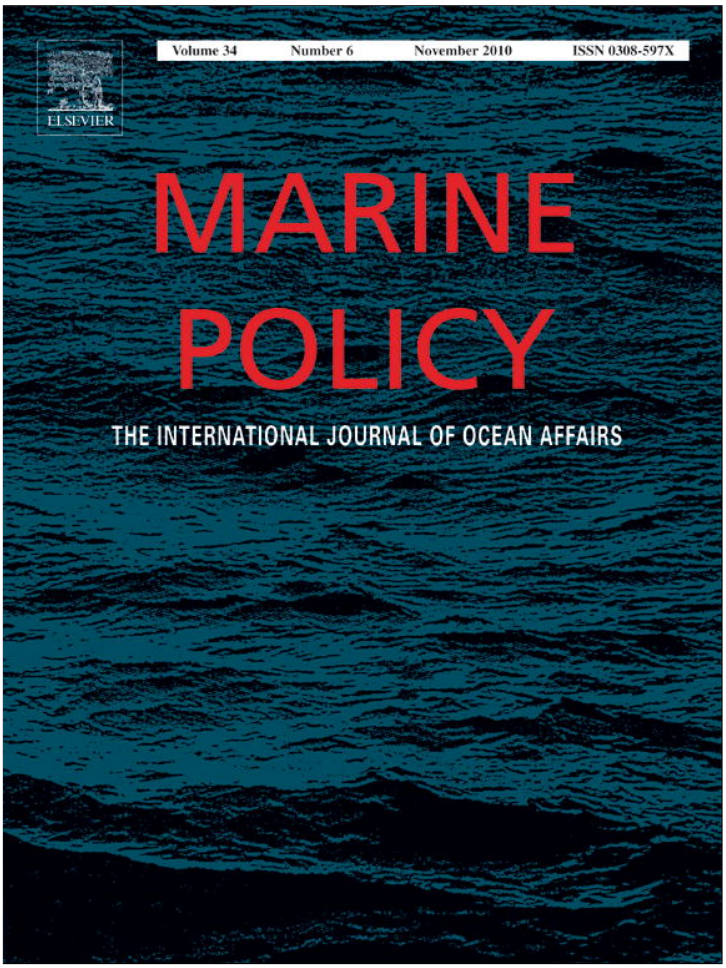

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Insights from the users to improve fisheries performance: Fishers' knowledge and attitudes on fisheries policies in Bahía de Kino, Gulf of California, Mexico

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ABSTRACT

This study investigated the interpretation and level of support of government regulations in Bahía de Kino, Sonora, one of the most important fishing communities in terms of diving extraction of benthic resources in the Northern Gulf of California. Research was conducted from April to August 2007, focusing on the small-scale fisheries sector of commercial divers. Information on fishers' awareness of current policies, fishers' attitudes concerning different aspects of fisheries regulation, and fishers' suggestions on how their fisheries should be managed, was gathered through structured interviews (including open and closed-ended questions), informal talks and participant observation. Results provide further evidence supporting the need for formally recognizing the fishers as key stakeholders in local fisheries, and for working cooperatively towards the design of management strategies and regulations that provide better stimulus for resource stewardship and discourage overfishing. Very importantly, this study suggests that there is strong support from resource users for implementing regulatory measures for local fisheries. Results could be used as a preliminary baseline to initiate the discussion among fishery stakeholders towards the development of species-specific management plans for the area, as required by the recently enacted fisheries act in Mexico, the "Ley General de Pesca y Acuacultura Sustentables".

1. Introduction

Effective management of fisheries relies not only on the development of rules that are appropriate for the biophysical and social characteristics of the fisheries in question, but also on the understanding and internalization of these rules by resource users [1–3]. Rules that are understood and deemed legitimate and functional by fishery stakeholders have the potential to lead towards robust and effective management of fishery resources.

Often, however, local practices do not resemble the formal laws expressed in legislation [4]. If managers assume that users automatically learn, comprehend, and make use of the government rules in place, the development of management strategies may be based on administrative assumptions rather than on what is really happening in the field [3]. Cross-scale interactions and coordination (between governmental and local domains) are critical to make sure that the formal rights and rules are compatible with local practices and circumstances so that negative externalities are avoided [1,5].

As a means to begin addressing how well governmental rules are suited to local circumstances within fishing communities of the Northern Gulf of California[1] (NGC) (Fig. 1), Mexico, the interpretation and level of support of government regulations was studied in Bahía de Kino, Sonora. Bahía de Kino is one of the most important fishing villages in terms of diving extraction of benthic resources[2] in the NGC (Fig. 1) [7]. The Gulf of California (GC) is a region characterized by its biological richness and socio-economic significance [8]. Fishing (large and small scale) is a predominant economic activity throughout the GC, comprising approximately 50,000 fishers and 25,000 boats operating in small-scale (or artisanal) fisheries, and other 10,000 fishers and 1,300 boats operating in large-scale (or industrial) fisheries [9]. The region

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[1] Based on observations of fish species' distribution patterns, the Gulf of California has been divided in three main areas (north, mid, and south) [6]. The Northern Gulf of California has been defined as the area extending north of an imaginary line from San Francisquito in Baja California and Bahía de Kino in Sonora (Fig. 1).

[2] Benthic species spend most of their life cycle in association with the sea bottom (e.g., mollusks, crustaceans).

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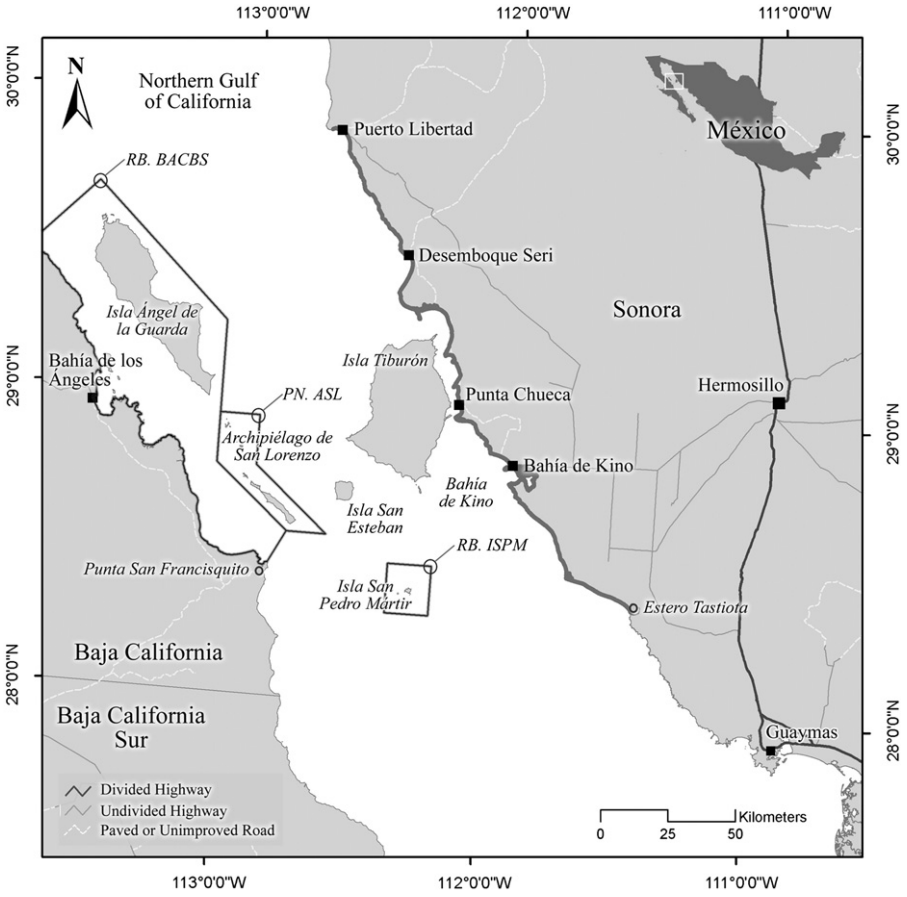

Fig. 1. Map of the study area within the Northern Gulf of California (NGC). The thick gray line on the Sonoran coastline indicates the general geographic jurisdiction of fishing permits for most diving products in Bahía de Kino, extending from Puerto Libertad to Estero Tastiota. The MPAs present in the area are indicated as follows: Reserva de la Biósfera (Biosphere Reserve) Bahía de los Angeles y Salsipuedes (RB. BACBS); Parque Nacional (National Park) Archipiélago de San Lorenzo (PN. ASL); Reserva de la Biósfera (Biosphere Reserve) Isla San Pedro Mártir (RB. ISPM). Square markers indicate the main towns or cities. Hermosillo is the capital city of Sonora. Cartographic design: Marcia Moreno-Báez and Erika Koltenuk.

produces approximately 50% of the landings and 70% of the value of national fisheries in Mexico [8].

However, in spite of the importance of small-scale fisheries (SSFs) in the region, these fisheries have received little attention from the federal government in comparison to large-scale fisheries (like shrimp and small-pelagic species) [10,11]. This is likely because SSFs use many widely dispersed small boats that are not easy to monitor and because their economic contributions are similarly dispersed and difficult to assess. Also, despite the existence of formal regulatory tools, access to small-scale fisheries has been nearly open in practice [10]. Largely due to state subsidies and policies encouraging migration from different parts of Mexico [11], the Gulf of California GC has seen a significant increase in fishing pressure over the last few decades and a downtrend in total production in many primary target species [9,10,12,13]. In addition, fishing communities are thought to be largely uninvolved in the development of management policies (at least formal resource management rules), and the extent of compliance with formal regulations is unclear.

A previous publication by Cinti et al. [14] described the social and fisheries impacts of fisheries policies in Bahía de Kino, and discussed whether the formal institutional structure of Mexican fishing regulations is effective in promoting conservation behavior by small-scale fishery stakeholders. These authors suggest that current rules set the standard too high for direct users (the people who go fishing) to access fishing rights, promote the disconnection of right holders (usually absentee operators) from the resource, and intensify rent-seeking interests. This incentivizes overfishing and exacerbates social inequalities.

The present article presents additional information collected during the same research period and using the same methodology, on fishers' awareness of current policies, fishers' attitudes concerning different aspects of fisheries regulation, and fishers' suggestions on how their fisheries should be managed. Results provide further evidence supporting the need for formally recognizing these small-scale fishers as key stakeholders in local fisheries, and for working cooperatively towards the design of management strategies and regulations that provide better stimulus for resource stewardship and discourage overfishing. Very importantly, this study suggests that there is strong support from resource users for implementing regulatory measures for local fisheries. This finding, together with other information provided by the fishers could be used as a preliminary baseline to inform and guide the development of species-specific management plans for the area, as required by the recently enacted fisheries act in Mexico, the "Ley General de Pesca y Acuacultura Sustentables" (see www.sagarpa.gob.mx). This type of assessment where fishers' perspectives on management issues are gathered can be useful to improve fisheries performance, particularly in settings where participatory mechanisms are not yet in place.

2. Background information

2.1. Bahía de Kino's diving fisheries: social and resource characteristics

Bahía de Kino is a rural coastal community of approximately 5000 inhabitants [15] situated in the state of Sonora (Fig. 1). Fishing is the most important economic activity [7]. About 800 fishers and 200 active boats (locally called "pangas") are involved in small-scale fisheries in this community [7]. A total of 66 species are harvested by these small-scale fishers, of which 35 are regarded as the primary targets of fishing trips (Project PANGAS, unpublished). Species extracted are an important source of marine products at the local and regional level. A number of these species are also internationally commercialized [7,16].

About 80 pangas were active in commercial diving in Bahía de Kino at the time this study was conducted (2007). Divers mainly harvest pen shells (mostly *Atrina tuberculosa*, and occasionally *Atrina maura*, *Atrina oldroydii*, and *Pinna rugosa*), octopus (*Octopus* spp.), and fishes [mainly groupers (*Mycteroperca rosacea* and *M. jordani*) and snappers (*Hoplopagrus guentherii* and *Lutjanus novemfasciatus*)]. Sea cucumber (*Isostichopus fuscus*) is also an important diving fishery, though clandestine because no authorization to harvest this species has been granted in the area [14]. Smaller quantities of lobsters (*Panulirus* spp.), rock scallop (*Spondylus calcifer*), several species of clams (*Megapitaria squalida, Dosinia* spp., and others), and snails (*Hexaplex nigritus, Strombus galeatus,* and others) are also harvested. Pangas are 8–9 m long, equipped with 55–115 hp outboard motors. To breathe underwater, divers use a "hookah", which is fabricated locally using a modified paint sprayer as the air compressor connected to a modified beer keg as the reserve air tank [17]. One or two 100 m hoses are attached to this tank with air regulators at the end. The diving crew may include the operator or "popero" (who operates the boat), one or two divers, and a divers' assistant (who controls the air supply for the divers). Poperos usually act as divers' assistants too, to increase the economic efficiency of the fishing trip (earnings are divided among less people). One of these crew members is also in charge of the boat or captain, who is responsible for its maintenance and for responding to the owner[3] in case anything happens to it. Captains are generally the most experienced and knowledgeable fishers and those who tend to make the decisions about fishing [7]. Fishers working in commercial diving may at times also work in other fishing activities, using gillnets (for fish and shrimp) or traps (for swimming crabs, *Callinectes bellicosus*). However, they are strongly dependent on fishing to make a living. Fishing is the only source of income for 71% of interviewees [14], and diving (of the set of fishing activities they develop) is the primary source of income for 93% of interviewees.

Information on fisheries performance for any species targeted by commercial diving in Bahía de Kino is scant. The only official fishery information available are landings statistics, which should be interpreted with caution given that illegal fishing is likely high because of unreported catch, catch captured outside local port's jurisdiction that is declared as if it was captured inside (e.g., in another administrative jurisdiction), and misidentification of species, among other factors (see [14] for historical landings of main target species). The first reliable estimation of the condition of one of the main local diving fisheries, the pen shell fishery, was provided by Moreno et al. [18]. These authors concluded that the species was severely overfished.

2.2. Legal framework

Fisheries administration in Mexico has traditionally been centralized [10]. Nonetheless, a recently enacted fisheries act (October of 2007), the "Ley General de Pesca y Acuacultura Sustentables", introduced decentralization[4] as one of its primary goals (see www.conapesca.sagarpa.gob.mx). Some of the relevant elements of this new law[5] will be described. However, data for this study were collected in 2007 and therefore this study will focus on the formal institutional setting in place at that time (before the new law was enacted).

Fisheries regulation in Mexico is shared by two federal agencies, SAGARPA,[6] the Secretary of Fisheries and Agriculture, and SEMARNAT,[7] the Secretary of the Environment and Natural Resources. SAGARPA, via CONAPESCA,[8] its National Fisheries and Aquaculture Commission, is the primary agency in charge of fisheries regulation, issuing licenses in the form of fishing permits, authorizations, or concessions. CONAPESCA is also in charge of enforcing regulations related to fishery resources that fall under SAGARPA's jurisdiction. INAPESCA,[9] the National Institute of Fisheries, is the scientific "backbone" of CONAPESCA.

On the other hand, SEMARNAT, via DGVS,[10] its General Division of Wildlife, regulates the use of species listed "under special protection"[11] and, in the case of benthic resources listed in this category (e.g., sea cucumber and rock scallop), may authorize their harvest through a species-specific permit.[12] SEMARNAT is also in charge of the establishment and management of marine protected areas (MPAs) throughout Mexico via CONANP,[13] the National Commission of Natural Protected Areas. INE,[14] the National Institute of Ecology, generates scientific and technical information about the environment to provide support for decision making to SEMARNAT. PROFEPA,[15] the Federal Agency for the Protection of the Environment, is SEMARNAT's enforcement body. The Navy is also empowered to provide enforcement support to both CONAPESCA and PROFEPA if needed.

Throughout Mexico, fishing permits (granted by CONAPESCA) are the most widely used management tool to grant access to marine resources. Fishing permits may be granted to any corporate entity (typically a cooperative) or individual for four years or less (2–5 years in the new law), and they are renewable upon compliance with regulations. The core requirements to access fishing permits include: (a) presenting personal

[3] Usually when a crew member owns the fishing equipment, he or she is the person in charge. Otherwise, the captain is appointed by an owner external to the crew.

[4] This law establishes that States and Municipalities will have participation in decision making through the creation of State Fisheries Laws and State Fisheries and Aquaculture Councils.

[5] Note that the bylaw that would make this new law operational is still under revision (as of March 2010), which means that the prior bylaw (correspondent with the old fisheries law enacted in 1992) is still in use.

[6] Stands for "Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación".

[7] Stands for "Secretaría de Medio Ambiente y Recursos Naturales".

[8] Stands for "Comisión Nacional de Acuacultura y Pesca".

[9] Stands for "Instituto Nacional de la Pesca".

[10] Stands for "División General de Vida Silvestre".

[11] Species included in the norm NOM-059-ECOL-1994 and subsequent modifications.

[12] Called "Predios Federales Sujetos a Manejo para la Conservación y Aprovechamiento Sustentable de Vida Silvestre" (Federal Polygons for the Conservation and Sustainable Use of Wildlife). This tool and CONAPESCA's fishing concessions provide exclusive use-rights over one or more species within a specified area.

[13] Stands for "Comisión Nacional de Áreas Naturales Protegidas".

[14] Stands for "Instituto Nacional de Ecología".

[15] Stands for "Procuraduría Federal de Protección al Ambiente".

documentation, (b) specifying the species, fishing area, landing port, and duration of the right being solicited, (c) specifying and certifying technical information about boat(s), motor(s), and fishing gear(s) as registered in the Secretariat of Communication and Transportation, (d) certifying the legal possession of boat(s), motor(s), and fishing gear(s), (e) certifying the legal constitution and membership of corporate entities, (f) certifying inscription at the Federal Taxpayers' Registry (Ministry of Economy), and (g) paying the required fees.[16]

The permit specifies the particular species (e.g., octopus permit, lobster permit) or group of species[17] to be harvested within a broadly specified region [19]. In Bahía de Kino, the spatial jurisdiction of fishing permits for species targeted by commercial divers overlap one another (see Fig. 1 for general jurisdiction of fishing permits). Each fishing permit specifies the number of boats (referred as "número de espacios") that are permitted for use to harvest the species authorized in the permit, together with technical specifications of the fishing equipment(s) (boat, motor, and fishing gear). Also, a boat that belongs to a permit holder can be registered in more than one permit. That is, the same boat can be entitled to fish several species, depending on the amount of permits registered to a specific boat.

Fishing permits provide a number of benefits to their holders. Permit holders are the only ones who can legally land the catch and declare it at a Regional Office of CONAPESCA [19]. Permit holders are also the only ones who can provide legal invoices (or "facturas") for the product extracted directly from sea.[18] These invoices certify legal ownership of the harvest, and are necessary to sell and transport the catch to regional or international markets. Note that permit holders are only allowed to harvest and sell resources that have been caught using the fishing equipment(s) (boat, motor, and fishing gear) registered in their permits.

Mexico's laws also provide a mechanism for applying for fishing concessions (i.e., exclusive fishing rights over a species within an area)[19] and these concessions have the same requisites as for accessing fishing permits, plus detailed technical and economic information to assess the economic viability of the intended activity. Unlike fishing permits, concessions require the authorization of a quota of the resource being harvested. To date, no fishing concession has been granted in the Bahía de Kino area, or in the NGC.

Specific regulations for resource use are defined within "Normas Oficiales Mexicanas" (norms) published in the Federal Registry. Closures (temporal or permanent) and gear or size restrictions are the most common management measures in the existing norms. Generally there are no quota limits. In addition to fishery norms, INAPESCA develops the National Fisheries Chart or "Carta Nacional Pesquera" (CNP). This chart summarizes the status, management recommendations, and indicators for all Mexican fishery resources. These recommendations become legally binding under the new fisheries law. Table 1 shows the norms that apply to the target species of commercial divers in Bahía de Kino (also applicable to the entire GC and other regions within Mexico) and the main recommendations as they appear in the CNP for each species. Note that for most species, there is an absence of norms and knowledge on these species' population status [14].

The use of marine protected areas has only recently been implemented in the Bahía de Kino region. Isla San Pedro Mártir is an important fishing destination, especially for commercial divers, and in 2002, a large area surrounding this island was designated as a Biosphere Reserve [20]. Even though the area involved constitutes a small portion of local divers' fishing grounds, this is a new fisheries management strategy for this region and studies are currently underway to monitor its effectiveness in promoting sustainable populations of marine organisms targeted by small-scale fishers [20].

These regulations (access and resource-use rules) are enforced by the federal agencies cited above. In Bahía de Kino, only two officials from CONAPESCA are in charge of monitoring and enforcing regulations concerning fishing permits and resource-use norms under CONAPESCA's jurisdiction. The area under their responsibility spans over 200 km of coastline (from Puerto Libertad to Estero Tastiota; Fig. 1), and inspections are usually performed by land. There are approximately 350 boats operating in this area, in addition to boats from other communities that arrive in varying numbers depending on the season (see Cinti et al. [14]). There is no permanent presence of PROFEPA (in charge of enforcing regulations concerning MPAs and species under special protection) in town. However PROFEPA's officials may arrive upon demand by members of the community, the Navy, CONANP, or CONAPESCA's officials. The navy provides support for enforcement to both agencies at sea when solicited. The navy is the only agency that is allowed to carry guns. Resources and personnel are often in short supply, and officials are frequently unable to cover the entire area in a timely and effective manner [14]. Insufficiency of inter-institutional agreements and coordination among the different agencies involved is also a major impediment to achieve effective enforcement in the area.

In Bahía de Kino, most permit holders are in reality the buyers of the fishing product (absentee permit holders). Marine resources targeted by commercial divers are generally captured by fishers who do not own a fishing permit and do not belong (as members), to any cooperative holding permits [7,14]. These fishers are locally called "pescadores libres" or independent fishers and they are the labor force of the permit holders (individual or corporate). They possess the fishing expertise and experience, and gain legal access to resources by entering into a working relationship with the holder of a permit (by working in his pangas under his permits). Ironically, because most of these fishers do not own fishing permits in their name (or in the name of a cooperative of which they are the members) they are not legally registered in the fishery and consequently, they are considered illegal participants.

The relationship between permit holders and their workers is complex. These fishers are highly dependent on permit holders economically, which is often detrimental to them but also beneficial (permit holders serve as banker, lending money in case of illness, emergencies, basic needs). On the other hand, permit holders frequently benefit from this relationship but they also bear substantial risks by lending to people who have limited financial assets.

Of the sample taken by Cinti et al. [14] (which is the same sample used in this study), 82% of respondents were independent fishers, none was an individual permit holder, and 18% were members of cooperatives holding fishing permits.

[16] The processing fee for a fishing permit was about US$50 in 2008 ("Ley Federal de Derechos", Art 191 A, inciso IIa), but the actual cost of the permit varies according to the species (e.g., permits for abalone, lobster, or species included in the category "almejas" (clams) range between US$150 and 400 each, SAGARPA's personnel, personal communication).

[17] Some permits are issued for several species under a generic category, e.g., the "escama" (fish with scales) permit allows fishing about 200 species of fish, or the shark permit, which includes several species of elasmobranchs.

[18] Buyers without a fishing permit are allowed to buy product from permit holders, or from other buyers without a fishing permit and resell it. However, they have to carry with them a document that certifies the legal possession of the catch, which specifies the fishing permit under which the product in question was harvested [14].

[19] For example the abalone and lobster fisheries in the Pacific coast of the Baja California Peninsula.

Table 1
Management recommendations as they appear in the National Fisheries Chart (Carta Nacional Pesquera or CNP) for the main target species of commercial divers in Bahía de Kino, and fishery norms regulating the harvest of these species.

Species	Existing regulations by species	CNP management recommendations
Sea cucumber *Isostichopus fuscus*	NOM-059-ECOL-1994 Enforced by PROFEPA and the Navy Permanent closure throughout México	Population status in Sonora, undetermined. There are no recommendations for Sonoran sea cucumber populations. SEMARNAT may authorize use. No authorization for exploitation has been granted in Sonora.
Rock scallop *Spondylus calcifer*	NOM-059-ECOL-1994 (see above)	Lumped with other 15 species under the category "almejas" (clams). Population status in Sonora, undetermined. There are no recommendations for Sonoran rock scallop populations. SEMARNAT may authorize use. Only one authorization has been granted in Sonora, though not in Bahía de Kino.
Lobster *Panulirus* spp.	NOM-006-PESC-1993 Enforced by CONAPESCA and the Navy Applies to Federal jurisdiction of Gulf of México and the Caribbean Sea, Pacific Ocean including Gulf of California (GC) Gear restrictions: traps, unless other gear is authorized by SAGARPA Size restrictions: 82.5 mm (cephalothorax length) No breeding females Land entire specimen to enable control Temporary closure (GC): July 1 to October 30	Population status in Sonora, undetermined. A gradual increase in fishing effort may be allowed if supported by technical studies. Recommends assessing the resource in Sonora and other states, and regularizing the use of commercial diving. This fishing gear is widely used in the Gulf of California GC, even though it is prohibited for lobster.
Groupers, *Mycteroperca* spp.[a] and Snappers, *Hoplopagrus guentherii.*	None	Lumped with other 200 species under the category "peces marinos de escama" (marine fishes with scales). Commercial diving does not appear in the list of fishing gear used to capture these species. Population status in Sonora, undetermined. General recommendations include not increasing fishing effort in any of the species within the category, and modifying current categorization to allow administration by groups of related species (smaller groups).
Pen shell *Atrina* spp. and *Pinna rugosa*	None	Lumped with other 15 species under the category "almejas" (clams). Recommends not increasing fishing effort in Sonora and other states, and implementing the use of quotas in Sonora and Sinaloa.
Black murex snail *Hexaplex nigritus*	None	Population status in Sonora, undetermined. Recommends assessing the resource in Sonora every 2 years. General recommendations include not increasing fishing effort in any of the states where it is fished, and implementing reproductive closures.
Octopus *Octopus* spp.	None	Under a general category "pulpo" (octopus) including identified and unidentified species captured in Mexico. Population status in Sonora, undetermined. Recommends taking measures in Sonora if catches are lower than 100 MT. General recommendations for all octopus species include not increasing fishing effort, and reinforcing biological and fisheries studies to better regulate these fisheries.

[a] *Mycteroperca jordani*, *Mycteroperca prionura*, and *Mycteroperca rosacea* are enlisted as endangered, near threatened and vulnerable, respectively, in the IUCN red list of threatened species.

3. Methods

Research in Bahía de Kino (Fig. 1) was conducted from April to August 2007, focusing on the small-scale fisheries sector of commercial divers. Information on knowledge and attitudes concerning different aspects of fisheries regulation was gathered through structured interviews (including open and closed-ended questions), informal talks and participant observation. The first phase of the research was devoted to getting used to the setting, building trust, and having informal talks with fishers, participating in a few fishing trips ($n=4$), and recording observations at the beach. During the final phase of the research, a structured interview was designed based on what was learned in previous months.

Among additional topics published in Cinti et al. [14], the structured interview assessed fishers' knowledge of regulatory tools and procedures such as: (1) the Fisheries Act (enacted in 1992 and in use until late 2007) and its bylaws, (2) resource-use norms by species establishing how a given species may or may not be caught (closures, size restrictions, etc.), (3) procedures to request fishing permits and territorial rights (i.e., concessions), (4) penalties for infractions, and (5) anticipated changes in Mexican policies concerning fisheries, specifically about the new fisheries act (enacted in late 2007). Fishers' attitudes concerning different aspects of fisheries regulation were investigated using a combination of open-ended questions and a set of statements in a 5-point Likert scale. Open-ended questions allowed the fishers to express their opinions more freely about what was currently missing in terms of fisheries regulation in Bahía de Kino. The Likert-scale statements allowed for quantification of predetermined topics including fishers' attitudes toward access and resource-use regulations, fishers' perceptions of performance of local authorities concerning enforcement of regulations; and fishers' willingness to join cooperatives, the most common form of formal organization in the region. Additional questions on fishers' associative and labor preferences complemented this latter topic.

The structured interview was applied to fishers belonging to the major groups of divers in town that were active in 2007 (six groups). Even though the selection of interviewees was not random due to the lack of updated information on these groups' members, whenever possible the number of interviews was distributed among groups more or less in proportion to an

estimate of the number of boats working for each group at the time interviews were performed. A total of 45 interviews were conducted with 1–2 crew members from 40 pangas, out of approximately 80 active pangas involved in commercial diving in town. Eighty nine percent of interviewees were panga captains ($n=40$), of which 33 were also divers and the rest ($n=7$) were captains and divers' assistants (the persons who assist the divers on board).

Differences in responses to the Likert-scale statements among fishers were explored by contrasting the responses to each statement using non-parametric statistics (Mann–Whitney *U*-test). The responses of fishers having two different modes of fishing operation, and also different reputations concerning compliance with fishery regulations, were compared. The first group, that was named the "island group", consisted of fishers primarily operating in oceanic islands (Isla Tiburón, I. San Pedro Mártir, I. San Esteban, I. Ángel de la Guarda, and islands of the Archipiélago de San Lorenzo) (Fig. 1). The main target species for this group are rocky reef species such as lobster, octopus, fishes, and occasionally pen shells (sand–mud species). This group has the reputation of being less respectful of regulations than the second group. The second group, which was named the "bay group", consisted of fishers whose main target species are pen shells and octopus, and occasionally lobsters and fishes, in the surroundings areas of Bahía de Kino and Isla Tiburón (Fig. 1). In the case of sea cucumber, there is no legal harvest on the Sonoran coast.[20] However, it is generally acknowledged that this species is widely harvested and although it cannot be known for sure which of these groups is most active in the clandestine harvest of sea cucumber, the island group is believed to be the one that harvests this species the most. Each of these two groups consists of several distinct subgroups primarily defined by who they work for (who they sell their product to) [14].

4. Results

4.1. Fishers' knowledge of fisheries policies

In general, respondents were unaware that a Fisheries Act, a bylaw of this Act, and species-specific norms as such existed. However, they were generally aware of important things contained in these legal instruments such as which species are allowed to be captured (contained in resource-use norms), and that fishing permits are required for fishing (contained in the Fisheries Act and its bylaw).

In terms of resource-use regulations, most of respondents were aware of the permanent closure on sea cucumber fishing (NOM-059-ECOL-1994, SEMARNAT, Table 1), the temporal closure on lobster fishing (NOM-006-PESC-1993, SAGARPA, Table 1), and the lack of regulations for octopus, pen shells, fishes (groupers and snappers), and black murex snail. However, additional restrictions on lobster fishing concerning allowed size and fishing gear (Table 1) are generally ignored by respondents, as well as the permanent closure implemented on rock scallop fishing (NOM-059-ECOL-1994, SEMARNAT, Table 1).

With regards to the requirements to access fishing permits, even though 90% of respondents have never tried to request a fishing permit on their own, about 70% were aware of at least one or two main requirements for permits. Ownership and certification of ownership of fishing equipment(s) (boat, motor, and fishing gear) were the most commonly mentioned. In general, respondents perceived that accessing fishing permits was unreachable because of their high cost,[21] the need to own several fishing equipments (they believed they could not access a permit having only one panga), and the notion that authorities would grant fishing permits only to formalized groups (e.g., cooperatives), not to individuals. Surprisingly, most of the fishers believed that they needed to own at least three fishing equipments to access a fishing permit. Interestingly, the law does not restrict the number of fishing equipments that can be registered in a permit. In addition, a number of respondents expressed that they did not need to request fishing permits on their own since they have always worked for permit holders (under the permits of corporate or individual permit holders), or because authorities were simply not enforcing the fishing permit requirement.

Eighty seven percent of respondents were aware that a group of fishers was allowed to request a territory at sea for management purposes. When asked about the name under which they would formally request this territory, about half of these fishers recalled a "concession", about 10% a "reserve", and 40% could not remember. Nonetheless, most of these fishers were unaware or had a very limited knowledge about how to request this territory, and they generally perceived the process as very difficult, with too many requirements to fulfill.

In general, respondents were well aware of the penalties they would suffer if caught in illegal fishing activities. This indicates that they are generally aware of which species are allowed to be fished and when, even if they ignore the existence of formal instruments containing these rules (Normas Oficiales Mexicanas). Respondents usually perceived that Sonoran fisheries authorities are less strict in the application of fisheries regulations compared with authorities in states of the Baja California Peninsula. This is a region often visited by fishers from Bahía de Kino, and even permit holders from that region hire divers from Bahía Kino [14,21].

With regards to any recent changes in Mexican policies concerning fisheries, 100% of respondents were unaware that changes in fisheries legislation were underway. This is not surprising considering that most of them did not know that a fisheries act even existed. The only change in legal requirements that respondents have noticed in recent times concerns an increase in enforcement activities by local authorities within the last year or year and a half.

4.2. Fishers' attitudes toward fisheries regulation

4.2.1. What is missing in Bahía de Kino in terms of fishery regulation? (open-ended question)

The most frequent issues and suggestions expressed by respondents concerning regulatory aspects involved: (1) controlling the entrance of outsider pangas into local fishing grounds (27% of respondents) (see Cinti et al. [14] for a description of local access issues), (2) more respect for regulations (22% of respondents), (3) more support from local authorities particularly in applying and enforcing current regulations (22% of respondents), and (4) a more even distribution of fishing permits, granting them to real fishers, not to absentee operators (22% of respondents) (Fig. 2).

[20] A few authorizations to harvest sea cucumber have been granted by SEMARNAT in the states of Baja California, and Baja California Sur.

[21] For the GC, the tendency has been to restrict or put on hold the allocation of new permits in the majority of benthic small-scale fisheries (except for new fisheries like the geoduck or panopea clam (*Panopea* spp.) fishery for which exploratory permits (*permisos de fomento*) have been recently granted in the NGC). One way in which an individual or corporate entity may obtain a permit is by transferring permits that are no longer used by their holders. Though profiting with permits' transference is prohibited, in practice the interested party usually has to pay an extra amount than the actual cost of the permit (a bribe) to the owner of the permit and the officials that do the paperwork.

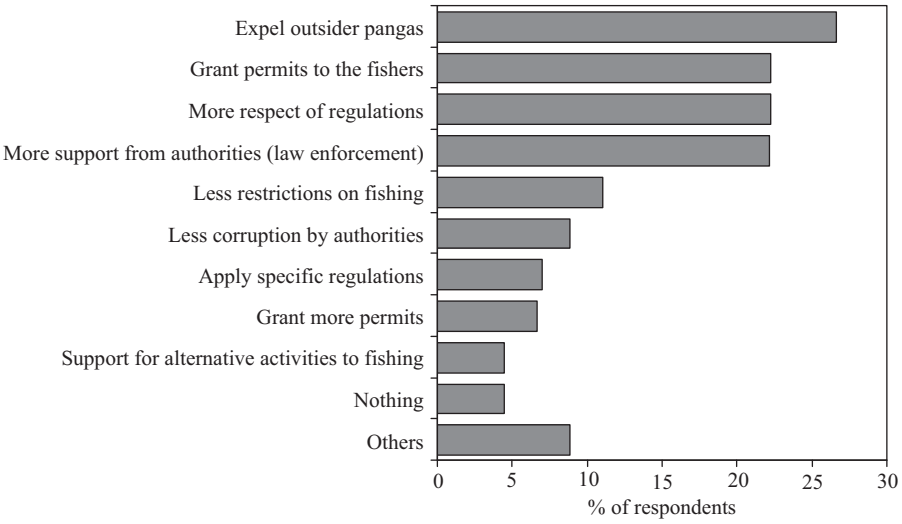

Fig. 2. Fishers' responses to question: What is currently missing in terms of fishery regulation in Bahía de Kino? One person may have provided multiple answers.

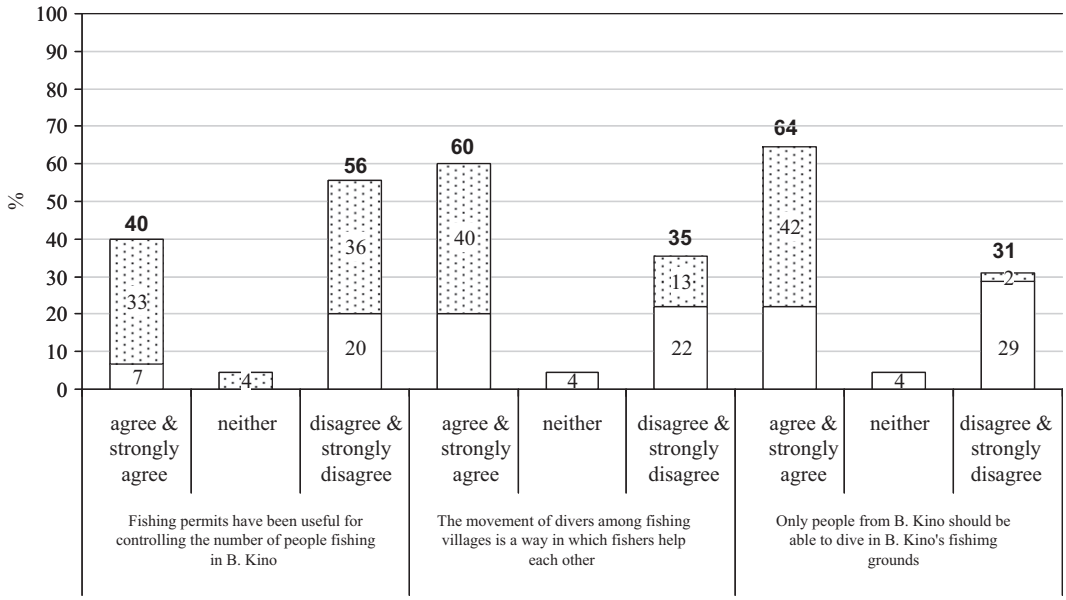

Fig. 3. Fishers' attitudes toward access limitation, $n=45$. The numbers in bold above each bar indicate the total percentage of responses for each category or combination of categories (i.e., agree and strongly agree) with the stippled bar for the "agree" or "disagree" responses and the plain bars for the "strongly agree" or "strongly disagree" responses for each statement.

On the other hand, only 5 of 45 respondents (11%) claimed that fewer restrictions on fishing should be imposed (Fig. 2), arguing that important fishing grounds have been closed[22] to fishing through the establishment of protected areas ($n=3$ specifically regarding the Reserva de la Biósfera (Biosphere Reserve) Isla San Pedro Mártir, and the Parque Nacional (National Park) Archipiélago de San Lorenzo on the coast of Baja California, Fig. 1); or that restrictions are too radical for some species which should be opened for fishing ($n=2$, both concerning sea cucumber fishing).

[22] Interestingly, the no-take areas within these MPAs do not comprise the entire MPAs. Two point six percent of the Isla San Pedro Mártir Biosphere Reserve and 15% of the National Park Archipiélago de San Lorenzo are completely closed to fishing. In addition, enforcement is almost absent, particularly in the second case.

4.2.2. Fishers' attitudes toward access regulation (Likert-scale)

Forty percent of respondents agreed with the idea that fishing permits were a useful tool to limit access to local fishing grounds, while 56% evaluated it negatively (Fig. 3). In addition, 60% of respondents agreed with the idea that the movement of divers among fishing villages (e.g., divers from Bahía de Kino to Guaymas and vice versa) is a way in which fishers help each other and 35% did not (Fig. 3). Interestingly, a number of these fishers observed that if these divers were to arrive bringing their pangas with them, their reaction would be different. In general, local fishers are reluctant to accept the arrival of new pangas to fish in local fishing grounds [14]. When fishers were asked to evaluate whether they agreed that only people from Bahía de Kino should be allowed to dive in local fishing grounds, this statement also received a high level of support (64%) (Fig. 3). Overall, there is a tendency to support the protection of local fishing grounds from outsiders, especially if this movement

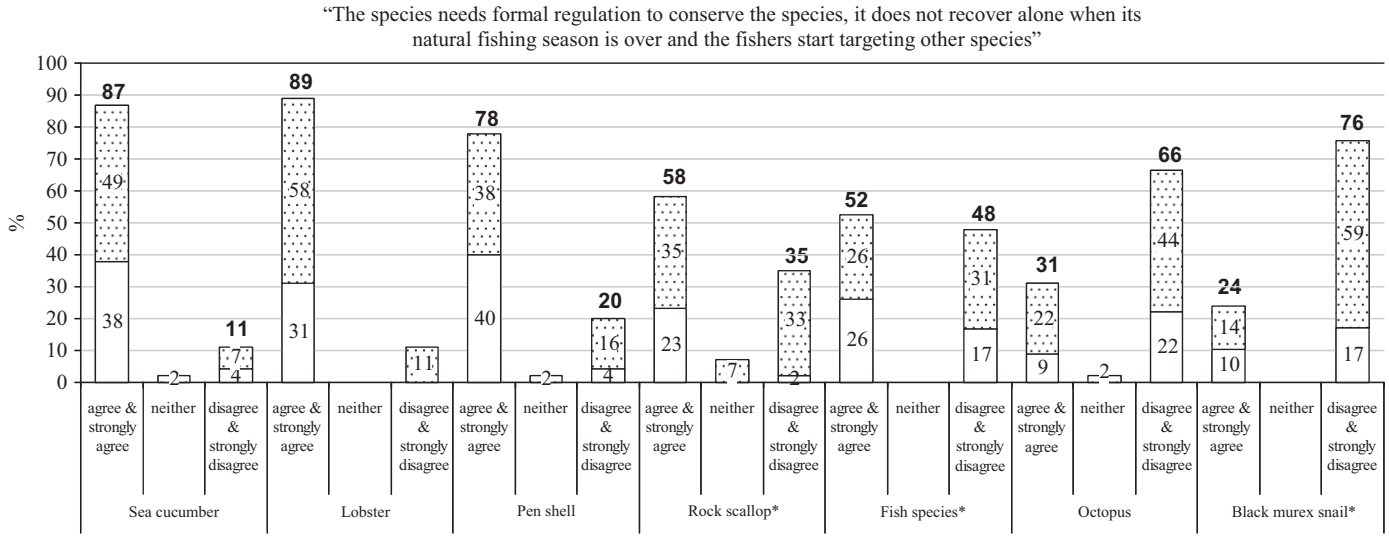

Fig. 4. Fishers' attitudes toward resource-use regulation by species, $n=45$, except for species with asterisks: rock scallop ($n=43$), black murex ($n=29$), and fish species ($n=42$). The numbers in bold above each bar indicate the total percentage of responses for each category or combination of categories (i.e., agree and strongly agree) with the stippled bar for the "agree" or "disagree" responses and the plain bars for the "strongly agree" or "strongly disagree" responses for each statement.

implies increasing the number of pangas fishing in the area. Interestingly, the fishers from Bahía de Kino are known throughout the Gulf of California GC for being highly migrant, entering other port's jurisdictions without permission [14,22].

4.2.3. Fishers' attitudes toward resource-use regulation (Likert-scale)

Statements assessing fishers' attitudes toward resource-use regulation for each target species[23] were worded in a negative form in order to diminish the probability of influencing fishers' responses towards a pro-conservationist view: "The species does not need formal regulation to conserve the species, it recovers alone when its natural fishing season is over and the fishers start targeting other species". Results are presented in inverse order to simplify their interpretation (Fig. 4). When fishers expressed that any of these species needed formal regulation, fishers' suggestions on how the species should be regulated were recorded (Table 2).

Overall, fishers' attitudes toward resource-use regulation and their suggestions on how the species should be regulated indicate that, in general: (1) respondents perceive that local resources are quite scarce with most showing signs of overuse and (2) respondents tend to support the idea that most of their target species need some form of formal regulation to conserve the species. In general, fishers' suggestions on how their primary target species should be regulated emphasize implementing temporal closures more than any other measure, either on species without regulation (e.g., pen shells) or species with existing legal protection (e.g., sea cucumber) (Table 2). Interestingly, the use of quotas was seldom mentioned.

In general, respondents strongly support the need for formal regulation of the harvest of sea cucumber (87%), lobsters (89%), and pen shells (78%) (Fig. 4). The main suggestions on how sea cucumber should be regulated include implementing a temporal closure (and issuing permits) rather than the permanent closure already in place (see Table 2 for suggested dates). For lobster, the main suggestions involve increasing enforcement of current temporal closure, prohibitions on harvests of small size individuals and breeding females, and the ban on nocturnal diving.[24] For pen shells, most fishers suggest implementing a temporal closure (see Table 2 for suggested dates), and enforcing requirements for legal possession of fishing permits.

In the case of rock scallop (*Spondylus calcifer*), although this species is not a primary target species due to its comparative scarcity and low demand, the majority of respondents support the need for regulation in order for this species to recover (58% of support vs. 35% do not support) (Fig. 4). According to the fishers, this species is accessible for fishing all year round and consequently more vulnerable to overuse (Table 2). Rock scallops are often harvested as a byproduct during the harvest of more profitable species (because of price or high abundance) like octopus, sea cucumber, or rocky fishes, since they are found in rocky or near rocky habitats. Rock scallops are in fact protected by SEMARNAT (NOM-059-ECOL-1994, Table 1), though respondents were generally unaware of the existence of this regulation.

On the other hand, in the case of fish species targeted by local divers (groupers and snappers) responses were divided (52% support vs. 48% do not support the need to regulate the species) (Fig. 4). Respondents not supporting the need for regulation explained that these species show seasonal variations in behavior, approaching shallower waters during cold water months, and moving deeper and becoming more active during warm water months. Even though respondents did not mention that this behavior might be related to reproduction, a migratory behavior like this has been observed in the leopard grouper (one of the main species of fish they harvest) when they aggregate to mate. The species migrate to specific sites disappearing from places where they are commonly seen, from April through June [23]. According to the fishers, this movement would make fish species inaccessible for fishing (through diving) for a period of time and consequently less vulnerable to overuse.

[23] A predetermined list of target species was used and it was only asked about the species on the list. The list was based on previous knowledge of the area.

[24] In the GC, nocturnal diving with commercial purposes is only prohibited in areas of traditional use by indigenous groups (like the Seri Indians), according to the management plan of the "Islas del Golfo de California" protected area (area of reserve and refuge for migratory birds and wild fauna), and in some other protected areas like the Bahia de Loreto National Marine Park and Isla San Pedro Mártir Biosphere Reserve. Nonetheless, respondents tend to believe that nocturnal diving with commercial purposes is prohibited everywhere.

Table 2
Fishers' suggestions on how the species should be managed.

Species	Fishers' suggestions on how the species should be managed
Sea cucumber *Isostichopus fuscus*	• Need urgent attention. Overexploited (very scarce, very small sizes left). • Closure is not respected, extracted all year round. • Fishers suggest temporal closure during reproduction with strict enforcement (and provide permits to regularize fishing), rather than a useless permanent closure. Or close it permanently, but substantially enhancing enforcement. • Suggested time for temporal closure: summer time (~May–August) based on fisher's observations of reproductive season. • Fishers also suggest controlling the buyers. Reinforce control in processing plants.
Rock scallop *Spondylus calcifer*	• Overexploited (very scarce) • Infrequently fished due to scarcity, low demand and low price. It is fished as secondary species during octopus fishing season. • Apply temporal closure in the summer (when they believe it reproduces) or ban it for several years. • Fishers believe that it takes longer to recover than other species (low growth).
Lobster *Panulirus* spp.	• Need urgent attention. Overexploited (very scarce, very small sizes left). • Closure is not respected, extracted all year round. • More enforcement is needed to avoid extraction during closure. • Control nocturnal diving [a], limit extraction of breeding females and small size individuals. • Fishers consider that current closure dates are wrong. Lobsters start reproducing in late May–early June. Closure should start one month earlier (including June).
Fishes Groupers, *Mycteroperca* spp. & Snappers, *Hoplopagrus guentherii.*	• Fishers agreeing with the need for regulation generally claim for controlling nocturnal diving[a], and increasing vigilance in islands. • According to the fishers, the fish approach shallower waters during cold water months, and move deeper and become more active during warm water months. This makes harder their capture using harpoon. • A temporal closure should be established when the water gets cold (~two months, probably in November–December). • Impose size restrictions. Small sizes are not respected.
Pen shell *Atrina* spp.	• Most of the fishers suggest temporal closure during reproduction in summer (from May–June until August–September). • Enforcement could be facilitated since most fishers stop fishing it naturally in the summer because extraction is no longer convenient (muscle turns very thin), though some local and foreign fishers still fish it. • Fishers also suggest controlling legal possession of fishing permits (and the number of boats allowed per permit). • Some fishers suggested setting a quota since today everyone fish in the same fishing sites until it is over.
Black murex snail *Hexaplex nigritus*	• It is infrequently worked in Bahía de Kino because of scarcity, low demand and low price. • Most of the fishers agreed that it may recover alone since it is seasonal (only accessible during the summer when it aggregates to mate and inaccessible (buried) the rest of the time). Yet, they also agree that it is caught while it reproduces. • Only 10% of the fishers said that it would need regulation (temporal ban during the summer or permanent closure for several years until it recovers).

Octopus *Octopus* spp.	• Most of the fishers agreed that it may recover alone since it is a seasonal resource (only accessible in coastal areas during summer and inaccessible for fishing the rest of the time). Yet, they also agree that it is caught while it reproduces.
	• ~30% of the fishers believed that even if it is seasonal, it may need regulation since it is overexploited and it is caught during reproduction. These fishers suggest:
	  ○ Temporal closure during last months of natural fishing season (July and August) when it have laid their eggs for incubation.
	  ○ Give preference for extraction to local fishers.
	  ○ Establish a quota.

[a] In the GC, nocturnal diving with commercial purposes is only prohibited in areas of traditional use by indigenous groups, according to the management plan of the "Islas del Golfo de California" protected area (area of reserve and refuge for migratory birds and wild fauna), and in some other protected areas like the Bahia de Loreto National Marine Park. Nonetheless, even though it is widely practiced, respondents tend to believe that nocturnal diving is prohibited everywhere.

In contrast, respondents supporting the need for regulation of fish species would like to see an increase in enforcement of nocturnal diving (see footnote 24), especially near islands, and the establishment of size restrictions together with more enforcement, to reduce the harvest of small-size individuals (Table 2).

For octopus and black murex snail (*Hexaplex nigritus*) the majority of respondents do not support the need for regulation (66% for octopus and 76% for black murex) (Fig. 4). Most of these fishers justify their opinions on regulations for these species explaining that these species are seasonal in their accessibility, only available for fishing in coastal waters during summer and inaccessible the rest of the year. In addition, the black murex snail is rarely extracted in Bahía de Kino because of their scarcity, low demand, and low price. Nonetheless, respondents also agree that both species are caught during reproduction and are likely to be affected (Table 2).

4.2.4. Fishers' perceptions of performance of local authorities (Likert-scale)

Responses were divided when fishers were asked if they agree that "without the support of local authorities, they would not

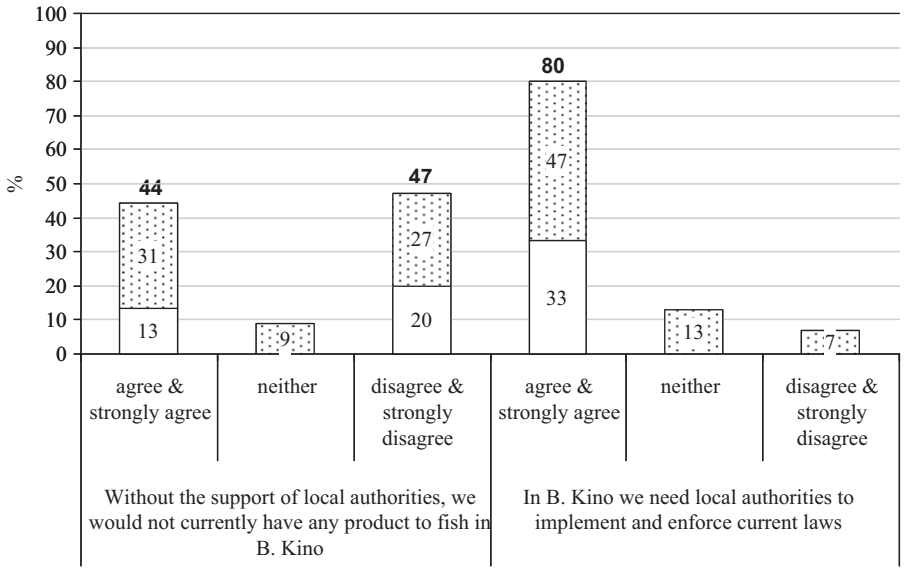

Fig. 5. Fishers' attitudes toward authorities' performance, $n=45$. The numbers in bold above each bar indicate the total percentage of responses for each category or combination of categories (i.e., agree and strongly agree) with the stippled bar for the "agree" or "disagree" responses and the plain bars for the "strongly agree" or "strongly disagree" responses for each statement.

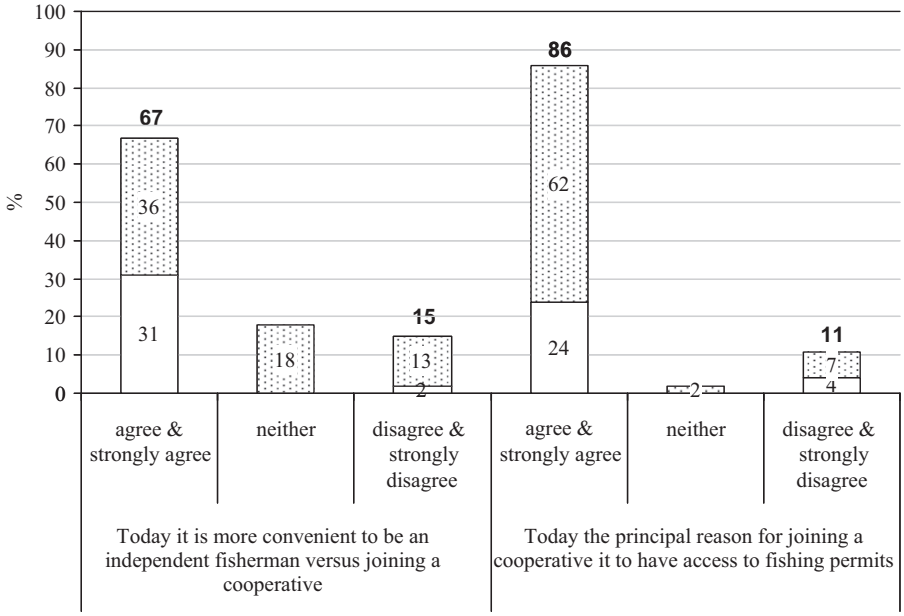

Fig. 6. Fishers' willingness to join cooperatives, $n=45$. The numbers in bold above each bar indicate the total percentage of responses for each category or combination of categories (i.e., agree and strongly agree) with the stippled bar for the "agree" or "disagree" responses and the plain bars for the "strongly agree" or "strongly disagree" responses for each statement.

currently have any products to fish in Bahía de Kino" (44% agreed vs. 47% do not agree) (Fig. 5). In other words, about half of respondents agreed that local authorities have had an important role in preventing the depletion of fishery resources in Bahía de Kino, while the other half do not support this idea. Nonetheless, 80% of respondents agreed that in order to improve the situation of local fisheries, the implementation and enforcement of current regulations by local authorities was needed.

4.2.5. Fishers' willingness to join cooperatives (Likert-scale)

Sixty seven percent of respondents agree that working independently is preferable to working as a member of a cooperative (Fig. 6). On the other hand, 86% believe that the main motivation for joining a cooperative today is having access to fishing permits (Fig. 6). In addition to the Likert-scale statements, the preferences of fishers and the reasons for their preferences were assessed through additional questions as part of the same interview. These results indicate that 40% of respondents would prefer working as a member of a group or cooperative because it would allow them to access benefits and support that would be hard to obtain as independent fishers. These benefits included access to support and increased (positive) attention from the government, access to equipment owned by the cooperative (boats, motors, and fishing gear), the possibility of buying one's own equipment through credit or loans, access to

fishing permits, advantages in selling one's product (legal receipts, better prices), and social benefits such as health insurance. However, the benefits most frequently mentioned were improved access to fishing permits and fishing equipments. This result reaffirms the point that obtaining a fishing permit as independent fishers is a difficult task.

In terms of incentives to join cooperatives it is clear that in general, respondents look for material benefits that are difficult to obtain as independent fishers, rather than other type of support given by the collective nature of a cooperative. Also, when expressing their reasons for preferring to work as a cooperative member, many respondents answered in a conditional way commenting that if the cooperative functions properly, they would prefer the cooperative option. Local experiences with cooperatives have not been generally successful [14], and this insecurity is reflected in fishers' answers.

On the other hand, 53% of respondents preferred to work independently (not as a member of a group or cooperative). The reasons include having had bad experiences with cooperatives, such as poor administration and organization, unequal contributions of members to the cooperative and internal conflicts between members. Other reasons for preference for working as independent fishers included freedom on the job, and higher earnings than as member of cooperatives due to the possibility of getting a better price when selling one's product, and avoiding paying cooperative dues. Obtaining higher earnings was the most common answer from respondents who stated a preference for working independently.

In addition, the preferences of respondents with regards to the alternative ways in which they can legally access fishing and sell their catch were assessed: (1) with fishing permits of their own (individual permits), (2) as a member of a cooperative that holds fishing permits, (3) working under the permits of individual permit holders (locally called "permisionarios"), or (4) working under the permits of a cooperative (not as member of the cooperative). Interviewees were told to assume that any of the offered options was equally feasible in practice. Interestingly, 73% of respondents would prefer working with fishing permits of their own (individual permits), only 20% would prefer working as a member of a cooperative that holds fishing permits; and no one would prefer working under the permits of individual permit holders or "permisionarios". Ironically, this is the most common way for fishers to access fishing permits and legal authority to sell products in Bahía de Kino [14].

4.2.6. Attitudinal differences among groups of fishers (Likert-scale)

Convincing evidence of differences exist between the island and bay group concerning attitudes toward resource-use regulation for fish species ($p < 0.01$), perception of performance of local authorities ($p < 0.01$) and perception of the need for reinforcing implementation and enforcement of current rules by local authorities ($p < 0.01$) (Table 3).

Respondents of the bay group tend to show a more negative perception of how local authorities have performed and are more supportive of an increase in enforcement of current regulations, than respondents of the island group, who tend to be more cautious about those topics. Differences in perceptions might be explained by the fact that the primary target species of the bay group (octopus and pen shells) are not subject to any formal regulation (Table 1), while the main species targeted by the island group are subject to official restrictions (norms regulating lobster and sea cucumber harvesting) (Table 1). Respondents whose target species are already regulated may fear or be less likely to accept an increase in enforcement. Nonetheless, in spite of these differences, it should be noted that respondents of both groups

Table 3
Results of Mann–Whitney *U*-tests between fishers of the island and bay group per statement. Values between brackets indicate the number of respondents.

Statements	Mean rank		*p*-Value
	Island group	Bay group	
Fishers' attitudes toward access regulation			
(1) Fishing permits have been useful for controlling the number of people fishing in Bahía de Kino	25.4(27)	19.4(18)	0.114
(2) The movement of divers among fishing villages (e.g., divers from Bahía de Kino to Guaymas and vice versa) is a way in which fishers help each other	25.2(27)	19.7(18)	0.150
(3) Only people from Bahía de Kino should be able to dive in the area of Bahía de Kino	20.9(27)	26.2(18)	0.154
Fishers' attitudes toward resource-use regulation			
(4) *Pen shells* do not need for formal regulation to conserve the species, they recover alone when its natural fishing season is over and the fishers start targeting other species	24.9(27)	20.2(18)	0.212
(5) *Sea cucumber* do not need for formal regulation to conserve the species, it recover alone when its natural fishing season is over and the fishers start targeting other species	25.3(27)	19.5(18)	0.109
(6) *Octopus* do not need for formal regulation to conserve the species, it recover alone when its natural fishing season is over and the fishers start targeting other species	25.7(27)	18.9(18)	0.069
(7) *Lobsters* do not need for formal regulation to conserve the species, they recover alone when its natural fishing season is over and the fishers start targeting other species	23.5(27)	22.3(18)	0.742
(8) *Rock scallops* do not need for formal regulation to conserve the species, they recover alone when its natural fishing season is over and the fishers start targeting other species	24.0(26)	19.0(17)	0.180
(9) The *black murex snail* do not need for formal regulation to conserve the species, it recover alone when its natural fishing season is over and the fishers start targeting other species	16.6(14)	13.5(15)	0.269
(10) *Fish species* targeted by divers do not need for formal regulation to conserve the species, they recover alone when its natural fishing season is over and the fishers start targeting other species	28.0(25)	11.9(17)	0.000*
Fishers' perceptions of performance of local authorities			
(11) Without the support of local authorities, we would not currently have any product to fish in Bahía de Kino	27.2(27)	16.7(18)	0.007*
(12) In Bahía de Kino we need local authorities to implement and enforce current laws	18.8(27)	29.3(18)	0.005*
Fishers' willingness to join cooperatives			
(13) Today it is more convenient to be an independent fisherman versus joining a cooperative	24.1(27)	21.4(18)	0.491
(14) Today the principal reason for joining a cooperative it to have access to fishing permits	24.4(27)	20.9(18)	0.301

* Significant differences at $p < 0.05$.

tend to support the need for some kind of formal regulation for the majority of the species they harvest (including sea cucumber).

5. Discussion

Studies of what the resource users know about and how they perceive the formal policies that regulate their activity are useful tools to assess the effectiveness of rules designed to manage natural resources to ensure sustainable harvests. These kinds of studies can help policy-makers design regulations that incorporate appropriate biophysical and social characteristics of the setting, so that people's responses to these policies – and hopefully fisheries performances – are improved.

Cinti et al. [14] described the local social and fisheries impact of formal fisheries policies in Bahía de Kino, and discussed whether the formal institutional structure of Mexican fishing regulations is effective in promoting responsible behavior by small-scale fishers. These authors described a system aimed to regulate access to the fishery (the permit system) that sets the standard too high for many real fishers to access fishing permits, tends to promote the disconnection of permit holders (usually absentee operators) from the resource, and intensify rent-seeking interests. Resources and markets tend to be concentrated in a few hands (permit holders' hands), and an informal system[25] of production is created (the fishers that operate the boats and do not own fishing rights). This informal labor system is practically invisible to the federal government, resulting in the exclusion of most fishers (usually more closely attached to the resources and with the most at stake if resources are overfished) from management decisions concerning the fishery. This social structure creates the wrong incentives for effective fisheries management, incentivizing illegal fishing rather than discouraging it. In addition, the authors highlight their observation that overuse is also promoted by the absence of legally binding norms to regulate resource uses in most of the species targeted by local divers, the lack of knowledge on these species' population status, and an insufficient system for enforcement and control.

This article reinforces and complements the results presented by Cinti et al. [14], from the perspective of resource-users, suggesting that:

(a) There exists an unequal distribution of fishing rights. None of our interviewees had fishing permits in their names (as individual permit holders) and only 18% were members of cooperatives holding fishing permits. Nonetheless, these cooperatives did not commercialize their harvests through their cooperatives, which means that they are also highly dependent on external buyers or other permit holders to sell their product. In addition, obtaining a more even distribution of fishing permits, granting them to the users of resources (not to absentee operators), was a major suggestion by local fishers.
(b) Current policies and policy changes do not reach the fishers in a direct and formalized way, and they are shaped with no participation of local fishers. Permit holders are the only ones legally involved in the fishery, and consequently, the only ones informed about regulatory measures, policy changes, or government benefits available to them. The result is that fishers, operating under permits held by others do not have thorough knowledge about existing rules.
(c) The existing system for monitoring and enforcing current rules is inefficient as reflected by fishers' willingness to reinforce vigilance and improve authorities' response to illegal fishing.
(d) There exists the need to implement additional regulatory measures on most of the species targeted by local divers because of a generalized state of overfishing.
(e) There is a strong willingness of resource users to improve the condition of local fisheries through implementation of regulatory measures.

Even when local fishers have no formal rights to resources, weak organization, limited power, limited access to information, and insufficient institutional support, their attitudes and demands show that potential for implementation of improved fishing regulations exists. This is particularly important since it may provide the basis for the development of locally supported management strategies, with a higher likelihood of compliance and a higher potential for managing these resources sustainably. Nonetheless, it is important to acknowledge that regardless of the strong support by local fishers towards increased enforcement of existing regulations and implementation of new ones, most of these fishers are working informally and hence not complying with legal requirements in some aspect or another. Thus, it is suggested that before any significant change is made on how regulations are implemented and enforced, local fishers should be approached in a non-threatening way and opportunities for them to regularize their activity should be provided.

The new fisheries act adds to the pre-existing list of management tools the possibility of developing species-specific management plans, and "Regional Fishery Ordinance Plans" ("Programas de Ordenamiento Pesquero"). Each of these plans must define the area to be incorporated into the plan, provide a list of users, the species subject to use, and the species-specific management plans available for the species of concern. As initially suggested by Cinti et al. [14], an institutional tool like this could be used in Bahía de Kino to grant exclusive access to the community (or to a group of neighboring communities) within the limits of their fishing grounds, and serve as a protective umbrella to help avoid intrusions from outside. Also, providing exclusive use or property rights on the users of resources (individually or collectively) for specific fisheries (and – controllable – areas) within these limits may provide additional incentives to avoid internal competition for resources among local groups or individuals. These could be approached through the use of rights-based mechanisms[26] already available in Mexican legislation (i.e., CONAPESCA's fishing concessions or SEMARNAT's species-specific permits that provide exclusive use-rights over one or more species within a specified area; MPAs that may grant exclusivity of access to certain groups or communities) or through exploring others that may have proved promising in other places under similar circumstances. Our results could be used as a preliminary baseline to initiate the discussion among fishery stakeholders from the diving sector of Bahía de Kino towards implementation of improved fishing regulations.

This does not mean to imply that the permit system has to be necessarily eliminated, but instead elements of its design modified (to reduce the chances of achieving unfavorable outcomes) and combined with rights-based mechanisms. Some of these modifications (which may be useful for the permit system beyond Bahía de Kino) might include: (a) Ease the requirements for accessing fishing permits so that resource users are able to successfully request them. (b) Give preference to resource users in

[25] The informality of this fishing sector is such that most fishermen do not even have national identification credentials (locally referred as "Credencial de Elector") that would allow them to vote.

[26] Approaches that tend to eliminate 'the race for fish' and provide incentives for fishery stakeholders to participate in management decisions and increase compliance with regulations (e.g., territorial use-rights in fisheries or TURFs, marine tenure systems, use-rights to a certain gear or to an amount of a resource granted to individuals, groups of individuals or communities) (see [2] and [24]).

the allocation of permits that are made available. (c) Limit the number of boats each permit holder could register into the fishery. This would make room for others to access fishing rights and discourage concentration of resources in a few permit holders. (d) Limit the number of permits each permit holder could hold (to avoid concentration). Nonetheless, it is advisable that permits are kept multi-specific (or that each permit holder be allowed to accumulate a number of permits for different species), to allow for diversification to better cope with resource fluctuations. (e) Revoke permits that are badly used or not in use by their holders so that they can be reallocated to people with long history into the fishery. (f) Be more strict in the application of the rules to revoke permits so that permit holders have more incentives to comply with rules, and permit holders that fail to comply make room for others to access these permits. (g) Significantly improve control measures to increase the chances of detecting violations such as the concealing of illegal catch under current permits, particularly in processing plants considering that one of the main reasons for local fishers to harvest illegal products is the existence of buyers willing to buy them. (h) Provide incentives for rule compliance through combining the permit system with rights-based tools and more inclusive management approaches.

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