

# Mexican Pacific Shrimp – Bottom Trawl FIP

## Changes to the default Tree (V1.3 to V2.0)

Principle	Component	PI	Performance Indicator	Key changes from v1.3 to v2.0, for each PI	v1.3 Scoring Level	v2.0 Likely Scoring Level	Rationale
1	Outcome	1.1.1	Stock status	<p>Stock status now scored against ‘a level consistent with MSY’ in Scoring Issue b (SI b), instead of whatever reference points were being used as the ‘target’ in the fishery.</p> <p>New guidance provided on use of proxies for scoring stock status (including F), and in scoring SI b re ‘fluctuations around’ an MSY-consistent level (GSA2.2.2-4).</p>	<60	<60	<p>Determination of stock status is limited, as regular stock assessments are not carried out for all species in every region. The last comprehensive assessment is over 13 years old and out of date (INP, 2000). According to CNP (2012) the shrimp fishery of the Pacific coast is exploited at the maximum sustainable level, but no details are provided on the sources or references, therefore the “official” status is not of much value.</p> <p>Shrimp are highly productive and resilient to fishing pressure, but recent stock assessments showed that brown shrimp stocks are at or near MSY level and blue and white shrimp are substantially below MSY. Analyses of relative abundance also indicate relative stability for brown shrimp, but generally declining trends for blue and white shrimp stocks. No spawner-recruit relationship has been demonstrated at the stock levels observed, and there is no information to determine if the blue or white shrimp stocks with low biomass are at levels that threaten recruitment.</p> <p>Each year, INAPESCA conducts surveys of shrimp during the season and in the closed season, and after determining that adequate recruitment and growth occur, they recommend the best dates for the season to re-open. This annual information suggests that recruitment has not been impaired for any of the stocks, but trends in abundance indices suggest otherwise for blue and white shrimp stocks.</p> <p>Even though managers do not currently use MSY reference levels to make decisions, from current and past stock assessments it is evident that the blue shrimp stock has been below MSY levels for the</p>

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							past 16 years (since the 2000 assessment). Perhaps the fishery has not collapsed because stock-recruitment has a (positive) environmental component (such as that shown by ENSO correlations) that counteracts or masks the effects of fishing pressure. The implementation of MSY- reference points would help to minimize the risk of recruitment impairment if the stock were kept above the limit, and the target reference point would keep the stock around Bmsy if met.
			Reference Points	<p><u>PI removed in v2.0 assessment tree</u></p> <p>‘Outcome’ reference points (e.g. MSY and PRI or proxies) considered in PI 1.1.1 in the scoring of stock status.</p> <p>‘Trigger’ reference points (e.g. Btarget, Blim) considered in PI 1.2.2 as elements of the fishery HCRs.</p> <p>The existence of reference points in the fishery stock assessment is now scored in PI 1.2.4 in SI b.</p> <p>Reference points used in key LTL fisheries now used in scoring PI 1.1.1 (using the special PISGs applicable to LTL stocks – Table SA2). New guidance on scoring F in GSA2.2.15.</p>	60-79		
		1.1.2	Stock Rebuilding	<p>PI now scored whenever PI 1.1.1 scores &lt;80. In v1.3 this is PI 1.1.3, in v2.0 this is now PI 1.1.2.</p> <p>Rebuilding timeframe must be no longer than 20 years or 2 generation times to achieve a 60 scores (compared to 30 years or 3 generation times previously) – SI a.</p>	<60	<60	At the point of the last official stock assessment (INP 2000) and the 2006 and 2012 FMPs, no rebuilding of brown shrimp was considered necessary, as the stock appeared to be at or near MSY. Recent analyses show that the stock is stable and possibly showing greater abundances in recent years. Stock assessments for blue shrimp and white shrimp have, however showed abundance levels substantially below MSY, and stock status for both species is

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				Exploitation rates (e.g. F) must be specifically considered in scoring SI b at the 80 level (see SA2.3.4 and GSA2.3.4), where such information is available in the fishery.			classified as “deteriorated”. No signs of recovery are evident for either of these species’ stocks. General measures to achieve sustainability and rebuild declining or depleted stocks were outlined in the 2006 FMP (INAPESCA 2006). The main strategy is to control fishing effort.  Based on the latest blue shrimp assessment, it does not appear that management actions or recovery plans have improved the status of the stock. Regular assessments are recommended to monitor success of rebuilding plans.
	Management	1.2.1	Harvest Strategy	Requirements for scoring shark finning (SI e) are strengthened in v2.0, especially at SG80.  New SI f requires consideration of the use of the potential of alternative measures to reduce the mortality of unwanted catches in the fishery (as applied also to species in P2, see sections SA3.5.3 and related guidance).	< 60	< 60	The official management strategy prescribes the use of MSY reference levels. However, stock status is not evaluated consistently or periodically by means of production model assessments, and abundance in relation to those levels is unknown for most stocks. Even if relative abundance and recruitment are measured appropriately.  The de facto management strategy is built around the high productivity of the shrimp stocks, closure of the fishery when berried females occur, voluntary cessation of fishing when CPUE drops to unprofitable levels, and areas closed to shrimp trawling for waters 5 fathoms or less in depth and within nine km or the mouth of estuaries. It is not clear what proportion of berried females or what other measure of reproductive activity would trigger a closure. The fishing season begins on variable dates by species and area, as recommended by INAPESCA based on scientific surveys that are carried out during the closure. The dates are determined when the peak reproductive period has ended, when the shrimp have grown to a suitable (commercial) size that optimizes yield; when the harvestable biomass in shallow protected areas reaches maximum levels

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							<p>(meaning that recruitment to fishing areas begins); and when the time is also suitable to the cultural and economic needs of the community.</p> <p>Determination of the optimum times (dates of opening of each fishery) are critical for each fleet to obtain the desired yield. A minimum mesh size is intended to retain marketable shrimp but to allow smaller organisms to pass through. The management system restricts specified trawls to deeper waters, and cast nets (suriperas) and entanglement nets (chinchorros) in the shallower waters. Fishing for brown shrimp is restricted to depths deeper than the normal distribution of blue and white shrimp, leaving blue and white shrimp as mostly artisanal fisheries. However, the management allows sequential inshore (artisanal) to offshore (industrial) fishing and heavy fishing pressure on the stocks, which could lead to overharvest.</p> <p>The management strategy responds, at least partially, to the state of the stock, as stock status evaluations are carried out each year during the closure to determine both, the date of closure and reopening of the season. The goal is to maintain the stock within biological limits by verifying the precise timing of peak reproductive activity. Each stock is analyzed to estimate the size and sex structure, the state of maturity of females, the growth and migration patterns, and the relative abundance (spatial-temporal and bathymetric) observed during the open and closed periods. Thus, exhaustive surveys are carried out each year to determine the time of closure and start of the fishing season, but it is not clear if and how results from other stock assessment analyses are used as part of the harvest strategy. It is not clear either if the strategy has</p>

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							<p>achieved the goal of maintaining MSY or if recovery of blue or white shrimp has been attained.</p> <p>From the above, it appears that the harvest strategy is really based on maintaining CPUE rather than on meeting reference points. Stable CPUEs, however, could be far from MSY levels. Without proper stock assessments, there is no scientific basis to scale CPUE to MSY. This alone, indicates that the harvest strategy does not meet the objectives, as management actions are not based on the state of the stock but on biological and economic considerations. Given that the actual strategy seems to be more responsive to environmental variation, perhaps the goals of management should be redefined if maintaining MSY levels is not an appropriate target. In this case, it should be demonstrated that the fishery has limited or no effect on abundance, and that it is solely driven by environmental factors. The management plan and CNP should be modified accordingly, with objectives that are in line with the assumptions and with the actual management strategy. Otherwise, the de facto harvest strategy has to be modified to meet the current objectives.</p> <p>Although some past reports show interaction of the UoA with sharks, it is likely that shark finning is not taking place, but there is a need to corroborate this.</p>
		1.2.2	Harvest control rules and tools	<p>Definitions of 'generally understood' and 'well-defined' HCRs now provided (as used in SI a, see end of guidance section GSA2.5).</p> <p>'Available' HCRs may now achieve a 60 score in specific situations where the stock is still abundant and there is a reasonable</p>	<60	<60	<p>The HCRs that are in place are expected to reduce the exploitation rate as the point of recruitment impairment (PRI) according to managers. INAPESCA monitors shrimp reproductive cycle, with the intent to leave enough adult shrimp to generate adequate recruitment for the next year. In addition, the fishery closes annually when berried females appear, which generally coincides with declining CPUE and reduced (economic) interest in</p>

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				<p>expectation that they will be applied (SA2.5.2-5 and related guidance).</p> <p>Specific consideration must be given to current exploitation levels (e.g. F) where available in scoring SI c (see SA2.5.6-7 and guidance).</p>			<p>fishing by fishermen. The season starts again when the peak reproductive activity ends, recruits attain commercial sizes, and the relative abundance by species, zone, and area is adequate, in comparison with historical trends. However, it is not clear how INAPESCA knows that the abundance of shrimp (observed in the experimental fishing conducted in each area) meets the recruitment requirements.</p> <p>While there is intent to stop fishing in time to assure recruitment in a normal range, the information describing the rules in place to deal with declining biomass, other than the closure during the peak reproductive period, is not available. The available analyses suggest that INAPESCA uses a variety of robust quantitative tools to inform the decisions, and that uncertainty is considered. The management system would have to deal with a serious abundance decline on an ad hoc basis, in which INAPESCA would have to determine that a problem exists, and take evidence of the problem and recommendations to CONAPESCA. CONAPESCA would determine what, if any, actions are required. Thus, the control rules are not well defined or are not disclosed outside INAPESCA/CONAPESCA.</p>
		1.2.3	Information and monitoring	<p>To achieve a 100 score, “a comprehensive range of information” should include information provided by a strategic research plan (moved here in v2.0 from PI 3.2.4 of v1.3 tree). See SA2.6.3.</p> <p>Specific consideration needed on stock structures and uncertainties, including in fisheries based on ‘metapopulations’ (see new guidance added to the UoC section, G7.4.7-7.4.9, and in GSA2.6.1, also relevant to HCRs PI 1.2.2).</p>	60-79	60-79	<p>The fishery monitoring system produce sufficient relevant information related to stock structure, stock productivity, fleet composition and other data that are available to support the harvest strategy.</p> <p>For example, all fishermen must register with the government, so the legal fleet is well known. However, 10-15% of the catch is illegal, so the actual fleet is likely larger than the registered fleet. There are no estimates of shrimp catch during the closed period, but fresh shrimp are reported as readily available. Catch reporting is poor, with substantial amounts of catch unreported. Analysts make</p>

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							<p>assumptions about the unreported catch to account for total catch.</p> <p>Related to stock abundance and UoA removals are regularly monitored at a level of accuracy and coverage consistent with the harvest control rule, and one or more indicators are available and monitored with sufficient frequency to support the harvest controls. The management system collects biological samples from a substantial portion of the commercial catch to obtain species and size composition. The number of vessels and gears are also monitored on a regular basis. Fishery-independent surveys collect data during the closed season, which lead to the recommendations for opening dates the following season. Fishery-dependent and -independent data have not been integrated in comprehensive assessments. Surveys occur annually but stock assessments are only performed sporadically, most recently in 2016 for blue shrimp. Comprehensive stock assessments should be carried out regularly for all species and fishing areas to monitor abundance over the medium-to long term. Annual abundance estimates must be used to tune stock assessments. There are clear improvements in scientific research and management of the fishery. A wealth of scientific information has been generated in recent years to support the harvest strategy, but in some cases the link between science and management is not clearly established. The biological information generated from annual surveys is used as the main criteria to assess the relative stock status and to define the beginning and end of the fishing season. While this management action complies with short-term objectives, it does not maintain the stock at MSY levels. A 2016 assessment of the blue shrimp stock provided MSY reference values, but it is not clear if and how these are used to inform the</p>

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							harvest strategy. Regular stock assessments are needed to guide annual management decisions, and to monitor stock recovery and fishery performance over the long-term.
		1.2.4	Assessment of stock status	SI b now requires at SG80 that the assessment estimates stock status relative to reference points that are appropriate to the stock and can be estimated (moved here from PI 1.1.2 in the v1.3 tree).	<60	60-79	<p>The assessments -when developed- are appropriate for the stock and for the harvest control rule. INAPESCA's assessments have used the Fox and Shaeffer production models, age-structured delay-difference models (Deriso approach) and fishery-independent surveys to assess the status of the shrimp stocks in the Gulf of California. However, INAPESCA does not conduct stock assessments on a regular basis, even though data exist, because of limitation in staff time. The models that are currently applied are stochastic non-equilibrium biomass dynamic models, which respond best to longer time series and account for observation, model, and environmental uncertainty.</p> <p>The fishery-independent surveys track recruitment and reproduction annually, and results are used to track if values fall within a normal range and to follow trends in biomass and spawning biomass. While the assessments do estimate stock status relative to the reference points, the (official) assessments are too old (INP, 2000) to represent the current status of the stocks. Recent stock assessments published in the scientific literature (in 2012) are only available for a few areas (White and Brown shrimp in Sinaloa-Nayarit, Blue shrimp in the Upper Gulf).</p> <p>The link between stock assessment and management is not well defined, as the seasonal closure responds to biological information and relative abundance indices, not to absolute abundance levels calculated through stock assessment.</p>
2	Retained Species	2.1.1	Outcome	Species need to be re-categorized as either primary, secondary or ETP. Primary species	<60	<60	The artisanal suripera shrimp fishery of Sinaloa is taking part in a FIP since 2010 and has continually



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	(Primary species in v2.0)			<p>are those that are not covered under P1, are within scope of the MSC (i.e. not a bird, mammal, reptile etc) and that have management tools in place intended to achieve stock management objectives reflected in either limit or target reference points (see SA3.1.3 and related guidance).</p> <p>There are now separate scoring issues in this PI – one for main species and one for minor.</p> <p>Main species are those that are 5% or more by weight of the total UoA catch or ‘less resilient’ and 2% or more by weight (see SA3.4.1 to SA3.4.5 and related guidance). The species below these thresholds are minor.</p> <p>Main species are assessed in SI a in relation to the likelihood that they are above the point of recruitment impairment (PRI).</p> <p>At SG60, if a species is below the PRI the UoA needs to have measures in place that are expected to ensure that they do not hinder recovery and rebuilding of the species). This is in line with v1.3.</p> <p>If a species is below PRI, to meet SG80, the team need to determine if there are other MSC certified or in-assessment fisheries (UoAs) that also have this species (stock) as ‘main’.</p> <p>The team then needs to determine if there is ‘evidence of recovery’ of the species – e.g. direct evidence from a time series of stock status or estimates that show that <math>F &lt;</math></p>			<p>monitored and reported bycatch levels. In a bycatch study (Balmori and Morales, 2012) of the artisanal shrimp fleets operating in coastal bays of Sinaloa, they identified 15 species using suripera nets, but no primary species or species of particular concern were reported. Continued bycatch monitoring from this fleet will help to produce more precise species categorizations.</p> <p>Since the target species in the coastal lagoons and estuaries of Sinaloa is the blue shrimp, the other shrimp species harvested in lower proportions can be considered as main primary species. The catch composition varies every season, but biological surveys in this area during the off-season suggest that brown and white shrimp generally represent less than 5% of the catch. However, catch composition showed greater proportions with up to 36.5% of white shrimp during the 2016 season.</p> <p>Based on the latest INAPESCA (2016) analyses, the brown shrimp and the white shrimp stocks of Sinaloa-Nayarit are fully exploited, considering current catch compared to average catch. In addition, previous stock assessments have shown that all shrimp stocks (blue, brown, and white shrimp) in this region have been overfished since the mid-90s, in particular blue and white shrimp. A stochastic biomass dynamic assessment (Meraz-Sánchez et al., 2013) showed that brown shrimp in Sinaloa-Nayarit was below MSY levels, but that fast recovery was expected if sustainable effort levels were applied (fMSY = 2048 fishing trips and MSY= 9050 t). A similar assessment for the white shrimp of Sinaloa-Nayarit (Madrid-Vera et al., 2012) suggested that stock size had decreased significantly and that 50% of the catch between 1992-2010 had been consistently below MSY (3600 t). The authors concluded that the stock was overfished and in need of recovery. A PRI has not been determined,</p>

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				<p>FMSY (see SA3.4.6 and associated guidance)</p> <p>If there is no 'evidence of recovery', the team would need to determine if there is a demonstrably effective strategy in place between all MSC UoAs which categorize this species as main to ensure they do not collectively hinder recovery and rebuilding.</p> <p>SI b is scored at the SG100 level only if any minor species have been identified. It requires that where minor species are below the PRI, that there is evidence that the UoA does not hinder recovery and rebuilding.</p>			<p>so we cannot determine if the stock is likely above PRI. Thus, the fishery cannot score at least 60 until better assessment of stock status occurs.</p> <p>There is a strategy in place and reference points to manage the three main shrimp species in the Pacific Ocean, as described under Principle 1, consisting of the minimum stock biomass at the end of the season that can promote recruitment the following season. The proportion of mature females and the size structure that maximize yield and economic yield per recruit are considered for opening the fishing season. MSY reference points are not used to manage the fishery. Thus, to score this indicator, based on stock assessment results, we conclude that main primary species, particularly white shrimp are unlikely to be above the Bmsy, and that the management measures in place have not succeeded in the recovery and rebuilding of the stocks. From existing information, no minor primary species were found, but better species determinations can be made as more bycatch information becomes available.</p>
		2.1.2	Management	<p>The scoring issue on whether the strategy is achieving its objective was a separate SI in v1.3 but has been combined into the overall scoring issue on management strategy implementation (at SG100 level only).</p> <p>Requirements for scoring shark finning (SI d) are strengthened in v2.0, especially at SG80 (see SA2.4.3 to SA2.4.7 and associated guidance).</p> <p>New SI e requires consideration of the use of the potential of alternative measures to reduce the mortality of unwanted catches in the fishery (see sections SA3.5.3 and related</p>	<60	60-79	<p>Although there is no strategy in place for the UoA, since explicit regulations for retained species were not provided in the amended regulation (NOM-002-SAG/PESC-2013); some measures are acknowledged as part of the bycatch, which is addressed and this are expected to maintain the main primary species. All shrimp species in the Pacific are managed by the NOM, which includes measures to reduce fishing effort (vessel and gear specifications, seasonal and permanent area closures, catch quotas by region, etc.).</p> <p>The regulations have been tested marginally through fishing experiments, for example using modified gears or mesh sizes. Thus, only experimental evidence has been presented so far, however, the proportion of bycatch/ retained</p>

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							<p>species is likely to decrease with the introduction of the new measures.</p> <p>Regular monitoring of all shrimp species is in place as part of the strategy, so any drastic changes in abundance would be detected.</p> <p>Finally, there is a high degree of certainty that shark finning is not taking place, since sharks are not targeted, neither part of the bycatch of the UoA.</p>
		2.1.3	Information	<p>SI a is assessed in terms of whether the information is adequate to estimate the impact of the UoA on main species. Scoring issue (b) is assessed on whether information is adequate to assess the impact of the UoA on minor species (SG100 only) (see SA3.6.3, its sub-clauses and associated guidance).</p> <p>If the RBF is used for any species/species groups in PI 2.1.1, the RBF alternative in scoring issue (a) is required to be used (see SA 3.6.1)</p> <p>The v1.3 scoring issue on 'monitoring' has been removed, but teams are required to consider whether there is adequate information to detect any changes in risk level to main species as part of scoring issue (c) (see SA3.6.4 and associated guidance).</p> <p>Teams are also required to report the catch and UoA-related mortality of all main species together with a description of the adequacy of the information (see SA3.6.2 and sub-causes).</p>	<60	< 60	<p>No suitable information exists for effectively managing the retained species. The fishery reportedly retains only small amounts of non-target species; but recent research suggests that retained species may make up to 30% of the incidental catch, which may represent a large volume in relation to shrimp catch. These estimates are yet to be confirmed quantitatively,</p> <p>A number of studies on shrimp trawl bycatch have now elucidated the species composition and have found what the main retained and discarded groups are. The volumes retained or discarded by species, however, are not evaluated on a regular basis and are not known with certainty. Only qualitative information on retained species of economic value is available. Further research on bycatch species of economic importance (often retained) is described in the Bycatch indicator section below.</p> <p>Information for brown and white shrimp is available from regular monitoring of the fishery, which is analyzed regularly and used to support the (shrimp) management strategy described under P1. Once updated information from bycatch monitoring is available, this indicator could receive an unconditional pass, as long as primary species monitoring and analyses are updated regularly and reports are presented as evidence.</p>

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	Bycatch species  (Secondary species in v2.0)	2.2.1	Outcome	<p>Species need to be re-categorized as either primary, secondary or ETP. Secondary species are those that are not covered under P1, are not primary, and are out of the scope of the programme but the definition of ETP is not applicable (e.g. non-ETP birds, mammals, reptiles etc) (see SA3.1.4 and sub-clauses).</p> <p>There are now separate scoring issues in this PI – one for main species and one for minor.</p> <p>Main species are those that are 5% or more by weight of the total UoA catch or ‘less resilient’ and 2% or more by weight (see SA3.4.2 to SA3.4.5 and related guidance). In addition, all ‘out-of scope’ species are main (see SA3.7.1 and sub-clauses). In-scope species below these thresholds are minor.</p> <p>Main species are assessed in scoring issue (a) in relation to the likelihood that they are above biologically-based limits.</p> <p>At SG60, if a species is below the biologically-based limits the UoA needs to have measures in place that are expected to ensure that they do not hinder recovery and rebuilding of the species). This is in line with v1.3.</p> <p>If a species is below biologically based limits, to meet SG80, the team needs to determine if there is evidence of recovery or a demonstrably effective partial strategy such that the UoA does not hinder recovery/rebuilding.</p>	<60	< 60	<p>Trawl nets in the Gulf of California could have bycatch amounts to up 90% of the catch. Some portion of the bycatch may be retained (about 30% are species of commercial value), but the majority is discarded.</p> <p>The INAPESCA biologists monitor the proportion of bycatch, but do not estimate amounts by species. In the Gulf of California, the shrimp bycatch comprises approximately 242 benthic-demersal fish species, crustaceans, mollusks, and echinoderms, with fish being the dominant group.</p> <p>The trawl nets in the Mexican Pacific states catch on the order of 1:9 to 1:15 retained shrimp to bycatch, with an average of 1:9.7 through 2010. This ratio has been used as an indicator of trawling effects on bycatch, but it is highly variable and is not considered a reliable measure.</p> <p>It varies significantly within and between the Mexican states in the Gulf of California. The species composition depends on the season of the year, the fishing area, depth, currents, gear, and a number of other factors; a total of 366 species bycatch species have been reported. Approximately 114,000 tons of bycatch are discarded each season in the Mexican Pacific from the shrimp fishery. Of the total, less than 30% is retained.</p> <p>No other determination of the status of the bycatch species has been made. Shrimp trawl fisheries often generate substantial opposition from stakeholders because of bycatch, which could lead to objections.</p>

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				<p>In addition, if the catches of the secondary species are 'considerable' (i.e. greater than 10% fisheries (UoAs) that also have 'considerable' catches of this species (stock).</p> <p>If there are other MSC UoAs that also have 'considerable' catches, the team needs to determine if there is 'evidence of recovery' of the species – e.g. direct evidence from a time series of stock status or estimates that show that <math>F &lt; FMSY</math> (see SA3.4.6 and associated guidance)</p> <p>If there is no 'evidence of recovery', the team would need to determine if there is a demonstrably effective strategy in place between all MSC UoAs with 'considerable' catches of this species, to ensure they do not collectively hinder recovery and rebuilding.</p> <p>SI b is scored if any minor species have been identified, and is assessed only at the SG100 level. It requires that where minor species are below biologically based limits, that there is evidence that the UoA does not hinder recovery and rebuilding.</p>			
		2.2.2	Management	Same comments as for PI 2.1.2, but note differences in SGs.	<60	< 60	<p>The most recent proposal to amend the regulation (DOF 2012) reinforces the compulsory use of TEDs and addresses the need to implement fish-exclusion devices FEDs to reduce bycatch mortality.</p> <p>The new regulation proposes the compulsory use of FEDs in commercial shrimp vessels, and is based on evidence that these devices reduce incidental catch of non-target species by approximately 40%. Technical specifications for the design and installation of FEDs are also provided in the proposed amendment. The new commercial trawl</p>

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							catch logbooks will include the volume of discards and retained species by species.
		2.2.3	Information	Same comments as for PI 2.1.3.	<60	< 60	<p>There is information on the proportion of bycatch in the trawl and the artisanal fleets. Most of the bycatch species have not been studied and the impact of this fishery upon them is yet unknown. There are some estimates of bycatch volumes for some key species. However, it is difficult to relate the mortality of the bycatch to the stock status of the main species or to design specific measures to manage bycatch. Researchers acknowledge that bycatch affects the yield, abundance, and structure of some of the main bycatch species (e.g., flounders, triggerfish, swimming crabs) that are targeted by coastal fleets.</p> <p>The taxonomic composition of the bycatch species was evaluated in 2004-05 through onboard observer data collected from the Guaymas trawl fleet in the Eastern Gulf of California. It showed a total of 240 species, including fish (70%), mollusks, crustaceans, echinoderms, and sponges, the majority of small sizes. Presence/ absence data and the relative amount present in the samples were recorded. About twelve species represented 60% of the samples, which can be an indicator of the main bycatch species. Observer projects aim to be continued to better understand, conserve, and manage the species associated to the shrimp fishery. Another study (2012) reported 366 bycatch species from shrimp trawls, suriperas, and chango nets in Sonora, Sinaloa, and Nayarit.</p> <p>Various population dynamic studies on growth, natural mortality, size-age structure distribution, abundance, reproduction, and recruitment of key bycatch and economically important species (eg., flounder, triggerfish, snooks, grunts, guitarfish, goatfish, stingray, mojarra, sand perch, lizardfish</p>

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							<p>mantis shrimp, swimming crab, etc.) have been conducted in recent years (2007- 2011). These will help in the development of management plans for those main species.</p> <p>A number of technological alternatives are being tested to increase the selectivity, reduce bycatch, and maintain or increase efficiency of the different nets used in the shrimp fisheries of the Pacific coast of Mexico. Modifications include excluder devices for marine mammals (with particular emphasis on the protection of vaquita), fish, mollusks, and crustaceans of different sizes and shapes (fish-excluder devices, FEDs; bycatch-reduction devices, BRDs), turtle-excluder devices, TEDs for turtles; different mesh sizes; and lighter materials, different net shapes; smaller and lighter doors, etc. to reduce impact on the sea floor.</p> <p>The status of bycatch species in relation to biologically based limits remains largely unknown and would prevent this indicator from obtaining a passing score, particularly for the trawl fleet. If data continue to be collected to estimate the actual risk to main bycatch species, a higher score might be obtained. In the case of artisanal gears, they are themselves a partial strategy to manage bycatch, and data is being collected and analyzed to detect increases in risk (see López-Martínez and Morales-Bojórquez, 2012).</p>
	ETP species	2.3.1	Outcome	Species need to be re-categorized as either primary, secondary or ETP. ETP species are those recognized by national ETP legislation and listing in the binding international agreements including CITES and Agreements concluded under the Convention on Migratory Species (CMS) (see SA3.1.5 and associated guidance).	60-79	60-79	Three protected species/groups, the vaquita, totoaba, and sea turtles, occur in the area of the shrimp fishery in the Gulf of California. INP reports that trawls do not interact with vaquita, and that the area of distribution for vaquita and totoaba are closed to fishing. Other conservation groups and the protected area authorities (SEMARNAT- CONANP), however, indicate that incidental capture of marine mammals (including vaquita) and totoaba (up to 120,000 juveniles annually) occur in the shrimp

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				<p>In addition, out of scope species (e.g. bird, mammals) categorized as vulnerable, endangered or critically endangered on the IUCN redlist shall be considered ETP (see SA3.1.5 and associated guidance).</p> <p>SI a put in brackets to only be scored when there are national and/or international requirements that set limits for the species (SA3.10.1-2).</p> <p>If SI a is scored, in order to meet SG80, the team need to consider whether the combined effects of the MSC UoAs (relevant within the jurisdiction of the national agreement, or within the area of the international agreement) are within these limits (see Guidance on scoring issue a, GSA 3.10).</p>			<p>fishery. It is difficult to reconcile these opposite views, but it is a fact that conservation efforts for protected and endemic species, particularly vaquita, totoaba, curvina, and marine turtles, have substantial support from many stakeholder groups. This has helped to close areas to fishing, place gear restrictions to mitigate bycatch, improve surveillance in core reserve areas; and to carry out extensive campaigns to preserve ETP species. So these known direct effects of the UoA are likely to not hinder recovery of ETP species</p> <p>If the (more positive) reports by INAPESCA are accurate, sea turtles would comprise the main ETP species of concern. All species of sea turtle in Mexico, except leatherback, are increasing in abundance. Mexico prohibits the take and consumption of sea turtles, as required by CITES. The US Government has certified Mexico as a country that meets US standards for protecting sea turtles. This suggests that the legal fishery is highly unlikely to create unacceptable impacts on sea turtles. However, illegal fishing occurs without TEDs, which would violate national/ international requirements, but the quantity of this activity is unknown.</p>
		2.3.2	Management	<p>The 'alternative' Management PI table in v1.3 has been removed and teams now have the option to either use scoring issue (a) where there are national or international requirements; or (b) where there are not (see SA3.11.2 and associated guidance).</p> <p>New SI e requires consideration of the use of the potential of alternative measures to reduce the mortality of ETP catches in the fishery (see sections SA3.5.3 and related guidance, noting that where those clauses</p>	60-79	60-79	<p>There is an objective basis for confidence that the fishery strategy will work, based on information directly about the UoA and the species involved. For example, the seasonal-area closures, restrictions on gears, depths, and areas, BRDs and TEDs are qualitatively making an improvement on the impact of shrimp nets on ETP species in the Gulf of California shrimp fisheries. The Biosphere Reserve in the Upper Gulf and the Vaquita Refuge were declared mainly to protect vaquita and totoaba.</p> <p>Area closures show an effective and precautionary strategy based on best information. Also, there are additional prohibitions and gear regulations for the</p>



Principle	Component	PI	Performance Indicator	Key changes from v1.3 to v2.0, for each PI	v1.3 Scoring Level	v2.0 Likely Scoring Level	Rationale
				refer to morality of unwanted species there here apply to mortality of all ETP species).			<p>artisanal shrimp fleets that operate in buffer zones of the Reserve and other fishing areas in the Upper Gulf, provided in the reserve’s management plan, which intend to mitigate bycatch of protected species. These include acoustic alarms (pingers), seasonal and area closures within the reserve, and specifications for more selective nets. TEDs are mandatory since NOM-061-PESC-2006. This requirement demonstrates use of best practices. Mexico is a member of the Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC). However, the US Government had de-certified the fishery during 2010 because inspections showed fishermen did not use TEDs; after an effort by the Mexican government, fishermen again used TEDs and the fishery was recertified later that year. The violation of the TED requirement and the illegal trawling without TEDs demonstrates an ongoing need for vigilance in assuring compliance with TED requirements. The US Department of State re-certified the Mexican fishery in 2012 as compliant. Fishery interactions are not considered the driving factor in sea turtle abundance, which are affected more by nesting success and other factors, even for the continually declining leatherback.</p> <p>There is an objective basis for confidence that the partial strategy will work, based on information directly about the UoA and the species involved. Since the U.S. has a program to monitor industry that export shrimp into the country and provides a certification, this could be considered a regular review of the effectiveness and practicality of alternative measures to minimize UoA- related mortality of ETP species.</p>
		2.3.3	Information	SI a is assessed in terms of whether the information is adequate to estimate the impact of the UoA on ETP species (see SA3.6.3, its sub-clauses and associated guidance).	60-79	60-79	The seasonal-area closures, restrictions on gears, depths, and areas, BRDs and TEDs are qualitatively making an improvement on the impact of shrimp nets on ETP species in the Gulf of California shrimp fisheries. Since 1994, there is an observer program

Principle	Component	PI	Performance Indicator	Key changes from v1.3 to v2.0, for each PI	v1.3 Scoring Level	v2.0 Likely Scoring Level	Rationale
				<p>If the RBF is used for any species/species groups in PI 2.3.1, the RBF alternative in scoring issue (a) is required to be used (see SA 3.6.1)</p> <p>The v1.3 scoring issue on ‘monitoring’ has been removed, but teams are required to consider whether there is adequate information to detect any changes in risk level to main species as part of SI c (see SA3.6.4 and associated guidance).</p> <p>Teams are also required to report the catch and UoA-related mortality of ETP species together with a description of the adequacy of the information (see SA3.6.2 and sub-causes)</p>			<p>operating onboard industrial high-seas shrimp vessels in the Mexican Pacific (López González et al., 2012). One of the main goals is to obtain real information on bycatch and capture of ETP species with trawl nets. There is still a low observer coverage (variable by season and area) and although qualitative information is available, more reliable quantitative information is still needed to estimate the rate of interactions and the mortality of ETP species.</p> <p>We are not aware that specific information on turtle interactions is collected for the shrimp fishery. However, managers use this qualitative information and considered adequate to estimate the UoA related mortality on ETP species and to understand the impacts and support the existing policy. Currently the data available cannot provide even a quantitative estimate of sea turtle interactions with or mortality from the fishery, but the information is adequate to support the continued use of the measures to manage the impacts on ETP species</p>
	Habitats	2.4.1	Outcome	<p>Separate SIs now require specific assessment of the status of main habitats (i.e., either commonly encountered habitats and/or vulnerable marine ecosystems [VMEs]) and minor habitats (i.e., all other).</p> <p>“Serious or irreversible harm” is now redefined to more specifically assess whether or not the UoA’s impacts fundamentally alter the capacity of the habitat to maintain its structure and function by considering whether the habitat would be able to recover to 80% of its structure and function within 5-20 years if fishing on the habitat were to cease entirely.</p>	60-79	< 60	<p>Trawling has occurred in the area for 30 years, and trawl impacts have occurred for many years. INP points out that shrimp trawling occurs on soft bottom in highly dynamic area swept by tropical storms and hurricanes. Fishermen avoid rocky reefs, which would tear the nets. The shrimp management plan acknowledges that epibenthic organisms in the path of trawlers would be removed on an annual basis. INP has no concerns for the impacts of trawling on habitat. Trawl fisheries often generate substantial opposition because of habitat damage, which could lead to objections; it seems prudent to have some documentation to support conclusions on the impacts of the fishery. Recent (2004-2005) analyses of the impacts of trawling on habitats in the Gulf of California demonstrate physical alteration of the seabed, and changes in</p>

Principle	Component	PI	Performance Indicator	Key changes from v1.3 to v2.0, for each PI	v1.3 Scoring Level	v2.0 Likely Scoring Level	Rationale
				<p>The area of consideration was changed from “on a regional or bioregional basis” to “on the basis of the area covered by the governance body(s) responsible for fisheries management in the area(s) where the UoA operates”. This means that habitats within the area managed by the relevant local, regional, national, or international governance bodies are considered. However, if the habitat’s range is not completely enclosed within the “managed area”, the team shall consider the habitat’s range both inside and outside that area.</p>			<p>sedimentary structure due to trawling. This likely alters the benthonic community.</p>
		2.4.2	Management	<p>For UoAs encountering VMEs, SI a requires certain components within the UoAs’ measures/strategies. Measures include implementation by the UoA of precautionary measures to avoid encounters with VMEs, based on commonly accepted move-on rules. Partial strategies include implementation by the UoA of precautionary measures to avoid encounters with VMEs, such as scientifically based, gear- and habitat-specific move-on rules or local area closures. Strategies include a comprehensive management plan that is supported by a comprehensive impact assessment that determines that <i>all</i> fishing activities will not cause serious or irreversible harm to VMEs. See SA3.14.2 and related guidance.</p> <p>In SIs b and c, SG80 and SG100 are reworded to allow for “measures/partial strategy” and “partial strategy/strategy” to be evaluated in cases where the higher strategy level was not met (SI a).</p>	60-79	60-79	<p>The basic strategy for habitat protection is to prohibit trawling in shallow water and estuaries. Industrial trawling in the core areas of marine reserves is prohibited, and only artisanal gears are allowed in buffer zones. However, most MPAs are not located in the main areas where shrimp trawling occurs (in the coasts of Sonora, Sinaloa, Nayarit), and only protect 0.91% of potential fishing areas.</p> <p>No other measures seem to exist related to shrimp fishing impacts on habitat. Due to the dynamic nature of the shrimp habitats, as noted above, the impact of the shrimp fishing gears is likely negligible, meaning that the measures are likely to work, based on the managers experience in the fishery but a full assessment needs to document the impacts or lack thereof, particularly for the trawl nets that sweep larger areas. Given the controversy around the negative effects of trawls upon the sea bottom, more documentation of the management measures is needed.</p>

Principle	Component	PI	Performance Indicator	Key changes from v1.3 to v2.0, for each PI	v1.3 Scoring Level	v2.0 Likely Scoring Level	Rationale
				<p>SI c and d have been combined to be SI c in v2.0.</p> <p>SI d was added to assess the cumulative management of impacts on VMEs. If encountered, the UoA must implement precautionary management measures to protect VMEs. At SG60, the UoA must comply with any relevant management requirements (e.g. move-on rules) to protect VMEs against its own impacts. At SG80 and SG100, the UoA must comply both with any relevant management requirements to protect VMEs against its own impacts and with measures put in place by other MSC UoAs or by non-MSC fisheries to protect VMEs.</p>			
		2.4.3	Information	<p>For all SIs, SG60 and SG80 now refer to “main” habitats and SG100 to “all” habitats.</p> <p>If the RBF (CSA) is used for any habitat in PI 2.4.1, the RBF alternative in SIs a and b are used.</p> <p>For UoAs encountering VMEs, SI b at SG80 now requires a certain level of information specific to VMEs and closed areas (e.g. habitat and closed area maps, catch data on VME- indicator species).</p>	60-79	60-79	<p>New information is being collected on the habitats and on the impacts of trawling. The dynamic nature of the habitat is generally assumed; and the vulnerability of soft bottom and rocky habitats to trawling and other nets used in the shrimp fishery are generally well understood (López-Martínez and Morales-Bojórquez 2012). Some physical alteration of the seabed occurs: trawling removes organic matter from the seabed sediment, becoming more sandy. Changes in sedimentary structure due to trawling have also been detected. This likely alters the benthonic community by reducing the number of species associated to the substrate, eliminating some and hindering the recovery of others. On the other hand, due to the high energy of these environments, it is debatable whether trawls have a negative impact over soft, sandy bottoms. These impacts are likely small and reversible, but this has to be better documented.</p> <p>As noted above, due to the dynamic nature of the shrimp habitats, the impact of the shrimp fishing gears is likely small, but a full assessment needs to</p>

Principle	Component	PI	Performance Indicator	Key changes from v1.3 to v2.0, for each PI	v1.3 Scoring Level	v2.0 Likely Scoring Level	Rationale
							document the impacts or lack thereof, particularly for the trawl nets that sweep larger areas. The distribution of habitat types is known over their range, as well as the occurrence of vulnerable habitat types. However, to attain a SG100 score, full quantification of physical impacts and changes in habitat distributions over time need to be measured.
	Ecosystem	2.5.1	Outcome	No key changes.			N/A
		2.5.2	Management	<p>SIs a and b have been combined to be SI a in v2.0. The last two sentences of SI b at SG100 were moved into clauses (SA3.17.2 and SA3.17.2.1, respectively).</p> <p>SG levels 80 and 100 for SI b were reworded slightly to assess the level of confidence of the management strategy's ability and are in line with other changes to P2 management PIs.</p> <p>In SIs b and c, SG80 and SG100 were reworded to allow for "measures/partial strategy" and "partial strategy/strategy" to be evaluated in cases where the higher strategy level was not met (SI a).</p>	<60	60-79	<p>An explicit management strategy does not exist for removing or reducing the risk of the fishery on the ecosystem. There are however some measures for retained catch, bycatch, and habitat which, taken together, may reduce the risk to the ecosystem posed by the shrimp fisheries. In particular, area closures and the seasonal closure for shrimp appear to have an indirect, positive impact on various elements of the ecosystem, even if that was not an intended effect of the regulation.</p> <p>For example, the peak reproductive season of a variety of other species coincides with the shrimp closure in the summer months. Thus, this strategy also protects spawners and recruits of other species. Suripera nets do not pose a high risk to ecosystem components, considering that they are, themselves a partial management strategy. However, explicit measures to manage main secondary species may be required, even if the volumes retained/discarded are minimal.</p>
		2.5.3	Information	<p>SI d is assessed in terms of whether the information is adequate to estimate the impact of the UoA on the ecosystem components.</p> <p>SI e is also now assessed in terms of whether the information or data are</p>	60-79	60-79	An Ecopath-Ecosim simulation for the shrimp fishery represented conditions in 1978-1979. In 2004, another model was built to compare artisanal fisheries based on hook-and-line and gillnets as they coexist with the shrimp fishery. A number of other ecosystem studies have been carried out, analyzing the impacts of the gear and the fishery upon the

Principle	Component	PI	Performance Indicator	Key changes from v1.3 to v2.0, for each PI	v1.3 Scoring Level	v2.0 Likely Scoring Level	Rationale
				adequate instead of whether or not they are sufficient (see Table SA8).			soft bottoms, and individuals, populations, communities, and ecosystem. Results from this comprehensive work (by CIBNOR) help to broadly understand key elements of ecosystem structure and function, as well as the main risks posed by the shrimp fishery, particularly by the industrial trawl sector. It would, however, be useful to identify and understand the main ecosystem elements that would need to be monitored to assure that any impacts to the ecosystem from the UoA remain under control. It appears that the primary and secondary species are the ecosystem elements that need the most attention.
3	Governance & policy	3.1.1	Legal and customary framework	No key changes.	>80	>80	N/A
		3.1.2	Consultation, roles and responsibilities	No key changes.	>80	>80	N/A
		3.1.3	Long term objectives	No key changes.	>80	>80	N/A
		3.1.4	Incentives for sustainable fishing	<u>PI removed in v2.0 assessment tree.</u> Negative subsidies in fishing now considered in scoring P1 and P2 (see GSA2.1 and GSA3.5).			
	Fishery specific management system	3.2.1	Fishery specific objectives	No key changes.	>80	>80	N/A
		3.2.2	Decision making processes	No key changes.	60-79	60-79	N/A
		3.2.3	Compliance and enforcement	No key changes.	<60	<60	N/A
		3.2.4	Research plan	<u>PI removed in v2.0 assessment tree.</u>			

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				Research plan now considered at the SG100 level in the Information PIs in both P1 and P2.			
		3.2.5	Management performance evaluation	No key changes.	>80	>80	N/A