to 30 m [6]. Fishers also use self-manufactured fishing gears limited by activities in the Caspian. First of them is tjchalka could be described as hook-lines comprising self-catching unbaited hooks which are attached to the main line (see Fig. 2). There are two types of tjchalka mostly common in the Caspian: river tjchalka that sets in the estuary of the rivers and entangles sturgeons if they pass through the line and open sea tjchalka that sets in the shallow sea waters which are common in the Northern Caspian. The second is kalada that represents hook-lines with the sprat fish used as fishing bait covering an area of several kilometres and mostly used at sea. Usually fishers at SFBs use either the only gillnets or combine gillnets with the use of kalada or tjchalka depending on fishing skills and the area of sea where the boat operates.

In addition to unregulated organised sturgeon poaching there is ineffectual management strategies of official fisheries that along with organised sturgeon poaching led to critical depletion of sturgeon population in the Caspian. Thus, as it is shown in Table 1, beluga has shown the sharpest decline among sturgeons since the beginning of the 21-st century. As Khodorevskaya et al. noted, the rates of illegal take of