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On *super fishers* and *black capture*: Images of illegal fishing in artisanal fisheries of southern Chile

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A B S T R A C T

Illegal fishing (IF) is an unrelenting problem for small-scale fisheries governance worldwide, one with complex causes and solutions. This study explores stakeholders' images on IF as a way to understand its underpinnings and persistence. As an apt illustration, the king crab (*Lithodes santolla*) fishery of the Magellan region, Chile, was chosen, which operates under a semi-open-access regime. The results from two-year ethnographic research reveal four powerful images, as they literally emerge from stakeholders' narratives, comprising a series of practices that are branded in these particular terms: i) *super fishers*, which refers to owners of authorized vessels, who land the capture of unauthorized ones; ii) *whitewashing*, which involves the "whitening" of catch coming from unauthorized vessels or extracted in anticipation of the fishing season; this unreported capture can enter the export chain; iii) *cooked on board*, which involves the processing and packing, while at sea, of banned undersized or female crabs, which are later sold locally; and iv) *black capture*, that involves the landing of alive banned crabs in unauthorized ports, that are later processed in households and sold locally. These images suggest that IF is a relational phenomenon; this is to say that it is distributed on a series of relationships, practices, and actors embedded in a particular geographic and cultural context. As such, IF is difficult to dismantle, since changes do not depend on the ideal behavior of one actor -"the ethical fisher"- but on transformations of intertwined practices of all actors across the value chain.

1. Introduction

Illegal, unreported, and unregulated fishing (illegal fishing, IF, hereafter) is acknowledged as one of the largest threats to fisheries sustainability worldwide [1,2] and is not only an issue regarding industrial fleets at high seas, but it also affects small-scale fisheries [1,3].

The three IF categories become meaningful when there are formal rules and a governing system attempting to preserve fish stocks from over-exploitation. In this context, IF is considered a governance weakness in itself, along with corruption, poor stakeholder participation, and poor enforcement [4], and it falls into the category of wicked problems. Wicked problems are characterized by complexity [5], uncertainty, interdependence, and dispute [6–8] and therefore they should not be addressed through stronger regulations or technical measures alone, as proposed by the traditional deterrence-based model.

An alternative view to this model has been provided, for example, by the interactive governance theory, which recognizes that "images" held by stakeholders on IF may have a significant influence in governance outcomes [3,9].

Images are a broad term that can encompass other analogous ideas, such as mental models, worldviews, and beliefs. In this paper images are defined as specific social representations arising from practices that involve behaviors and habits, delineated by the context in which they are embedded. This definition presupposes that IF should be analyzed as a relational phenomenon. Relational approaches try to change and overcome the traditional dichotomies of social and political sciences (structure vs. agency, knowing vs. acting, human vs. non-human) by regarding everyday reality in terms of continuing events and dynamic processes produced by recursively related human and non-human elements [10]. A central feature of relational approaches to policy analysis is that they work in close interaction with the everyday world of public policy and society.

The concept of image has gained importance in the literature and in practice for several reasons [3,9]. Firstly, an erroneous picture of fisheries practices can mislead governance effort into undesirable consequences. Secondly, images can display discrepancy among different

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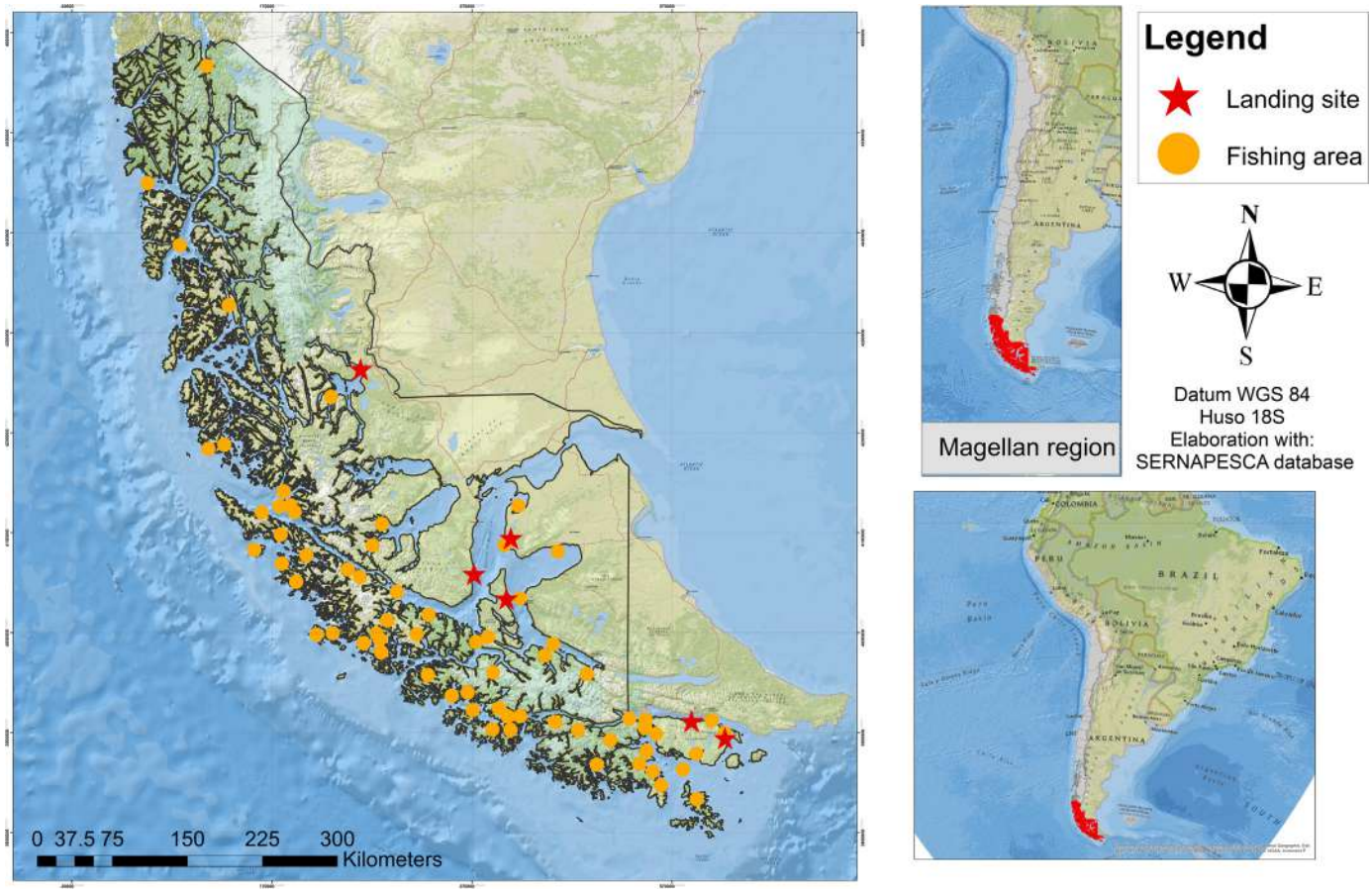

Fig. 1. Study area in the Magellan region, Chile, showing Chilean king crab fishing areas (dots) and landing sites (stars).

stakeholders, making it difficult to find a common ground and, eventually, leading to misunderstanding and confrontation [11]. Thirdly, the discursive power and hegemony of some images need to be recognized and elucidated for governance measures to succeed [3]. And lastly, images have a potential predictive value. While practices and experience shape people's images, the converse is also true because people can be driven by their ideas held in their images [9]. The Tragedy of the Commons as devised by Hardin [12] is unquestionably the most influential scientific image governing fisheries—and maybe common pool/access natural resources in general.

Being IF a sensitive topic, this first exploration for the king crab (*Lithodes santolla,* Jacquinot, 1844) fishery of the Magellan region (Chile) does not intend to quantify infringements with any degree of accuracy, less so to single out specific responsibilities. Infringements are known to take place in different forms and some transgressions are detected but others go unnoticed. Instead, the study focuses on the potential range of images on IF, their underlying causes, and the pathways to solutions, as they emerge from the narratives of stakeholders themselves. As an explorative and descriptive case study, it is intended (i) that the findings be illuminating in describing the specific functioning of IF in the Magellan region rather than generalizable to other contexts, ii) that they are informative to users, who can decide to what extent they echo with their own context, and (iii) that the findings raise issues for further examination by those involved in fisheries research and management.

Chile offers an interesting case study to explore fisheries governance in general and IF in particular. Chile is one of the countries with the largest number of fisheries regulations in Latin America [13–15]; yet in June of 2017 the Director of the National Fishing Service (SERNAPESCA) acknowledged that IF could quadruplicate legal capture in some important fisheries [16]. This recognition is supported by the evidence provided by scientific studies that report IF for several species [17,18], which nonetheless do not include Magellan fisheries.

At the same time, several Chilean artisanal fisheries are strongly market oriented as a result of 40 years of free trade and market-driven economic policies [19]. Therefore, the effect of an increasing global demand for seafood and the role of key foreign stakeholders on IF (processors, importers, retailers, and consumers) cannot be overlooked [20].

From the early 1990s Chile embraced the rights-based fishery management as the main policy option to govern fisheries [19], which relies on key instruments such as Total Allowable Catch (TAC), Individual Fishing Quotas (IFQs), Individual Transferable Quotas (ITQs) and Territorial User's Rights in Fisheries (TURFs). This rights-based orientation guided the design of the main legal body governing Chilean fisheries resources to date: the 1991 Fishing and Aquaculture General Act (FAGA) and its updates. Along with implementing the above instruments, the 1991-FAGA aimed to halt fishers' mobility and restrict the number of new artisanal fishers, through a registration system (Artisanal Fishing Record, RPA in Spanish) that legally limited fishers to one specific region. By law, the RPA can be closed by the authority when a fishery is declared assimilated to a state of full exploitation. The government can exceptionally open the RPA to new members in order to accommodate fishers' strong beliefs that marine resources belong to all [21].

As a member of the FAO Committee on Fisheries, in 2004 Chile implemented the National Action Plan within its national fisheries policy as a voluntary measure to prevent, deter and eliminate illegal, unreported and unregulated fishing. The national authorities involved in the application of the Action Plan are the Ministry of Economy, through SUBPESCA (Fishing Under Secretariat) and SERNAPESCA (National Fishing Service); the Chilean Navy, through the General

Direction of the Maritime Territory and Merchant Navy; the National Customs Service; and the Ministry of Foreign Affairs, through the Division of Environmental Affairs.

At present, a modification to FAGA is being discussed by legislators for the second time, which widens SERNAPESCA's attributions to sanction illegal fishing and recognizes the responsibilities of all agents within the value chain, focusing on post landing monitoring in order to target all those who profit from illegal fishing (Law Project N° 10483–21).

2. Study case

2.1. General context

The Magallanes and Chilean Antarctic Region (54°5′46.42" to 56° 9′2.85" S; 73°13'15" and 66°2′57.28" W) (hereafter referred to as the Magellan region) is the southernmost region of Chile and it is comprised of an extensive territory, with a coastline of gulfs, canals, estuaries, and fjords (Fig. 1). The population of the region is estimated at 165,593 residents [22].

In 2016, 5959 artisanal fishers were formally registered in the Magellan region, representing 6% of the nation's total (98,798). According to SERNAPESCA (2018), the RPA of vessels authorized to extract king crab in the region would include 591 active small and mid-size extractive and carrier vessels.

FAGA defines artisanal fishers as individuals that, in a personal, direct and habitual manner work as artisanal fishers and it distinguishes the following categories; i) vessel-owner (“armador”); ii) shell fisher and seaweed gatherer; iii) diver; and iv) artisanal fisher as such. A fisher may be ascribed to more than one occupational category.

The artisanal fleet is heterogeneous, ranging from deckles vessels (V-shaped hulls without decks), usually less than 8–10 m in length, with or without outboard engine, to small and mid-size vessels (“lanchas”), with a maximum length of 18 m and 50 gross tons of storage capacity [19].

FAGA also acknowledges intermediaries (“acarreadores”), which fit within the same category as vessel-owners when they own a transporting vessel that carries the catch from fishing vessels to landing ports. The FAGA decreed an artisanal exclusive zone of 9.3 km (5 nautical miles) wide (water column and sea bottom) as the area of operation of artisanal fishers [19].

2.2. Chilean king crab fishing

The king crab fishery is formally registered since 1961 in the Magellan region, although there are historical records of uninterrupted extraction from before the arrival of settlers at the end of the 19th century, until today. The authorization to extract this crab is made through a RPA for vessels with an assigned owner. This permit is species-specific and non-transferable. The vessel-owner hires a fishing crew which is composed of at least one skipper and 2 or 3 crew members.

The RPA for king crab is currently closed and therefore the entry of new vessels is only exceptionally possible. If a registered owner renounces her/his RPA or dies, it is possible that this RPA be legally transferred firstly to another family member or other fisher.

Besides the RPA, there are no annual fishing quota or sea-zoning exclusive allocations such as TURFs for king crab in Chile.

Fig. 2 shows the evolution of new permits (RPA) for king crab since 1992, associated to the enactment of FAGA. The registry has been closed several times during this period, being the last transitory closing in 2014. Each time a vessel undergoes a structural modification (e.g., enlargment of the cabin) or changes ownership, it is granted a new permit. Thus the numbers on the top of the bars in Fig. 2 can be truly new vessels or old ones with a new registration.

Fig. 3 shows national total landings since 1961, the Magellan region's landings since 1974, and the first transaction regional prices

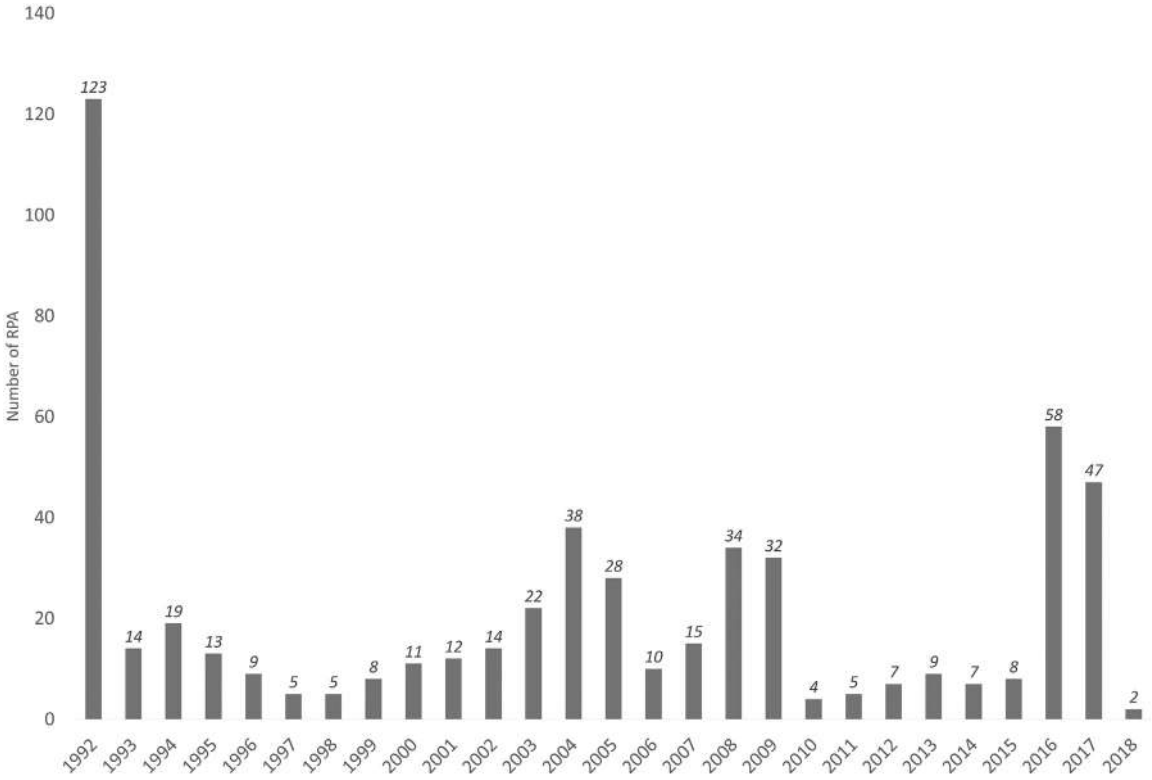

Fig. 2. Evolution of the artisanal fishery registry (RPA) permits granted to vessels to extract king crab in the Magellan region since 1992. On that date 123 vessels were registered that corresponded to the entire operating fleet at that time. In 2014 the RPA was closed and since that year the active legal fleet has been 593 vessels. Source: SERNAPESCA 2018.

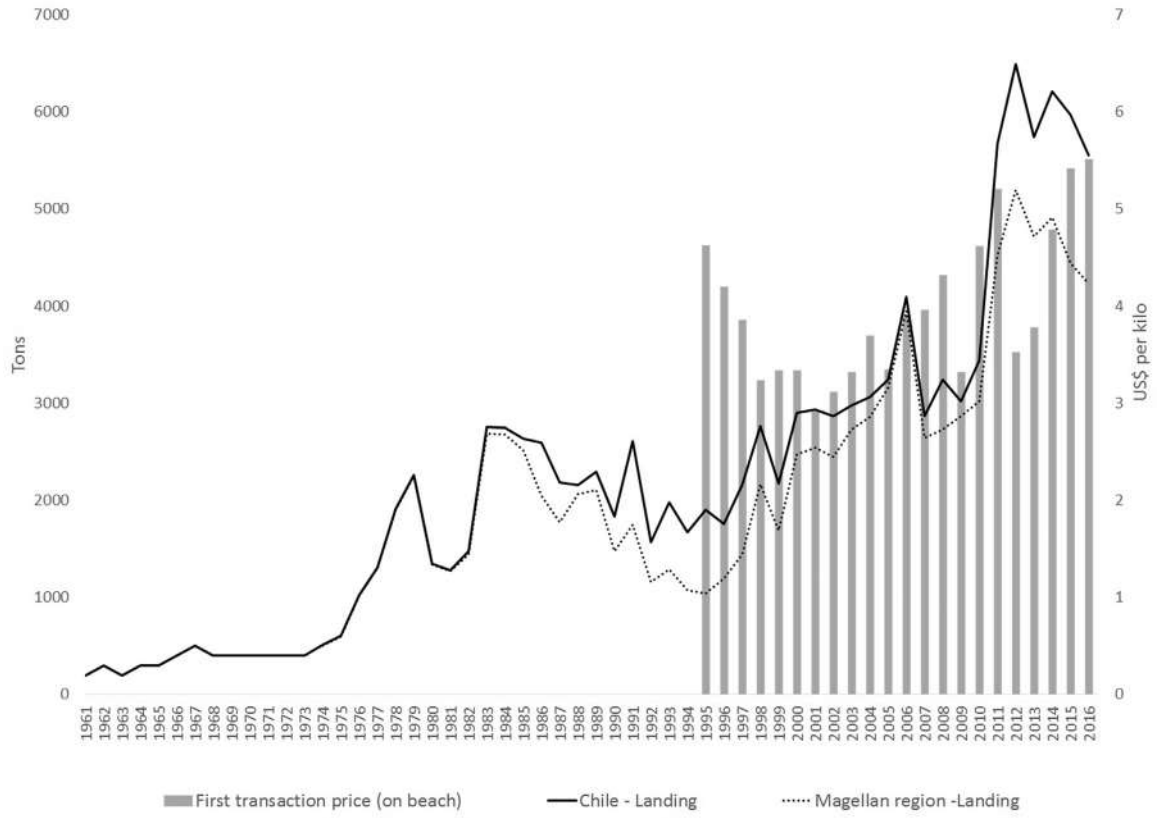

Fig. 3. Evolution of the landings of king crab in Chile and the Magellan region and the value of national exports in millions of US dollars. Source: SERNAPESCA (2018) and INE (2018).

since 1995. National and regional landings reached a historical maximum of 5193 metric tons in 2012, whereas prices have fluctuated between US$ 2.91/k in 2001 and US$ 5.51 per kilogram in 2016.

The king crab fishing operation begins on June 1st and ends on November 30th, with a small adjustment of dates each year. During this period the vessels depart to the fishing zone (30–60 h of navigation) and generally do not return to port during the whole season. The ban on king crab begins on December 1st and ends on May 31st of the following year.

At the fishing zone, crabs are captured with iron traps -which is the only fishing gear presently allowed- and then transferred to hauling vessels that transport them to port. Once landed, the fisheries inspection authority checks that the specimens are males, have a minimum length of carapace of 12 cm, and are alive. Subsequently, crabs are carried to processing plants located in different cities of the region.

3. Research approach and data collection

3.1. Research stages

The research is a case study that takes Chilean king crab artisanal fishery as an “apt illustration” on the functioning of IF in the Magellan region, although conceptually some of the identified problems apply to fisheries elsewhere and to other scales of fisheries governance. An “apt illustration” is a type of case study offering a description of some event, occurrence, or process in which the operation of some general theoretical principle is clearly illustrated [23].

The study is part of an investigation (2015–2020) into the human dimensions of coastal and marine socio-ecological systems in the Sub-Antarctic region of Chile, initiated in December 2015. The article reports the results from an exploratory research phase, which in the context of researching a sensitive topic such as IF, demands a qualitative approach to build both mutual trust between researchers and informants and a deeper understanding of fishing practices that help us in the correct interpretation of the data. The approach comprised ethnographic field observations, participant observation, informal and formal interviews.

Stage 1 (2015–2016) involved the research team becoming familiar with the specific characteristics and problems of artisanal fisheries in the Magellan region and relied on formal and informal interviews, complemented by a thorough revision of historical and press sources. Stage 2 (2016–2017) involved participant observation by one of the authors through her formal involvement as guest member in the public-private stakeholder platform “Management Committee for king crab and snow crab (*Paralomis granulosa* Jacquinot 1847) of the Magallanes and Chilean Antarctic Region”, since December 2016. In this committee we adopted a “participant as observer stance”, where the researcher is a member of the group being studied, and the group is aware of the research activity [24].

Stage 3 (2017–2018) involved the application of a structured interview with open questions that aimed at reconstructing the problem of IF and covered aspects such as awareness, perceived causes, effects on stocks, most frequent infringements, conflicts among legal and illegal fishers, the nature of IF itself, and perceived solutions. The instrument is provided in a Supplementary material (SI Appendix 1).

The interview was structured around 5 sections covering stakeholders’ representations on different aspects of IF. The first section corresponded to the identification of the interviewee in terms of her/his experience in the fishing sector from her/his respective status. The second section was focused on the definition and reconstruction of the IF problem, including the level of concern, the perceived seriousness, and its causes and effects. The third section focused on regulations and infringements and interactions between legal and illegal fishers. The fourth section centered on the perceived responsibilities of different

stakeholders on the problem of IF. Finally, the last section focused on spaces of dialogue around the problem, participation level, and potential solutions to IF.

After a pilot version applied in May 2017, the final interviews were carried out by two of the authors between June and July of 2017. The non-random technique of purposive sampling was applied to get in-depth information from a small number of interviewees of four main categories of stakeholders. A random sampling from a defined list of primary stakeholders was not feasible due to privacy concerns, but given the degree of trust and mutual understanding achieved in stages 1 and 2, the impossibility to adopt random sampling should not undermine the main goal of the research. Interviewees ($n = 23$) comprised the following groups: i) Group 1 was integrated by 10 artisanal fishers, mainly of king crab, including fishers as such, vessel-owners, and fishers' leaders; ii) Group 2 included seven state representatives covering research, enforcement, management, and policy making agencies; iii) Group 3 was represented by one NGO representative and one University researcher; and iv) Group 4 included four processing plants administrators and market intermediaries. The relative proportion of each category of interviewees is consistent with the universe of licensed vessel-owners (591), king crab processing plants (12), NGOs (7) and state agents (seven main agencies) involved in IF in the Magallanes region. In applying a purposive sampling, what matters is the point of discursive saturation produced within certain cultural domain by knowledgeable experts/people [25]. This point does not depend on the statistical representativeness of the sample, but on the socio-structural coherence of the discourse and the qualities the informant possesses for the researched topic.

Interviews were audio recorded and specific notes were taken. A key ethical consideration was to grant confidentiality and anonymity, which was explained in the written consent.

3.2. Data analysis

Data analysis comprised two phases: i) An inductive phase by which general local knowledge on fishing practices was obtained through field observations and interviews; ii) a deductive phase where codes were used to reduce the data from interviews and derive IF images, perceived causes and envisioned solutions. Data from informal and formal interviews were transcribed, read and interpreted by five of the authors using the approach of collective hermeneutics [26]. Interviews were labeled with the number of the interviewee group (G1 to G4) and their correlative number (N1 to N23).

4. Results

4.1. Illegal fishing as a relational problem

Stakeholders widely agreed that IF is a problem for king crab sustainability in the region and several infringements were identified (Table 1). The infringement recognized as the most common was the use of non-permitted fishing gear (nets).

Table 1
Most common infringements for the case of king crab in the Magellan region.

Infringement	Description
Fishing gear	Use of nets when only iron traps are allowed, particularly in the last two months of the season when males are moving in search of females and prices set by processors are higher
Minimum size	Undersized crabs (< 12 cm carapace length) are captured and not returned to water
Sex ban	Female crabs are captured and not returned to water
RPA	Vessels and/or fishers sail without RPA for king crab
Fishing season	Vessels initiate fishing activities before the permitted date, which implies an unauthorized departure

Illegal fishing is branded by interviewees as a complex problem, difficult to identify and quantify. State agencies remarked the fact that no assessment of its magnitude and effects on fisheries has ever been conducted, and there is a severe lack of information to carry on an evaluation and make management decisions. The idea of a sustained increase in IF over time predominates among state actors. This is very similar to what is perceived among academics and NGOs. In the case of fishers, visions oscillate between those who do not see IF as a relevant problem -they do not declare it as such-, and those who have built a representation -recurrent in most of the fishers interviewed- of IF as a problem but not the most important of all.

In as much, the private sector representatives do not acknowledge IF as a serious problem in the region. In an extreme, one processor's representative considered IF to be a "discourse" rather than a real problem (G4-N11).

Stakeholders opinions on the seriousness of IF were varied and often contradictory. Under qualitative criteria, three arbitrary levels of "seriousness" of the problem (low, medium and high) were identified, where low implies that the interviewee did not build an image of IF as a real or significant problem, medium implies the recognition of IF as a real and perhaps important problem, but one more among others and, finally, high implies that IF was recognized as the main problem for the fishery in the region.

Illegal fishing was recognized as a problem for different reasons, but its impact on stocks was the major one (Table 2). The presence of unregistered vessels would mean a direct increase of fishing effort, subsequently leading to higher extraction levels, and possibly inducing overfishing. As illegal extractions are not declared or declared inaccurately, official data on landings, fishing effort and biomass estimations become untrustworthy, impeding the design of adequate policy measures.

The majority of stakeholders had a comprehensive knowledge of illegal practices occurring within value chains. Illegal fishing involves a series of unauthorized exchanges from the port of departure to the fishing grounds and back, most of which are almost impossible to trace by enforcing agencies.

King crab fishing (alike other fisheries in Chile) operates through the informal up-front financing of the fishing operation, a practice that is known as "enabling" ("habilitación" in Spanish) or "advance" ("anticipo"). Enabling represents a verbal agreement that compels the vessel-owner to deliver a certain amount of crabs to a specific intermediary or processor. These verbal agreements become unaccountable for local public authorities.

As stated by a fisher: "When you ask for an advance you are insuring your delivery, because otherwise I could come loaded with product, but if I am not engaged to any processor, they will not receive my catch; they will receive directly from those who are already indebted" (G4-N20).

These arrangements are the result of a highly concentrated and monopolized value chain. Expressions of processors' market power are for example the following: i) only processors sell bait, which is very scarce in the region; ii) processors set prices during the fishing season, without intervention of fishers' unions; iii) processors can operate their own transport vessels, which is seen by fishers as an unfair competition.

The distribution of profits within the fishing operation is also an informal agreement between the vessel-owner and his/her crew. Usually the owner gives 10% of the profit to each member of the crew and a percentage a little higher to the skipper. This payment modality is usual in Latin America and other places such as the Mediterranean, and it is known as "system of parts" (o "sistema a la parte" in Spanish) [27].

4.2. The images of illegal fishing

Images are understood here as specific social representations arising from practices in a certain field of action. They involve behaviors, habits and cultural repertoires delineated by the context in which they are

Table 2
Depiction of the problem of IF from stakeholders' narratives.

Interviewee	Perceived seriousness of IF	Reasons why IF is a problem	
G1: Fishers	Medium	Leads to overfishing	"I think crabs are being exploited. There are many vessels working with a lot of material [traps and nets], in order to get more product"
		Promotes disloyal competition	"the competition is disloyal; while I have to comply with certain amount of rules, the other [the illegal fisher] does not comply with any"
G2: State	High	Leads to overfishing	"no doubt that the unauthorized catch of female crabs is affecting or could affect the renewal of the population because it is removing the eggs"
		Creates perverse incentives	"illegal fishing is a problem for the State, because it generates perverse incentives that increase the rate of exploitation, which leads to unfair competition"
		Impedes truthful stock estimations	"If you ask me today, how is the king crab fishery? I have no idea! That is, I cannot tell you anything in quantitative terms, based on a report or something, or a mathematical model"
		It operates as a well-organized institution	"Illegal fishing exists because there is a very good structure, an organization within the illegality that has not been detected"
G3: NGOs and academics	High	Impedes truthful stock estimations	"fishers could be extracting more than statistics report, and that is a problem for management"
		It has consolidated an illegal local market	"The local community is buying the resources … the gastronomy sector continues to promote products that are seasonally banned"
G4: Processors and intermediaries	Medium low	Leads to overfishing	"the magnitude of illegal capture is irrelevant! When processing plants start to export illegal product and be able to "whitewash" the capture, then those volumes will be important"

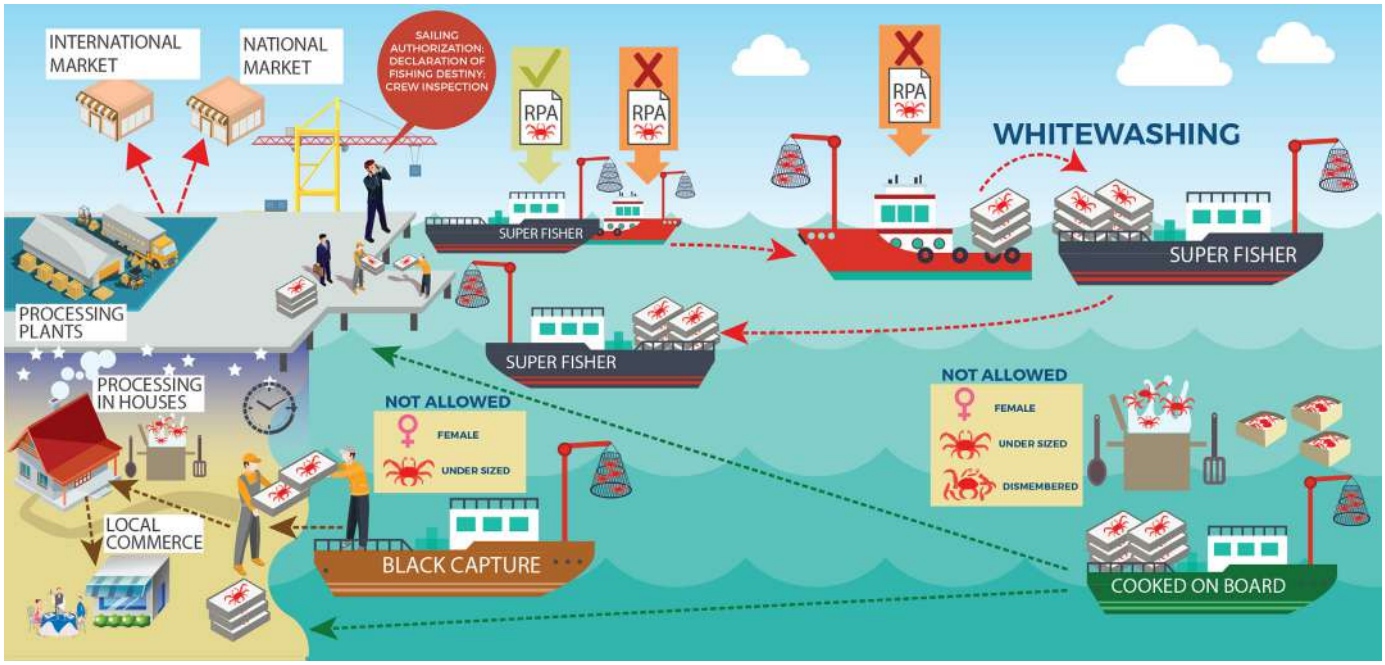

Fig. 4. Images of illegal fishing in the king crab fishery of the Magellan region.

embedded. The following are the predominant images, as they literally emerge from the ethnographic data, and which comprise a series of practices that are branded in these particular terms (Fig. 4).

4.2.1. Image 1: whitewashing ("Blanqueamiento" in Spanish)

This transaction involves vessel-owners and intermediaries and it occurs in three different ways. The first involves the transfer at sea of crabs from vessels without RPA to fishing or carrier vessels with RPA which "whitewash" the undeclared catch and land it and deliver it to processing plants as legal. A second form is the handing over of landing documents from an authorized vessel-owner to an unauthorized one, such as the latter can commercialize his/her capture as legal. And a third and minor form is through the so-called "cloned vessels" which refers to the fabrication of a copy of the RPA belonging to an active vessel to be used by an unauthorized one, such that both can extract and land catch as legal.

Whitewashing practices are considered the most important in terms of volume, the most difficult to control, both at sea and landing ports, and the ones with more serious implications for international business as long as illegal capture can enter the export chain.

Whereas whitewashing practices directly involve vessel-owners and carriers, some respondents pointed at processing plants as part of the problem. Specifically, those plants processing large quantities of crabs and located on areas benefited by legal franchises for extreme zones through the Navarino Law (municipalities of Porvenir, Primavera, Timaukel, and Navarino) are identified as those less concerned with the origin of captures as one intermediary stated: "those plants processing 1000 t for example and moreover receiving a benefit from the State, obviously do not care where the crab is coming from" (G4-N13). In turn a fisher said: "In the end, the plant is interested in illegal fishing because it is cheaper, because they can sell more, because they will have more product; ultimately, illegal fishing can enter the production lines

of processors and be sold. In the end, we can all cheat" (G1-N2).

4.2.2. Image 2: super fisher ("Super pescador" in Spanish)

Super fishers are authorized fishers (vessel-owners and carriers with RPA) landing unreported illegal capture as legal. In other words, they are the ones undertaking the whitewashing. The local label of "super fishers" refers to the fact that their catches exceed their landing capacity (vessel size, crew size, and fishing gear).

As in the case of whitewashing, the presence of super fishers is sometimes justified on moral and solidarity basis. As the sector is mainly dominated by fishing families and networks of close friends, fishers without RPA are "helped out" by legal fishers, as one fisher stated: "It is over 10 years that the records [RPA] are closed and that super fisher, who does it out of solidarity—because many times he does not even earn money—is getting all the blame today. But these super fishers are sometimes the relatives who are helping those who are not registered and have to eat" (G1-N18).

This could explain that no denunciation of infringements prevails among fishers, a social practice that is strengthened by kinship, which in Chile characterizes many artisanal fishing communities. Yet, no denunciation is not only sustained on solidarity basis but also on two other facts: i) illegal and legal operations do not interfere with one another in the Magellan region since king crab is still abundant; ii) the distinction of legal and illegal fishers is ambiguous and ever-changing. As stated by one interviewee: "there are legal, legal-illegal, and illegal fishers" (G4-N13).

On this respect, a State interviewee indicated: "Today I [impersonating a fisher] am against illegal fishing, but two years, five years ago I was the king of illegal fishing. It is a cyclical thing, not a categorical one" (G1-N1).

4.2.3. Image 3: cooked on board ("Cocinado a bordo" in Spanish)

This image comprises a set of practices that involve landing of processed (cooked and packaged) product from banned undersized and/or female specimens. This product can be landed at authorized ports at night, where it escapes supervision, or at unauthorized ports and it is sold door-to-door all year long. As opposed to whitewashing, that would benefit vessel-owners and carriers, "cooked on board" products complement the income of crew members.

Respondents acknowledged that there are local networks in which these crab products are distributed, often sold by the family of the fisher or her//his close contacts. Thereby, local consumption of illegal products is not seen as wrong, but naturalized instead. Lack of local markets and unaffordable crab prices are the main reasons for local consumption of illegal extractions. A State interviewee stated: "Each fisher is making his illegal share to sell and when they arrive at port they disembark it in small jars and plastic trays, and sell them".

4.2.4. Image 4: black capture ("Pesca negra" in Spanish)

Whereas this image could comprise all the previous ones, it covers an additional practice, which is the landing of alive undersized and/or female crabs at unauthorized ports. This capture is sold to local intermediaries and is usually processed in private households. Alike the cooked on board product, black capture is destined to supply local markets and there is no information on its commercial value. A State representative mentioned: "Restaurants are selling illegal products all year round and they have always done it; this means that someone does not control and that someone does not care; it is complicated, but it is almost institutionalized".

4.3. Causes of IF and paths to solutions

The images of IF are linked to several causes that are synthetized in Table 3. The four causes presented are the most prevalent in the narratives but not the only ones.

Representations of the causes are different and even contradictory,

Table 3
Representations of illegal fishing by the different stakeholders.

Cause	Fishers	State	NGOs and academics	Processors and intermediaries
Market demand and prices (regional and global)	- "king crab is highly valued; it is sold very easily in illegal trade" - "the good price that is paid out of season [December]"	- "the economic value of the product" - "the processors commit illegalities; they are part of the system"	- "the demand from the gastronomic sector and the local community" - "The economic interest, given the value of the products in the market"	- "there is a high demand from processing plants". - "there has been 5 years since the king crab price increased a lot"
Need, lack of opportunities, and culture	- "the lack of permits in the last 10 years [RPA]. - "the new generations have no choice but to fish illegally" - "because of friendship; fishers always try to help the one who has less"	- "necessity; lack of opportunities" - "it is a cultural thing of the fishers themselves"	Without mentions to needs	- "fishers have economic needs and have a good understanding of the damage that the IF can cause" - "the illegal fisher has to engage in illegal practices to feed his family"
Low monitoring and enforcement (fishers) Monitoring difficulties (public agencies)	- "the illegal product can be delivered because there is no inspection" - the processors pressured the government and the government dismissed all the inspectors"	- "the geographical extent of the region, impedes effective control" - "we are unable to supervise without naval or aerial means" - "at sea there is no way! [to control IF]. Fishers spot you from afar and throw the illegal catch into the water"	Without mentions to monitoring	- "the way of monitoring is difficult". - "it is a problem of monitoring and enforcement"
Stringency of regulations	- "the records (RPA) have to be opened so that people can register in the region" - "I know many divers who do not have permission because they have not completed high school"	Without mentions to stringency of regulations	- "Closing of the fishery records". - "Obligation of schooling for fishers". - "between fishers, public and private institutions there is no common language about regulations".	- "[there are] problems of corruption" - "without control and clear sanctions, the industry is not regulated".

but there is consensus on the role of market demand and king crab' s high prices as triggering factors.

Asked why prices promote infringements, fishers point out at the necessity, which appeals to the universal value of "survival" and the reproduction of their own ways of life, beyond the norm—maintain families, camaraderie, help those who have less. These needs are also recognized as an important driver of IF by State agents.

Whereas the need to work and sustain a family is a prevalent answer, interviewees also recognize that over time, fishing has become a profitable business where millions of Chilean pesos are traded each year. Indeed, a king crab fishing operation can render near US$ 100,000, based on 2016 total landings, number of vessels, and average season prices (US$12 $\times$ k^{-1}).

The third causal explanation is the lack of monitoring and enforcement capacity, which responds to a combination of geographical conditions and lack of resources which are considered precarious given the size of the region (G2-N2).

Finally, the last cause identified by fishers but not shared by State agents, is stringency of regulations, which somehow contradicts the previous cause. Fishers' testimonies suggest that the closure of the RPA has forced them to work without permission. The closing of the RPA is aligned with the precautionary principle of FAGA which entitles the authority to act preventively in view of increasing landings and insufficient information on the species. Yet, is it clear from the interviews that the extent of this measure is neither well understood nor supported by fishers.

As it is common for wicked problems, a myriad of solutions is envisioned by stakeholders and only some of them are consistent with the causes identified. Given the manifold nature of the propositions, these solutions were arranged in six types and thereof treated as pathways to solutions, rather than solutions by themselves (Table 4).

These pathways do not have the same discursive weight among interviewees. For fishers, the most recurrent solution points out to the recognition of "historical rights", a question that implies, from their point of view, opening the RPA to those currently marginalized. That is, to legalize the illegals, a solution that is considered unfeasible for State regulators since it contradicts the precautionary vision of FAGA and the RPA itself, as it could lead to an increase in fishing effort.

The second type of solution on which fishers and State agents coincide, is to improve monitoring and enforcement, that is to say, to increase the efficiency of regulation on the part of State agencies (SERNAPESCA).

The other two types of solutions proposed by fishers, although less recurrently, are the institutional agreements (e.g. the Management Committee) between the parties involved and the cultural change, which could be defined as a change in visions and extractive practices. It is worth noting that State agents considered a cultural change the main type of solution that must be reached.

It is worth noting that a type of solution referred to the market is not emphasized by stakeholders. Market demand and prices are among the main factors explaining the persistence of IF (Table 3) but they have no counterpart on the solutions' side. The only statement that could approach this idea was raised by a researcher from a state agency, who points to the need for self-regulation by processing plants. It is worth asking, to what extent that is possible under the conditions described here.

This situation constitutes a source of uncertainty since it indicates that market factors are outside the control capacity of fishers and the State. In fact, several interviewees stated that IF will not be solved as long as high market prices prevail.

5. Discussion and conclusions

This study focused on the range of images that different social actors hold on IF. The value of the results is threefold: i) gaining empirical knowledge on the relational nature of IF as portrayed by stakeholders themselves; ii) documenting situated explanations for IF persistence; and iii) exploring potential pathways to solutions.

The images of *Whitewashing*, *Super fishers*, *Cooked on board*, and *Black capture* reveal that IF is relational phenomenon within the socio-ecological system; this is to say that it is distributed on a series of relationships, practices and actors, embedded in a particular geographic and cultural context. Such complexity demands taking global market dynamics into account. These markets are an array of distant and heterogeneous agents and however creating direct and often negative stimulus to the intensification of IF in places such as Magallanes.

Images are powerful narrative devices that convey concealed fishing, surveillance and market exchange practices, situationally understood by most stakeholders and therefore revealing a clear sign of relational awareness.

Images involve different relations including trading (e.g., enabling) as well as social relations (e.g., no denunciation; collaboration), showing patterns or particular configurations that are important features of the lives of the actors who display them [10]. The "legal-illegal fisher" is an example of such patterns.

The dissent among stakeholders on the nature of the problem reflects the different representations regarding the various causes of IF, but also the different values they uphold.

There is clear tension between the goals of avoiding overfishing via more rigorous enforceability, ensuring fisher's income and livelihoods, and keeping the export oriented business model.

A prevalent reality from the testimonies, is the usually conflicting duality of fishing as both a business opportunity and a way of life, visions that coexist and are acknowledged by government actors as criteria that need to be incorporated into the policy making process.

The evidence supports that IF is a problem that cannot be tackled if the underlying motives are not properly understood and addressed. In a relational approach, agency – the capacity to act – is distributed in a network of human and non-human actors [28], and so the responsibility cannot lie in a single one—the ethical fisher in this case—, but on the intertwined practices of the many actors involved in the fishing activity.

For fishers IF is a matter of sustaining a livelihood, but in some cases IF has also led to large profits as a result of high international prices. For government agents IF imposes a conflict between their duties enforcing the law and the State's social responsibility towards fishers, a duty that in some cases cannot go against powerful fishers' unions and processor's associations. For scientists and NGOs, IF is a concern that translates in the importance of applying the precautionary principle given the lack of accurate data for assessing the stocks. For Magellan citizens IF extractions are the possibility to access an iconic and tasteful seafood product whose high exporting prices make it unattractive for local markets. In turn, for processors IF is a minor problem on which they declare to have no part, position that is contradicted radically by the testimonies of fishers and some State representatives, who point at processors as interested parties in the occurrence of IF and at international demand as a main triggering factor.

Hence, IF is very difficult to dismantle since changes do not depend on the ideal behavior of the "good fisher", but on transformations of several practices by numerous actors.

Relational solutions therefore go beyond enforcement and strict control. Instead, IF opens up the way of thinking wicked problems as a chance for all actors to explore modes of harnessing emerging opportunities. The technical complexity and social embeddedness of IF, requires the collaboration of all the actors in the value chain as well as public authorities, scientific experts, and non-governmental organizations. Examples of unfolding possibilities in the case at hand is the figure of the Management Committee, which despite its institutional restrictions (e.g., lack of decentralization), represents a concrete interface for most stakeholders to speak out and find a common ground for the fishery's sustainability. It is widely acknowledged that stakeholders' relations are critical in collaborative planning practices [29]. Stakeholders' relations are said to be "the medium for collaborative work"

Table 4
Pathways to solutions for IF as identified by the different stakeholders.

Type of solution	Fishers	State	NGOs and academics	Processors and intermediaries
Recognition of historical rights	- "to sit down at a table with the government; that they recognize us as fishers and give us back what they took from us". - "reopen the RPA and incorporate those licenses that have expired" - "update the documentation of illegals and register new fishers"	Without mentions to historical rights	Without mentions to historical rights	Without mentions to historical rights
Institutional agreements	- "extend the extraction period, reduce the closure, and work all year" - "an agreement that harms the least amount of people"	- "demonstrate short-term and medium-term benefits [of controlling IF]; rethink closures" - "we are all involved; the solution depends on collaboration" - "that the private actors establish clear rules of decision, against illegalities … for example, not buying"	- "norms have to be changed". - "to stablish [stronger] bans to recover the populations"	- "gradually open the RPA" "reach consensus within the king crab and snow crab committee"
Monitoring and enforcement	- "authorities must worry about resources and increase control" - "more effective and unexpected control" - "more control and self-reporting of illegal fishing by fishers"	- "encourage control" - "intensify the controls at departure, in navigation and landing" - "pursue, sanction, and control"	Without mentions to monitoring and enforcement	- "to monitor IF at the processing plants" - "rules have to be clear, and sanctions have to be severe"
Market conditions	- "shorten fishing operations and improve the price" - "promote local markets"	- "better income for artisanal fishers and greater accessibility to fishing"	Without mentions to market conditions	- "to reconvert those fishers that do not have fishing permits" - "that fishers be able to engage in other jobs" - "train fishers as tourism services providers"
Research	- "conduct studies to assess the condition of resources"	Without mentions to research	Without mentions to research	Without mentions to research
Cultural change	- "denounce illegal fishers and raise awareness" - "[the solution] depends on the change that can be generated among fishers; it is a vision problem"	- "cultural change and taking responsibility" - "a change in the attitude of the fishers, where the regulations are respected in the first place" - "combination of environmental control and education for fishers, buyers and organizations"	- "fisher's consciousness and culture has to change". - "create incentives to adopt good fishing practices"	"more education for fishers"

[30]: it is through these relationships that consensus and mutual learning can occur.

A relational approach towards IF is challenging yet promising in developing countries and elsewhere for various reasons: i) it shifts attention from a focus on usually well-defined management outcomes and results, to the contingent identification of emergent opportunities and properties; ii) it understands IF images as socioecological phenomena, distributed in a network of relationships rather than a problem belonging to a discrete group of actors (fishers); iii) it takes seriously the role of non-human agents (e.g., fish species), in the complex definition of IF, for instance through deepening the knowledge of king crab ecologies; iv) it takes into account the local/regional influence of distant actors, such as retailers, consumers and international organizations; and last but not least; v) it aims to reconcile the normative aspects of induced social change with a deeper and more emphatic understanding of culture.

The regional scenario of IF reveals the intersection of diverse and even contradictory interests. This dialectical expression is typical of social relations and implies admitting an inclusive relational perspective of political (e.g., power relations or deployment of corporate interests) and historical-cultural variables (e.g., values and customs). The images constitute shared social representations that the actors construct from their knowledge of the practices that sustain IF. However, faced with the identification of causes and responsibilities, the differences and contradictions between and within the groups become evident. Ambiguity and contradiction do not arise as problems but as social dimensions that need to be taken into account in the analysis. They are very difficult to be ruled out or governed, unless we move towards a relational approach in which more attention is paid no to the behavior of specific actors but to critical practices distributed among a chain of actions

Acknowledging these features of IF and incorporating them in policy design may help

enhance legitimacy of policy reformulations and new regulations and strengthen support from the fishing communities. Overall, the results of this study have demonstrated that IF fishing is clearly a governance issue that cannot only be tackled by stronger regulations and punishment of fishers alone.

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Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at http://dx.doi.org/10.1016/j.marpol.2018.06.020.

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