

**Ninth Meeting of the Comité Internacional para la Recuperación de  
la Vaquita (CIRVA-9)**

**Southwest Fisheries Science Center**

April 25-26, 2017

La Jolla, CA

**ACKNOWLEDGEMENTS**

Our appreciation to our funders: WWF Mexico, The Marine Mammal Commission. The views expressed in the report do not necessarily reflect those of the groups named.

Also, our thanks for hosting the meeting at the Southwest Fisheries Science Center/NOAA Fisheries to Cisco Werner, Lisa Ballance and Barb Taylor. Thanks also to Annette Henry for her support during the meeting.

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## EXECUTIVE SUMMARY

The ninth meeting of the Comité Internacional para la Recuperación de la Vaquita (CIRVA-9) was held at the Southwest Fisheries Science Center, La Jolla, California, on April 25-26, 2017.

### THE VAQUITA IS ON THE VERGE OF EXTINCTION

Five dead vaquitas have been recovered in March and April 2017, including one during this meeting. It was confirmed that at least three of these animals were killed in gillnets, and two were perinatal animals with no associated female carcass. A sixth dead vaquita was photographed in December 2016 or January 2017 but a carcass was never recovered. Six sites within the Vaquita Refuge were monitored acoustically from March 6<sup>th</sup> to April 17<sup>th</sup>, 2017. Only two encounters with vaquitas were recorded during this period, far fewer than expected based on detection levels in 2016. Taken together, these observations indicate that the extremely small vaquita population has been further reduced in size in the past few months. CIRVA emphasizes that there is no new evidence to change its longstanding view that entanglement in gillnets is the only factor driving the species toward extinction.

### ILLEGAL FISHING CONTINUES AT VERY HIGH LEVELS

Illegal fishing activity for totoaba has continued at a very high level and poachers are operating openly both day and night in the Upper Gulf. Thus far in this fishing season, the Sea Shepherd Conservation Society has retrieved 150 active totoaba nets and observed a considerable amount of illegal fishing activity. Additional nets have been retrieved in the multi-institutional gear removal program. It is clear that enforcement efforts must be greatly strengthened to prevent this illegal activity from continuing.

### A PERMANENT AND EFFECTIVE GILL NET BAN IS ESSENTIAL

CIRVA welcomes the Government of Mexico's "Agreement Prohibiting the Use of Gillnets for Commercial Fishing in Waters of Federal Jurisdiction in the Northern Gulf of California." However, this Agreement falls short in a number of areas, particularly in that it does not prohibit the possession of gillnets. CIRVA reiterates its previous recommendation that the sale or possession of gillnets on land and at sea should be illegal in the area of the current gillnet ban and on adjacent lands.

### ACOUSTIC MONITORING PROGRAM MUST CONTINUE

CIRVA *recommends* that the regular acoustic monitoring program in the Vaquita Refuge continue in summer 2017. The results of the monitoring program will provide new estimates of population size, trend, and spatial distribution, which will inform the Consortium for Vaquita Conservation, Protection and Recovery (Vaquita CPR) program currently planned for implementation in October-November 2017. CIRVA also recommends that the expert group on acoustic monitoring be consulted to determine the optimal design of a supplemental acoustic monitoring program (in addition to the regular summer program) to determine whether vaquitas continue to exist outside the Refuge.

### VAQUITA CPR IS CRITICAL TO THE SURVIVAL OF THE SPECIES

Given the recent deaths of at least six animals since CIRVA-8 and the high levels of illegal fishing activity in the Upper Gulf, CIRVA believes that the only hope for the survival of the species in the short term is to capture vaquitas and bring them into human care. Therefore, CIRVA strongly endorses the Vaquita CPR plan and recommends that as many individuals as possible are captured in October and November 2017 and held until the Upper Gulf is safe for their return. Based on current conditions, it may be many years before it is possible to return vaquitas safely to the wild. CIRVA recognizes that the risks of capture and captive maintenance are high, but these are greatly outweighed by the risk of entanglement in illegal gillnets in the wild.

Two live vaquitas were observed on May 1, 2017 at the estimated location of 31°01.75'N, 114°45.78'W near San Felipe.

## 1. INTRODUCTION AND WELCOME

The ninth meeting of the Comité Internacional para la Recuperación de la Vaquita (CIRVA-9) was held at the NOAA Southwest Fisheries Science Center, La Jolla, California, on April 25-26, 2017. CIRVA members in attendance included: Lorenzo Rojas-Bracho (chair), Armando Jaramillo-Legorreta, Barbara Taylor, Jay Barlow, Peter Thomas, Andrew Read, Robert Brownell, Greg Donovan (by phone), Frances Gulland, Nina Young, Jorge Urbán, Arne Bjørge, Victor Camacho, Tim Gerrodette, and Randall Reeves. The committee's work was supported by a number of invited

experts who provided presentations and contributed to plenary discussions. Rojas-Bracho chaired the meeting and Read, Thomas, Young, and Reeves acted as rapporteurs. Meeting participants are listed in Annex 1.

Lisa Ballance, Director of the Marine Mammal and Turtle Division, welcomed CIRVA members to the Southwest Fisheries Science Center. Rojas-Bracho reviewed the agenda, which was adopted as amended (Annex 2). Several background documents were provided to meeting participants and are listed in Annex 2.

## 2. ACOUSTIC MONITORING PROGRAM

Jaramillo presented a preliminary analysis of acoustic monitoring results in a reduced sampling grid during March-April 2017. To obtain information about the current status of the vaquita, Jaramillo and his team sampled six adjacent sites from March 6<sup>th</sup> to April 17<sup>th</sup> (42 days). Only 6 of the standard grid of 46 sites used since 2011 were sampled because of anticipated C-Pod losses over much of the area where illegal fishing is known to occur. The six sites were selected outside of areas of illegal fishing as determined from information provided by the Mexican Navy and Sea Shepherd Conservation Society (Fig. 1). These sites (14, 15, 16, 18, 19 and 32) had accounted for an average of 58% of the total clicks detected per year between 2011 and 2016 and, therefore, were expected to be highly informative.

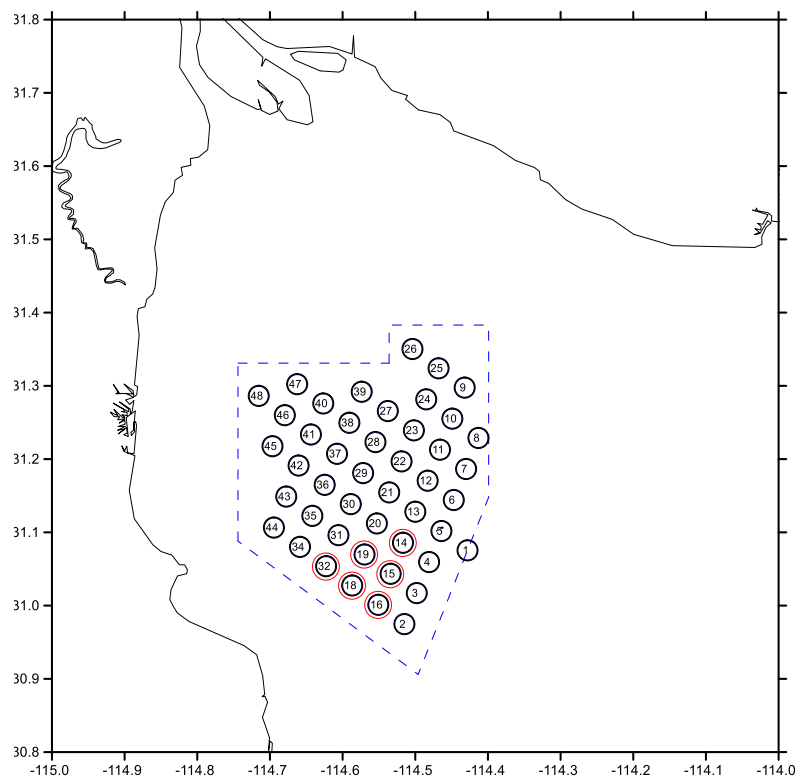


Fig. 1. Acoustic monitoring sites inside the Vaquita Refuge. The standard grid of 46 sites is shown, with the six sites sampled in March-April 2017 are identified by the red circles.

A previous trend analysis indicated an average annual decline rate of 38.8% between 2011 and 2016 (CIRVA-8 2016). A simpler approach, which uses the raw acoustic data as a direct index of changes in acoustic activity, generated an average decline rate of 34.2% per year, well inside the credible interval of the more elaborate formal trend analysis (26.5% - 52.0%). An analogous index based on data from only the six sites listed above provided a decline rate of 35.7%. The consistency of these values indicates that the information from those six sites is a reliable index of population change.

Only two vaquita detections were recorded from the six sites during the 42-day monitoring period in 2017, far fewer than expected based on detection levels in 2016. These data, though measured outside of the usual monitoring period, are a cause for concern. It is critical that acoustic monitoring throughout the full standard sampling grid (which was used from 2011 – 2016) be continued in 2017 during the core sampling period (mid-June to mid-August) in order to make stronger inferences about current population status.

CIRVA recommends that the regular acoustic monitoring program continue in summer 2017.

- CIRVA **emphasizes** the importance of fully sampling the core area, as has been carried out every year since 2011, from 19 June to 19 August.
- The 2017 monitoring results should be analyzed as quickly as possible, and no later than the end of August 2017, to update estimates of population size and trend and to inform the Vaquita CPR program (see 6, below).
- CIRVA also **recommends** that the expert group on acoustic monitoring be consulted to determine the optimal design of a supplemental acoustic monitoring program (in addition to the regular summer program) to determine whether vaquitas continue to exist outside the Refuge.

### 3. UPDATE ON ALTERNATIVE GEAR DEVELOPMENT AND DEPLOYMENT

#### 3.1. Expert Committee on Fishing Technologies

The Expert Committee on Fishing Technologies (ECOFT) was established in 2016 by INAPESCA and World Wildlife Fund Mexico to provide independent guidance and oversight to the development of alternative gear and practices. At this meeting, CIRVA received two documents from ECOFT, one a summary of the committee's findings since CIRVA-8 (Annex 3), the other a catch analysis on small-scale shrimp trawl trials in the Upper Gulf of California from 2009-2016 (Annex 4). Leigh Henry briefly presented the documents on behalf of Chris Glass as chair of ECOFT, and Enrique Sanjurjo as the Secretariat, neither of whom was able to attend the meeting.

In the absence of either Glass or Sanjurjo, and given limited time at this meeting, CIRVA was unable to carry out a detailed evaluation of ECOFT's findings or proposed recommendations. CIRVA has made multiple recommendations on the use of alternative gear in the past (see previous CIRVA reports), many of which remain applicable. In particular CIRVA notes its most recent previous recommendations as follows:

CIRVA-7 (May 2016): "CIRVA reiterates that there is no longer any justification for the Government of Mexico to delay the issuance of commercial permits to fish for shrimp with the small trawl.

(4) The "Selective net RS-INP-MX" shrimp trawl has received adequate testing, and a strong regulatory framework exists for its application. Therefore, the EWG recommended that such trawls be used on a commercial basis in the UGC."

CIRVA-7 (May 2016): "Given the immediacy and importance of the need for non-entangling alternative fishing gear in the Upper Gulf, CIRVA stresses the need for continued investment of time and resources (including financial) by the Government, the private sector, and non-government foundations and organizations in alternative fishing technology work."

CIRVA-8 (November 2016): "CIRVA reiterates the need to accelerate the development of viable alternative fishing methods and to train fishermen in their use. This will require testing and use of alternative gears and requires developing methods of monitoring, control, surveillance and traceability. In turn, this requires the lead agencies, National Institute of Fisheries and Aquaculture (INAPESCA), National Commission of Fisheries and Aquaculture (CONAPESCA), and Secretariat of Environment and Natural Resources (SEMARNAT), to work immediately, effectively and transparently with the Expert Committee."

Furthermore, CIRVA notes that mandatory vessel tracking systems need to be employed in all fisheries to curtail illegal activity and guarantee the proper surveillance of all vessels engaged in field experiments or trials (see 4.4, below).

CIRVA welcomed these reports and expressed its appreciation for the hard work of ECOFT members. In particular, the analysis of the comprehensive results of trials with the small trawls (Annex 4) was seen as a major contribution.

#### 3.2. Socio-economics and international expert panel review

Since its inception in 1997, CIRVA has considered the need to provide support for local human communities as an integral component of its advice for conserving the vaquita (Table 1). To review the socio-economic interventions that have been applied since 2008 and consider potential future actions, an expert panel was convened at a special session on the vaquita at the biennial forum of the North American Association of Fisheries Economists in La Paz, Baja

California Sur, on 24 March 2017. Among the economic interventions reviewed were the buyout/rent-out/switch-out schemes, alternative livelihoods, payments for ecosystem services, and alternative fishing gears and livelihoods. Participants recognized that a range of market and institutional failures had hampered the effectiveness of these interventions and that to overcome these obstacles, it is critical to have clearly defined use rights for fisheries, good fishery management, and strong institutions to ensure compliance – not necessarily more enforcement. Clearly, resolving these issues takes time, and time has run out for the vaquita. The panel outlined a series of goals to pursue as the opportunity allows (See Annex 5). CIRVA appreciates the work of the expert panel and encourages it to continue.

CIRVA RECOMMENDATIONS
CIRVA 1 (Jan 1997): “All existing regulations be enforced and that any further regulations be developed <i>in consultation with the human inhabitants</i> of the vaquita’s range.”
CIRVA 2 (Feb 1999): CIRVA recommends: 6. Research be <i>started immediately</i> to develop and test alternate gear types and techniques to replace gillnets. 7. Education and consultation begin immediately among fishers, social scientist and biologist to seek the best alternative to gillnetting. 8. A program be developed to <i>promote community involvement</i> , widespread education and public awareness of the importance of the Biosphere Reserve, the vaquita and the relevance of its protection as a Mexican and world heritage. Development of public support is critical to the success of this conservation program. 9. Measures be developed to <i>offset the economic hardship</i> imposed by these regulations on residents of the Upper Gulf.
CIRVA 3 (Jan 2004): “It [CIRVA] recognizes that such action will cause economic hardship for fishermen and this is taken into account in its minimum recommendation for immediate action. It stresses that this action alone will not guarantee the recovery of the vaquita. It is rather the minimum action required to reduce the possibility of further decline and <i>allow time for additional developmental work on alternative fishing gear</i> and methods, as well as socio-economic initiatives.”
CIRVA 4 (Feb 2012): CIRVA recommends: 2. Artisanal shrimp fishing vessels should be converted from using gillnets to using small trawls immediately. 3. Additional research is needed <i>immediately to develop vaquita-safe methods to fish</i> for finfish with artisanal vessels. The conversion of the entire fishing fleet to vaquita-safe methods needs to be accomplished as soon as possible (certainly within the next few years). 4. Spatial management measures are needed that <i>provide access incentives for shrimp fishermen who use small trawls</i> rather than gillnets.
CIRVA 5 (July 2014): CIRVA recommends that <i>increased efforts be made</i> to introduce alternatives to gillnet fishing in the communities that will be affected by enforcement of the exclusion zone. CIRVA recommends that issuance of <i>permits for legal non-gillnet fishing be expedited</i> .
CIRVA 6 (May 2015): CIRVA recommends that <i>increased efforts be made</i> to develop and introduce alternatives to gillnet fishing in communities affected by enforcement of the exclusion zone. CIRVA recommends that issuance of permits for legal non-gillnet fishing be expedited.
CIRVA Express (Dec 2015): <i>The most pressing current need</i> is to develop and test alternative fishing gear, to ensure a future for shrimp and finfish fishing in the Upper Gulf. CIRVA recommends that the Government of Mexico invest more resources in these trials and elicit the involvement of international expertise in their design and implementation. CIRVA reiterates its previous recommendation that the gillnet ban be made permanent and emphasizes, in addition, that the current compensation program must be reframed to <i>reward fishermen who switch to alternative gear</i> , rather than reward them for simply not fishing. The cost of the compensation program could be reduced significantly already by the next shrimp season if fishermen were allowed to fish for shrimp with the small trawls which have been tested and are legally authorized for use in the shrimp fishery, as recommended below. CIRVA added several specific recommendations on development of the small trawl shrimp gear.
CIRVA 7 (May 2016): CIRVA reiterates that there is <i>no reason for the Government of Mexico to delay</i> the issuance of commercial permits to fish for shrimp with the “Selective net RS-INP-MX” trawl, which has received adequate testing. CIRVA recommends that <i>every effort be made</i> to develop gillnet-free fisheries in the

Upper Gulf and to strengthen linkages between the fishermen using alternative gears and the seafood supply chain – this is a critical step toward incentivizing the conversion to gillnet-free operations.

CIRVA 8 (Nov 2016): CIRVA recommends: 6. There is an *urgent need to accelerate* development of viable alternative fishing methods and train fishermen in their use and to support the development of gillnet-free fisheries in the Upper Gulf. In particular, the Mexican Government should implement the recommendations and protocols of the Expert Committee for Fishing Technologies in the Upper Gulf of California.

Table 1. Summary of CIRVA recommendations since 1997 concerning development of alternative fishing gear and promotion of livelihood options to ensure the economic viability of local fishing communities in the Upper Gulf.

#### 4. UPDATE ON ENFORCEMENT AND REGULATIONS

CIRVA received brief updates on enforcement from the Mexican Navy and on monitoring from the Sea Shepherd Conservation Society.

##### 4.1 Report from the Navy (SEMAR)

Ivonne Vomend reported the results, through April 2017, of SEMAR's enforcement efforts since the President's announcement of the Integrated Strategy. The following table compares the cumulative enforcement actions reported at CIRVA-7 (May 2016) to those reported at this meeting (CIRVA-9):

Actions	CIRVA-7 (May 2016)	CIRVA-9 (April 2017)
<b>Inspections</b>		
<b>Boats</b>	<b>3,278</b>	<b>3,767</b>
<b>Persons</b>	<b>17,133</b>	<b>24,607</b>
<b>Vehicles</b>	<b>6,699</b>	<b>8,568</b>
<b>Buildings</b>	<b>48</b>	<b>52</b>
<b>Ships</b>	<b>275</b>	<b>427</b>
<b>Seizures or detentions</b>		
<b>Small boats</b>	<b>122</b>	<b>188</b>
<b>People</b>	<b>77</b>	<b>180</b>
<b>Vehicles</b>	<b>20</b>	<b>40</b>
<b>Totoaba specimens</b>	<b>79</b>	<b>296</b>
<b>Totoaba swim bladders</b>	<b>177</b>	<b>319</b>
<b>Gillnets or fishing gear</b>	<b>600</b>	<b>916</b>
<b>Large vessels</b>	<b>4</b>	<b>15</b>
<b>Surveillance</b>		
<b>Launching areas and fish camps</b>	<b>223</b>	<b>694</b>



<b>Stores and fishing depots</b>	<b>26</b>	<b>29</b>
<b>Marine zones</b>	<b>298</b>	<b>929</b>
<b>Checkpoints</b>	<b>45</b>	<b>237</b>
<b>Aerial patrols</b>	<b>91</b>	<b>257</b>

Table 2: Cumulative totals of SEMAR enforcement actions reported prior to CIRVA-7 (May 2016) and up to CIRVA-9 (April 2017).

#### 4.2 Report from Sea Shepherd Conservation Society (SSCS)

Oona Layolle presented a report on the activities conducted during “Operation Milagro III,” the SSCS campaign to protect vaquitas in the Upper Gulf, and suggested further actions that are needed based on her direct experience on the water. SSCS has been collaborating with the Government of Mexico on a program to document illegal fishing and to recover derelict gear including illegal gillnets and longlines within the range of the vaquita. SSCS uses both daylight and night-vision drones to film poachers hauling nets. From December 2016 through April 2017, the SSCS retrieved 183 totoaba gillnets of which 150 were active (Table 3). Additionally, SSCS has recovered many live and dead marine mammals, sharks, totoaba, sea turtles, and birds from fishing gear. Importantly, SSCS discovered two of the six dead vaquitas documented in 2017 (see Item 5 below). Layolle presented a map of the locations where SSCS encountered and retrieved illegal totoaba gillnets and longlines (Fig. 2). These nets had no surface manifestations (floats or other markers). There was clear overlap between the distribution of the totoaba nets, observed totoaba fishing, areas of vaquita carcass retrieval, and known vaquita habitat, including the Refuge. The true extent and distribution of illegal totoaba gillnet fishing are unknown, partly because of the limited ability of SSCS and the Navy to detect and retrieve nets in deeper waters and in areas where security is a concern north of the Refuge. Therefore, the map does not reflect a complete picture of the presence of illegal totoaba gillnets and the associated risk of entanglement throughout the Upper Gulf.

Project Phase	Period of operations		# of Ships	Totoaba nets			Other illegal nets	Long Lines	Total illegal fishing gear
		Days retrieving illegal fishing gear		Active	Ghost	total			
Op Milagro II	Feb 10 to Apr 23 2016	36	2	42	Not counted	42	1	16	59
Ghost nets	Oct 10 to Dec 07 2016	21	22	28	8	36	36	24	96
Op Milagro III	Dec 15 to Apr 23 2017	82	2	150	33	183	22	14	219
<b>TOTAL</b>	<b>Feb 10 to 2016</b>	<b>139</b>		<b>220</b>	<b>41</b>	<b>261</b>	<b>59</b>	<b>54</b>	<b>374</b>

		Apr 23 2017								
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Table 3: Net retrieval tallies from SSCS Operations and Derelict Gear Removal programs 2016-2017.

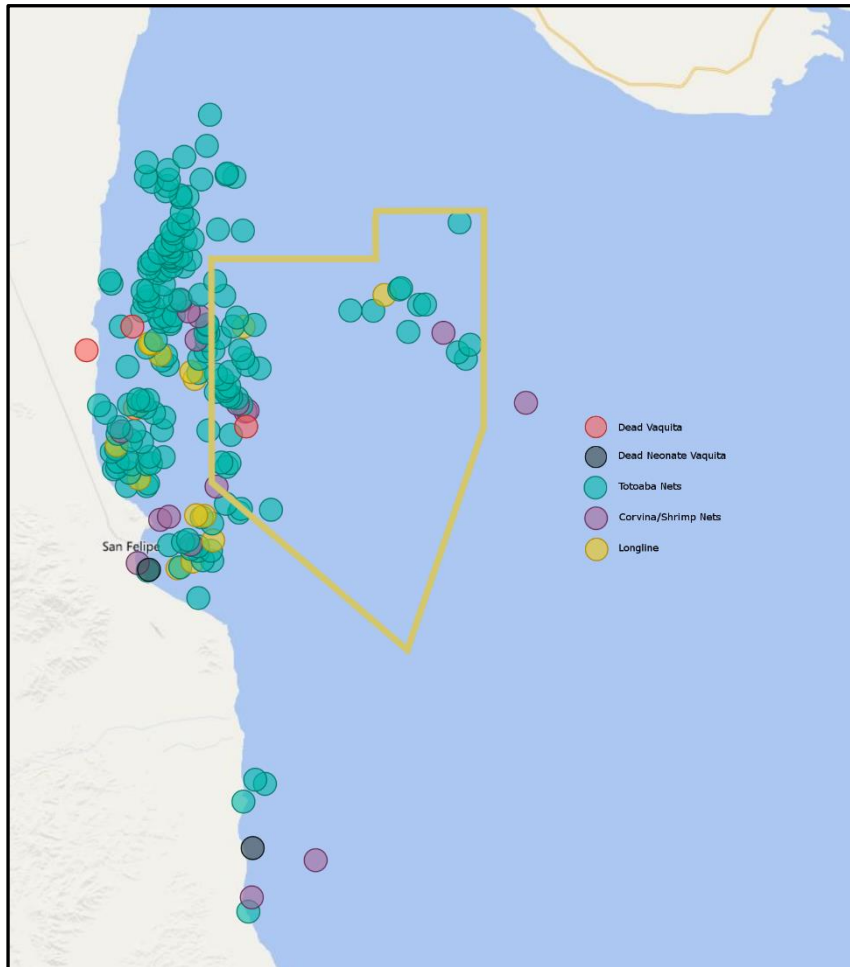


Fig. 2. Locations of illegal totoaba gillnets and longlines recovered by Sea Shepherd Conservation Society (SSCS) from December 2016 through April 2017. In addition, the locations of vaquita carcasses recovered in March 2016 are indicated, as is the geographical boundary of the Vaquita Refuge. Figure courtesy of SSCS.

Layolle again indicated that fishermen use legal activities as cover to gain access to totoaba fishing grounds. They operate under the guise of curvina fishing, sport fishing, or “transiting” from one point to another to mask their illegal activities. SSCS noted many pangas leaving at dusk or later, often with no running lights and no vessel names or markings (e.g. permit numbers), and returning to port in the early morning hours. SSCS also noted that fishermen are becoming increasingly brazen, operating during the day, as the economic gains from illegal totoaba fishing far outweigh the risks and costs of capture and prosecution. SSCS also concluded that, despite the investment of the Government of Mexico in vaquita protection, illegal fishing activity remains intense, and it has been relatively easy for fishermen to set and retrieve their totoaba gear. Layolle reported that, although the extensive photographic and video evidence cannot be used for prosecution, it could be used for targeted enforcement efforts. She suggested that measures be taken to make such evidence admissible into courts of law. Layolle also emphasized that illegal totoaba fishing has a large impact on biodiversity in the upper Gulf of California because of the large number of other species taken as bycatch.

CIRVA thanked Layolle for her report and praised the efforts of SSCS since 2015 in providing essential third-party monitoring of the Vaquita Refuge and in assessing effectiveness of implementation of the gillnet ban. CIRVA welcomed the important collaboration among the Mexican Navy, PROFEPA, and the SSCS vessels, and recommends that this monitoring work, as well as the effort to remove gillnets, be continued and strengthened in the coming year. CIRVA continues to recommend that all pangas be banned from the water after dark.

#### 4.3 Update on Fishing Gear Removal Program

Gustavo Cárdenas Hinojosa reported on the second phase of the Ghost Fishing Gear Removal Program in the Upper Gulf Of California. Funding and other support for the first and second phases came from a partnership of SEMARNAT, WWF México, SEMAR, PEMEX (fuel donation), SSCS, Museo de la Ballena y Ciencias del Mar, and the Association of Zoos and Aquariums' AZA SAFE program.

The second phase had been planned to start in February 2017, but the program was postponed three times because the fishermen involved did not want to participate during the curvina/totoaba fishing season due to security issues. They agreed to participate again in the program in early May as the totoaba migrate southward and into deeper waters.

Other participants agreed to start program activities on March 27<sup>th</sup> without the fishermen. Because of overlap in timing with the Curvina Enforcement Program, it was also agreed to conduct the net removal activities outside the periods when the tides were favorable for curvina fishing; this allowed security support from the Mexican Navy. To date, the effort to locate nets has been conducted with two small SSCS boats, one small PROFEPA boat, and one small INECC boat. The M/V Farley Mowat of SSCS and the R/V El Narval of El Museo de la Ballena have been used to pull up the gillnets. As of March 2017 a partnership has been established with Parley, a non-profit organization, to recycle the removed gear.

The few days of field effort prior to the CIRVA meeting was hampered by poor weather conditions. On April 11, 17, and 18 three trawl transects were completed on the west side of the Vaquita Refuge along the A and B Zones (Fig. 3).

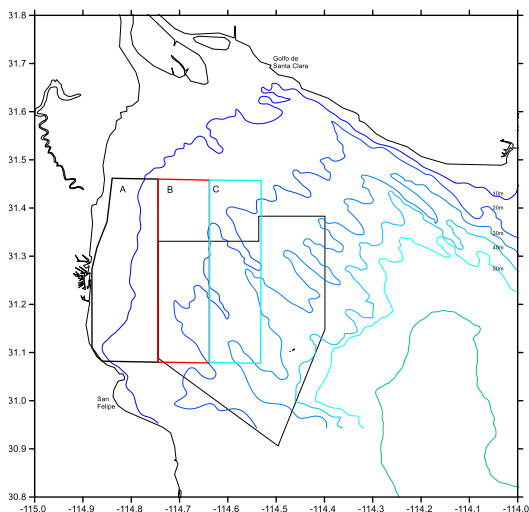


Fig. 3. Map showing the zones used for net searches. Zone A is outside and west of the Vaquita Refuge. Zone B is mainly in the western portion of the Refuge and Zone C is in the central portion. Water depths of the search area range from less than 10 to 30 m.

Nine totoaba nets, from 60 to 400 m in length, were retrieved including a total of 34 dead totoaba, four dead hammerhead sharks (*Sphyrna* sp.), 30 rays (living and dead), and several other fish and marine invertebrates. Four nets were retrieved by PROFEPA RHIBs: two totoaba nets, 300 and 1500 m long; and two mixed totoaba/shrimp nets, each 150 m long. All nets were destroyed and the remnants placed in numbered plastic bags provided by Parley to keep materials sorted as they are shipped for recycling. Effort, with participation of the fishermen, was expected to resume in May and continue through mid-July. Additionally, from May 2 through 28, participants will deploy side-scan sonar to assess the effectiveness of locating fishing gear.

CIRVA welcomed this report and the progress that has been made with this project.

#### **4.4 Enforcement**

The documented deaths of nine vaquitas over the last two years – six determined to have died in gillnets, two too decomposed to determine cause of death, and one where the carcass was unavailable for necropsy – and the recovery of hundreds of active totoaba nets demonstrate that illegal fishing for totoaba remains widespread. The recovery of active totoaba gear and direct observations of illegal fishing at night, and increasingly during the day, demonstrate that fishermen continue to operate with disregard for the law. Despite the extensive enforcement efforts carried out since the Integrated Strategy for the Recovery of the Vaquita was announced by President Peña Nieto two years ago, it is clear that illegal fishing is rampant throughout the vaquita's range. There is a critical need for more effective enforcement of existing fisheries regulations – for example, immediate response to reports of illegal fishing; arrests and prosecutions; and laws that prohibit the manufacture, possession, or transport of gillnets in the Upper Gulf. CIRVA acknowledges and appreciates the collaboration between SSCS and the Mexican Navy and reiterates its recommendation that they continue this important work. In addition, CIRVA recommends that the Mexican Government use the information provided by the gear removal efforts, the past and ongoing recovery of vaquita carcasses, and SSCS's observations of illegal fishing to launch – with the utmost urgency – intelligence-led enforcement operations to dismantle illegal fishing operations as well as the organized criminal syndicates driving the international illegal trade in totoaba.

#### **4.5 Update on Gillnet Ban (Agreement Announcement)**

Young summarized the Government of Mexico's "Agreement Prohibiting the Use of Gillnets for Commercial Fishing in Waters of Federal Jurisdiction in the Northern Gulf of California" (hereafter referred to as "the Agreement"), which becomes effective May 31, 2017. The Agreement permanently bans the use of gillnets, except in the curvina fishery, while permitting only the use of hook and line, traps, and trawls. As an aside, the curvina fishery did not operate this year due to a delay in approval of the required environmental impact statement; curvina fishermen, representing approximately 850 vessels, were compensated \$84 million pesos for the 2017 fishing season. The Agreement will require the use of vessel monitoring systems (VMS) in the entire small-boat fishery (approximately 650 permitted vessels). The VMS units have been purchased and are being installed now at a cost of \$7.5 million pesos. The Agreement calls for review of the curvina fishery in 2018 to provide recommendations for new technical options for catching curvina. To prevent a gap between the lapse of the existing gillnet ban and the Agreement's coming into force, Mexico has extended the existing gillnet ban to May 31, 2017.

The Agreement is a significant step forward, but it is lacking in four areas that are longstanding CIRVA concerns, as reflected in previous recommendations. The Agreement:

- exempts the curvina fishery;
- fails to prohibit the manufacture, possession, transportation, and sale of gillnets;
- fails to prohibit night fishing;
- includes no restrictions on port of departure and arrival or landing areas for fishing vessels.

CIRVA reiterates its previous recommendation that "the sale or possession of gillnets on land and at sea should be illegal within the area of the current gillnet ban and adjacent lands. This permanent ban must include gillnets used as rodeo nets in the curvina fishery." The newly proposed permanent ban appears to be a continuation of the regulations used over the past two years, during which time the vaquita population has declined from about 60 to fewer than 30 individuals. The results of the fishing gear removal program demonstrate that illegal totoaba fishing continues to be extensive, and this was true even before the curvina season started. The curvina fishery provides cover for illegal activities and complicates enforcement. It also allows sale and possession of gillnets which not only complicates enforcement but also likely slows any transition to alternative fishing gears.

To strengthen enforcement, CIRVA reiterates its recommendation that "no pangas be allowed on the water at night in the area of the gillnet ban." Enforcement could be significantly improved by combining vessel monitoring requirements with a prohibition on night fishing. Likewise, restricting the areas of departing and landing will facilitate surveillance operations. CIRVA recommends that the Agreement include limits on departure and landing points.

#### **4.6 New regulations on illegal fishing and in support of gillnet ban enforcement**

The Mexican Government published amendments to the Penal Code and the Federal Law to Combat Organized Crime in the Official Gazette April 7, 2017, which allow enforcement officials to prosecute criminals who, in groups of three or more, commit crimes against the environment – including illegal fishing for totoaba. Convictions could lead to sentences of up to nine years. The amendments make illegal fishing of various marine species, including shrimp,

lobster, sea cucumbers, and abalone, a federal crime. Formerly, penalties for illegal fishing only included fines and seizure of fishing gear, ships, and vessels (<http://bit.ly/2p9x8X8>).

CIRVA welcomed the new amendments to the Mexican criminal code establishing stronger penalties for totoaba trafficking, which include stronger imprisonment provisions and the elevation of such an offense to a felony equivalent to engaging in organized crime. CIRVA recommends that Mexico act immediately to prosecute totoaba poachers to the full extent under this new law.

## 5. REPORT ON VAQUITA NECROPSIES

Five dead vaquitas (Ps4-Ps8) were examined in March and April 2017 (see necropsy reports in Annex 6). Three of the specimens (Ps4, 7 and 8) showed *post mortem* lesions typical of fishery bycatch. Cause of death of the other two animals could not be determined due to advanced decomposition, but one was a fetus and the other a young calf, both found unassociated with dead females. Whether their deaths were associated with the death of the mothers, or due to abortion or abandonment could not be determined.

(1) One adult male (Ps4) was found by SSCS on March 19, 2017 (31°15.709'N, 114° 50.411'W). This carcass was missing its flukes when examined, weighed 36.7 kg, and was approx. 135-140 cm long. The skin had multiple stab wounds over the left side, and the neck and axillae had bruising characteristic of net entanglement trauma. The stomach contained 558 g of mainly whole fish, indicating recent feeding.

(2) A juvenile female (Ps7) was found floating approximately 20 miles NE of San Felipe in the Vaquita Refuge on April 20, 2017 by R/V El Narval. This animal was approx. 115 cm long and the skin had clear cross-hatched markings with parallel marks 15 cm apart characteristic of a totoaba net.

(3) A female near-term fetus (Ps5) was found floating at sea on March 12, 2017 approximately 33 km south of San Felipe. The specimen weighed 2.4 kg and was 61 cm long.

(4) A headless female calf (Ps-6) approx. 100 cm long was collected in an advanced state of decomposition just outside the port of San Felipe (30°59.765'N, 114°49.139'W) on March 5<sup>th</sup>.

(5) Kerri Danil (SWFSC) called into the CIRVA meeting on April 25<sup>th</sup> to report that she had just found another dead vaquita with a total length of 113 cm, on the beach approximately 24 km north of San Felipe at 31°14.157'N, 114°52.8'W. The animal was in an advanced state of decomposition, but entanglement marks could be seen on the carcass. The sex could not be determined. Muscle samples were collected for genetics, teeth for aging, and stomach contents for prey analysis. The skeleton was retained by PROFEPA.

A photograph was taken of a sixth dead vaquita in December 2016 or January 2017 but a carcass was never recovered. Two live vaquitas were observed 1 May 2017 at the estimated location of 31°01.75'N, 114°45.78'W near San Felipe.

## 6. VAQUITA CPR

### 6.1 Conservation Program Plan for Critically Endangered Vaquitas in the Upper Gulf of California

Cynthia Smith of the National Marine Mammal Foundation (NMMF) presented the VaquitaCPR Conservation Program Plan for Critically Endangered Vaquitas in the Upper Gulf of California (Conservation Program Plan) (Annex 7). This program has been designed to follow a phased approach starting with efforts to find and catch vaquitas, followed by evaluation of their suitability for holding in human care while held in purpose-built sea pens, acclimation to managed care, and ultimately housing and long-term care.

If sufficient funding is secured, field efforts will commence in October 2017, involving dedicated teams and support vessels in the tasks of finding, catching, caring for, and holding vaquitas. October provides the first weather window in which the calm conditions required to locate and catch vaquitas can be reasonably expected. Full details of the program, including personnel, timetables, and budget, were presented in the Conservation Program Plan reviewed by the Committee.

A significant portion of the resources required has been secured, and financial arrangements are being finalized for another major portion of the budget. Remaining shortfalls still jeopardize the ambitious timetable of this project. CIRVA notes the urgency of full and timely funding of VaquitaCPR to ensure that the teams are fully equipped and prepared for an October start to the field season. CIRVA noted SEMARNAT's commitment to provide a large share of funding from the Government of Mexico and acknowledged the significant contribution already made to the project by the Association of Zoos and Aquariums.

CIRVA thanked Smith for her leadership and the VaquitaCPR team (especially SEMARNAT, NMMF, TMMC, and Chicago Zoological Society as project partners) for the tremendous work they have done over the past several months to develop and seek funding for this program. CIRVA expressed its confidence that this team will continue to carry through with its thorough and high-quality planning as the October-November field season approaches.

Given the recent vaquita deaths and high levels of illegal fishing activity in the Upper Gulf, CIRVA believes that the only hope for the survival of the species in the short term is to capture vaquitas and bring them into human care for the long term. Therefore, CIRVA *strongly endorses* the Vaquita CPR plan and recommends that as many individuals as possible be captured in October and November 2017 and held until the Upper Gulf is safe for their return. Based on current conditions, it may be many years (decades) before it is possible to return vaquitas safely to the wild. CIRVA recognizes that the risks of capture and captive maintenance are high, but these are greatly outweighed by the risk of entanglement in illegal gillnets and extinction in the wild.

Given uncertainty about how many vaquitas remain, CIRVA recognized that VaquitaCPR needs to balance long-term planning and funding efforts against the realities of funding and the expected difficulties of finding and catching vaquitas, especially as the population size decreases even further. CIRVA recommends that VaquitaCPR continue planning and fundraising for a long-term or permanent vaquita sanctuary, but delay construction until vaquitas have been successfully caught and maintained.

## **6.2 Managing risk during VaquitaCPR**

CIRVA concluded that all immediate decisions related to the health of individual animals should be the responsibility of the veterinary team assembled by VaquitaCPR. An Independent Review Panel (IRP) has been established as part of VaquitaCPR to provide independent review of the proposed plan prior to implementation and to make recommendations to the Management Team for revisions to the program plan. Once the plan is in action, the IRP will be consulted to evaluate results including factors affecting survivorship of vaquitas and animal injuries, illnesses, or deaths, if any should occur as a result of project activities.

Larger questions were raised concerning the level of tolerance of risk to individual animals that would be acceptable during the implementation of VaquitaCPR. Consideration of the risks to animals in human care needs to be balanced against knowledge of the very high risks that individuals now face from gillnets in the wild. Half of the wild vaquita population was lost between 2015 and 2016 and this trend appears to be continuing in 2017.

Such high risks need to be considered when deciding, for example, whether to release an animal back into the wild rather than continue holding it in the case of imminent risk to the facilities (and thus the animals) from dangerous weather situations. It may be reasonable to conclude that it is more risky to release the animal back into its natural environment than keep it in human care. CIRVA agreed that a drafting team, consisting of CIRVA members and members of the VaquitaCPR team, would develop a “white paper” to describe the risk assessment process and discuss decision options and rationales. This

“white paper” could provide guidance to those in the field facing potential non-health-related decisions about whether to release animals. CIRVA **recommends** that this white paper be completed by the first week of June 2017.

In principle, given the ongoing dangerous conditions in vaquita habitat, the objective of VaquitaCPR should be to remove as many vaquitas from the wild as possible, as soon as feasible, beginning in October 2017. A second capture attempt will be conditional on the experience with the first attempt, evidence from the 2017 acoustic monitoring program regarding the continued presence, abundance, and location(s) of vaquitas, and the availability of the requisite resources.

Looking further into the future, CIRVA members discussed the conditions that would be required to release vaquitas into the wild. The eventual goal is of returning animals into a gillnet-free environment. CIRVA considers that for the environment to be gillnet-free and therefore safe for vaquitas, a *legal framework* prohibiting gillnets must be in place with clear *evidence* of its effective application. The following elements are proposed as examples of conditions or criteria for defining a safe, gillnet-free environment for vaquitas.

### *Legal framework*

- (i) The manufacture, sale, transport, or possession of gillnets on land and at sea must be illegal within the area of the current gillnet ban and on adjacent lands. This gillnet prohibition must be permanent and must include gillnets used in the rodeo-style (sistema de pesca de encierro) curvina fishery.
- (ii) Laws with stiff penalties for illegal fishing, including totoaba fishing, must be implemented and regularly reviewed for effectiveness.

(iii) Evidence must be presented that violations of the gillnet ban have been successfully prosecuted as serious crimes, followed by the imposition of fines and imprisonment that serve as deterrents to illegal fishing.

*Direct evidence of gillnet-free habitat*

(i) Remote sensing or physical dragging for gillnets throughout the vaquita's range and throughout fishing seasons with negligible detections. Independent parties must be allowed to participate in this work.

(ii) Absence of positive findings of marine life killed by gillnets within the entire range of vaquitas (for example dead dolphins with net marks or mutilation from being removed from nets) after a period (at least a year) of intense monitoring for such evidence.

(iii) Legal fisheries that use fishing gear shown not to pose an entanglement risk to vaquitas, totoaba, or other endangered species are the only fisheries operating in the region. These fisheries must be (a) accepted by and profitable to local communities and (b) subject to surveillance/monitoring and regulations that are enforceable.

These conditions and assessment criteria should be reconsidered regularly by CIRVA or other competent bodies. Evidence of the continued presence of vaquitas in the wild and, in particular, evidence from acoustic and/or visual monitoring showing stable or positive growth in numbers, would support a determination that the waters of the Upper Gulf of California are safe for vaquitas. CIRVA also reiterates that conservation success in the northern Gulf will depend on the economic health of adjacent communities. CIRVA reiterates its previous recommendations that economically viable alternative fisheries that do not pose an entanglement risk to vaquitas, totoaba, or other endangered species must be established in the region – this is a critical step toward incentivizing the conversion to gillnet-free operations.

## **7. REVIEW OF PRIOR CIRVA CONCLUSIONS ON POSSIBLE THREATS BESIDES GILLNETS**

The information presented in this and previous CIRVA reports about the extent of illegal gillnet fishing, together with the necropsy results, provides clear evidence that entanglement alone is driving the vaquita toward extinction. All necropsies in the past two years, where cause of death could be determined, indicated that the cause was gillnet entanglement. Concerns have been raised over other possible threat factors, but there is no evidence to indicate that factors other than gillnet entanglement are contributing to the vaquita's ongoing decline (see below). Several of these alleged threats have been discussed thoroughly in previous CIRVA reports, in particular CIRVA-3 in 2004 and CIRVA-4 in 2012.

(1) Colorado River

(i) Brusca et al. (2017)

(ii) CIRVA-4 (pages 19-20)

(iii) CIRVA-4 (Appendix I - Productivity of Gulf of California)

(iv) CIRVA-3 (Appendix 3.3)

(2) Predation and contaminants

(i) CIRVA 3 (Appendix 3.3)

CIRVA emphasizes that there is no new evidence to change its longstanding view that entanglement in gillnets is the only factor driving the species toward extinction.

## **8. REFERENCES**

Brusca, R.C., Alvarez-Borrego, S., Hastings, P.A. and Findley, L.T. 2017. Colorado River flow and biological productivity in the Northern Gulf of California, Mexico. *Earth-Science Reviews* 164: 1-30.

CIRVA. (2016) Report of the Eighth Meeting of the Comité Internacional para la Recuperación de la Vaquita (CIRVA-8). Available at: <http://www.iucn-csg.org/wp-content/uploads/2010/03/CIRVA-8-Report-Final.pdf>

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## **ANNEX 2: AGENDA CIRVA-9**

### **SOUTHWEST FISHERIES SCIENCE CENTER LA JOLLA, CA APRIL 25-26, 2017**

**Tuesday, April 25**

**8:30-10:00**

**1. Acoustic monitoring program (Only CIRVA members)**

- 2017 March-April results
- Future plans and budget needs
- Discussion and recommendations

**10:00-11:00**

**2. Welcome by Lisa Ballance**

- Introduction of participants
- Confirm chair and rapporteurs
- Review and adopt the Agenda
- Documents available for this meeting

**3. Update on alternative gear development and deployment**

- Gear testing program and international experts advisory group
- Socio-economics and international expert panel review
- Discussion and recommendations

**11:00-12:00**

**4. Update on enforcement and regulations**

- Enforcement: current situation
- Update on ghost gear program
- Update on gillnet ban (Agreement announcement)
- New regulations on illegal fishery and to support gill net ban enforcement
- Discussion and recommendations

**12:00-13:30 Lunch Break**

**13:30-14:30**

**5. Report on vaquita necropsies**

- Findings
- Status of samples

**14:30-15:30**

**6. Vaquita CPR:**

- Criteria for the reintroduction to the Gulf of California

**7. Review of prior CIRVA conclusions on possible threats besides gillnets**

- Review draft position papers
- Set out process for completion and review as needed

**15:30-17:00**

**8. Discussion of previous and new recommendations and drafting of first day report**

**17:00 - Adjourn for Evening**

**Wednesday, April 26**

**08:30 – 12:00**

**8. Vaquita CPR Progress Report**

- Update
- Revised guidance for ex situ planning and actions
- Summary of discussions on criteria for the reintroduction to the Gulf of California to Cynthia Smith and Kristina Martz
- Next steps: conclusions, agreement on goals, and recommendations

**9. Other items**

**12:00- 3:30**

**10. Report drafting (Summary paragraph for Minister, Executive Summary and recommendations, Brief paragraphs for each agenda item)**

**3:30-5:00**

**10. Report discussion and finalisation**

**5:00 Close meeting**

**List of documents**

1. Report of 2017 acoustic monitoring season
2. Report of the Ghost Fishing Gear Program
3. Report of Operación Milagro (SSCS) to be presented
4. Conservation Program Plan for Critically Endangered Vaquitas in the Upper Gulf of California (Vaquita CPR Program)
5. Documents on other threats

## ANNEX 3

### Expert Committee on Fishing Technologies (ECOFT)

#### Summary report for CIRVA

The ECOFT has met three times. Last time in November in San Felipe. For the minutes of the meetings please check: <https://ugccommittee.wordpress.com/sessions/>

Since then the committee has been working in subgroups:

- 1) Computer simulation and flume tank testing (Chris Glass, Paul Winger, Yann Herrera)
- 2) Suripera testing in Denmark (Chris Glass, Yann Herrera, Lotte Kindt-Larsen, Simon Northridge)
- 3) Fish pots and Danish Seine (Chris Glass, Yann Herrera, Lotte Kindt-Larsen, Sarah Königson)
- 4) Analysis of small trawl (Chris Glass, Enrique Sanjurjo, Yann Herrera)
- 5) Operations and future of the Committee (Chris Glass, Enrique Sanjurjo, Pablo Arenas)

The plans is moving forwards with all this things: computer simulation and flume tank testing to improve the small trawl, suripera testing in Denmark, fish pots and Danish seine testing and improving the intervention of the ECOFT in the field tests conducted by Inapesca.

#### **The following presents a set of points that describe the ECOFT's stance on alternative fishing technology in the Upper Gulf of California.**

- The ECOFT analyzed data from the previous 8 years of catches with the RS-INP-MX small trawl. Annexed we present a report that shows that the prototype net can be used as a substitute for gillnets, where it is a completely functional net and under the right circumstances can produce catches of high commercial value. The Chair recommends that permits be released immediately as outlined in the report.
- The ECOFT note that trials from 2016 designed and conducted by INAPESCA were of poor experimental design --not a single trial was performed using RS-INP-MX in San Felipe, where only suripera and modified versions were used to collect data. Data for experiments of 2016 can't be used to make any kind of recommendation regarding the use of RS-INP-MX in San Felipe.
- There are several alternatives to gillnets for finfish. In the workshop of Merida (2016) it was reported that longlines have good economic performance and that pots represent a promising alternative. The ECOFT is setting up experimental designs to test pots, traps and smaller static nets in the Upper Gulf of California. ECOFT also recommend that trolling for species such as sierra is a viable and potentially economically sound fishing type. We recommend trials start as a matter of urgency.
- ECOFT consider the method for catching curvina is harmless to the vaquita and this fishery represents an economic alternative for fishing communities. Satellite systems for tracking legal operations of curvina seem to be a good option to control this fishery. While conducting new gear trials for other fisheries, these tracking methods should be implemented in all cases.
- There is a need for further research in several of these topics. Small trawls still need to become lighter, or vessel horsepower should improve. Pair trawling, with appropriate training, may be a viable alternative and should be explored as a matter of urgency. Other designs for different regions in the Upper Gulf are needed. Further tests with suripera are required to produce a vaquita risk assessment. The ECOFT has prepared a working plan to research these topics and is already working on the first steps.
- It is a matter of urgency that institutions become more active with regards to the use of alternative fishing gear in the Upper Gulf. INAPESCA should consider the recommendations made by the ECOFT and provide a detailed action plan, CONAPESCA should grant permits for fishing in a timely fashion and SEMARNAT should allow for hooks and longlines to be deployed in a safe manner.

## ANNEX 4

### Catch analysis for small-scale shrimp trawls in the Upper Gulf of California: 2009-2016

#### Expert Committee of Fishing Technologies

April, 2017

#### INTRODUCTION

The RS-INP-MX trawl was proposed as part of a project of the United Nations Environment Program (UNEP, 2009). During this project there were various components defined to improve the catch efficiency of trawl systems and reduce incidental bycatch. In 2008, the National Fisheries Institute (INAPESCA), under the petition of the fishing sector, decided to test different small trawls for shrimp as an alternative to gillnets in the Upper Gulf of California (UGC). Considering the success of the industrial version of RS-INP-MX, it was decided that a smaller version would be tested for small-scale fisheries. From 2009 to 2016, INAPESCA made more than 5,000 casts with this net, obtaining various different results.

Year	Catch per trip (Kg)			Season	Proportion of shrimp by type	
	San Felipe	Golfo de Santa Clara	Average*		San Felipe	Golfo de Santa Clara
2009 <sup>a</sup>	41.5	2.6	27.6	Autumn	Brown (92%)	Brown (50%)
2010 <sup>b</sup>	5.5	6.2	5.7	Autumn	Brown (94%)	Brown (73%)
2012 <sup>c</sup>	37.8	-	37.8	Summer	Blue (100%)	-
2013 <sup>d</sup>	18.8	5.5	16.0	Summer	Blue (99%)	Blue (97%)
2015 <sup>e</sup>	15.2	0.2	1.9	Autumn	-	-
2016 <sup>f</sup>	0.8	2.8	1.9	Autumn	-	-

Table 1. Results from INAPESCA small trawl trials from 2009 to 2016

\*Average calculated based on total shrimp catch divided by total number of trips

Source: Own elaboration based on: (a) INAPESCA 2010. Pesca Experimental de Camarón con la Red de Arrastre Prototipo RS-INP-MEX en el Alto Golfo de California: Capacitación al Sector Productivo en la Construcción, Operación y Mantenimiento de la Red y Colecta de Información en Campo. Informe Ejecutivo de la Campaña 2009-2010. Doc. Interno. INAPESCA, 2010 28 p. (b) INAPESCA. 2011. Evaluación Biotecnológica de la Red de Arrastre Prototipo “RS-INP-MEX” Para Captura de Camarón en el Alto Golfo de California. 22p. y 12 Anexos. SAGARPA. INAPESCA, México and the database financed by World Wildlife Fund-Mexico. (c) Aguilar-Ramirez, D. y Rodriguez-Valencia, A. 2012. Eficiencia y Selectividad de Dos Diseños de Redes de Arrastre para Pescar Camarón Azul (*Litopenaeus Stylirostris*) en la Pesquería Artesanal del Alto Golfo de California. 13 p. INAPESCA, México and the database made jointly with WWF, NOAA e INAPESCA in 2012. (d) INAPESCA. 2014. Reporte Final del Proyecto: Experimentación de Artes de Pesca Alternativos para la Captura de Camarón Azul (*Litopenaeus stylirostris*) por el Sector de Pesca Ribereña del Alto Golfo de California. 47p. y 10 Anexos. SAGARPA. INAPESCA, México y la base de datos generada por INAPESCA para la temporada de camarón del 2013. (e) INAPESCA. 2016. Informe Técnico del Proyecto (periodo septiembre-diciembre 2015): Desarrollo de Sistemas Pesqueros Sustentables para el Alto Golfo. Informe Interno. STPN. 30 pp y anexos. (f) INAPESCA database for 2016 shrimp season (unpublished).

Table 1 shows an aggregated version of the results obtained with the RS-INP-MX prototype, as well as other modified versions of the same design. In 2009 and 2010, we can observe that there was a promising catch of brown shrimp (*Farfantepenaeus californiensis*), which is typically caught at night near the fishing grounds of San Felipe. In 2009, catches in San Felipe were 16 times higher than in Golfo de Santa Clara. However, the efficiency of the net to catch

blue shrimp (*Litopenaeus stylirostris*) and developing a net which worked in Golfo de Santa Clara were topics still subject to further research. The trials of 2012 and 2013 demonstrated that blue shrimp is indeed vulnerable to the small trawls tested in San Felipe. In 2015, the tests proved that the trawl system can work during the autumn months as well, when the fishing ban is lifted. In most years, except for 2010 and 2016, catches were more promising in San Felipe than in Golfo de Santa Clara. In 2010 and 2016, despite the average catches being higher in Golfo de Santa Clara, the difference between locations is not comparable to other years. Catches are quite low, therefore 2010 and 2016 could be considered as anomalous years.

Table 2 shows a comparison of catches with the RS-INP-MX prototype and modified designs in San Felipe. We can observe that, in most cases, average catch with RS-INP-MX is more than double that of modified systems. For 2016, no trials were made with RS-INP-MX in San Felipe.

Year	RS-INP-MX			Modified			
	Catch (kilograms)			Catch (kilograms)			
	Trips	Total	per trip	Trips	Total	per trip	kg per trip in San Felipe
2010 <sup>a</sup>	45	602	13.4	317	1235	3.9	5.5
2012 <sup>b</sup>	17	643	37.8	4	38	9.5	32.4
2013 <sup>c</sup>	149	2461	16.5	165	3363	20.4	18.8
2016 <sup>d</sup>	-	-	-	126	96	0.8	0.8
Total	211	3706	17.6	612	4732	7.7	10.3

Table 2. Proficiency of the RS-INP-MX prototype compared to modified versions in San Felipe

Sources: Own elaboration based on: (a) World Wildlife Fund (WWF) financed database developed by INAPESCA (b) Aguilar-Ramirez, D. y Rodriguez-Valencia, A. 2012. Eficiencia y Selectividad de Dos Diseños de Redes de Arrastre para Pescar Camarón Azul (*Litopenaeus stylirostris*) en la Pesquería Artesanal del Alto Golfo de California. 13 p. INAPESCA, México and the database created jointly with WWF, NOAA and INAPESCA in 2012. (c) database generated by INAPESCA the 2013 shrimp season. (d) database generated by INAPESCA for the 2016 shrimp season (unpublished).

On the other hand, Table 3 shows the importance of fishermen competence for the success of small trawl catches; 2010 is particularly noticeable where the first three quantiles had catches that were 10 times lower than the last two quantiles. In the case of 2013, even though the difference was not as large, the fishermen from the last quantile were still catching 4 times more shrimp than those from the first quantile. The Gini index shows the distribution of catch between fishermen, where 0 represents equal catches amongst fishermen and 1 complete inequality. Gini indices of 0.7 and 0.5, like the ones of 2010 and 2016 respectively, show a strong inequality between fishermen proficiency.

Year	1Q	2Q	3Q	4Q	5Q	Average	Gini
2010 <sup>a</sup>	0.2	0.6	2.1	21.9	22.6	5.5	0.7
2012 <sup>b</sup>	21.3	34.3	36.7	41.5	68.5	37.8	0.1
2013 <sup>c</sup>	8.0	14.8	17.9	21.9	27.8	18.8	0.3
2016 <sup>d</sup>	0.1	0.2	0.5	0.9	1.8	0.8	0.5
Weighted average	3.8	7.0	8.9	19.6	23.1		

Table 3. Shrimp catch per proficiency quantiles for fishermen in San Felipe

Sources: Own elaboration based on: (a) World Wildlife Fund (WWF) financed database developed by INAPESCA (b) Aguilar-Ramirez, D. y Rodriguez-Valencia, A. 2012. Eficiencia y Selectividad de Dos Diseños de Redes de Arrastre para Pescar Camarón Azul (*Litopenaeus stylirostris*) en la Pesquería Artesanal del Alto Golfo de California. 13 p. INAPESCA, México and the database created jointly with WWF, NOAA and INAPESCA in 2012. (c) database generated by INAPESCA the 2013 shrimp season. (d) database generated by INAPESCA for the 2016 shrimp season (unpublished).

When analyzing the data in more detail we can notice that fishermen aptitude and the type of net together have a strong influence in catch results. 2010 is particularly noticeable given that the first three quantiles used only modified nets which produced very low catches. Catches with RS-INP-MX from fishers in the last quantile produced an average of 26 Kg per trip, which is five times higher than the overall average of the entire year. These results make the tests with RS-INP-MX in 2010 comparable to those from other years and are well within a catch range that is commercially viable.

Considering that small trawls are recognized for their effectiveness towards brown shrimp in San Felipe since 2009, that the RS-INP-MX catches appear to be double that of other modified nets and that fishermen competence is an important factor in the catch efficiency of the net, analyzing the interaction between these variables, in addition to seasonality, becomes an important study of catch subsistence. Table 4 shows results from blue shrimp catch, fished with RS-INP-MX in San Felipe and distributed by quantiles of fishermen proficiency.

Year	Season	1Q	2Q	3Q	4Q	5Q	Average	Gini
2012 <sup>a</sup>	Summer	21.3	34.3	36.7	41.5	68.5	37.8	0.1
2013 <sup>b</sup>	Autumn	6.7	11.2	13.0	14.6	20.6	16.5	0.3

Table 4. RS-INP-MX catch efficiency per proficiency quantiles for blue shrimp in San Felipe

Sources: Own elaboration based on: (a) Aguilar-Ramirez, D. y Rodriguez-Valencia, A. 2012. Eficiencia y Selectividad de Dos Diseños de Redes de Arrastre para Pescar Camarón Azul (*Litopenaeus stylirostris*) en la Pesquería Artesanal del Alto Golfo de California. 13 p. INAPESCA, México and the database generated jointly with WWF, NOAA and INAPESCA in 2012. (b) database generated by INAPESCA for the 2013 shrimp season. Quantile data corresponds to 189 registered trips, which includes all of the casts including those that presented technical failures. The average of 16.5 corresponds to that reported by INAPESCA for 149 trips that discarded casts with technical problems.

We can observe that the fishermen that are best prepared to fish under these circumstances (last quantile) attain catches of 68.5 Kg per trip during summer months, which are higher than average catches. On the other hand, we can also observe that for the autumn months, blue shrimp catches are about 20.6 Kg per trip, which is not exceptional but could be compensated with brown shrimp catches that average around 41.5 Kg per trip.

In summary, the data from 8 years of study suggest that the small trawl RS-INP-MX is a viable option for blue and brown shrimp fishing in San Felipe. Despite the obvious need to continue improving the design of the net, either by making lighter or increasing the vessel horsepower, there is no doubt that under the right circumstances the net produces commercially viable catches. Therefore, as an immediate call to action, fishermen should be able to continue fishing using the RS-INP-MX prototype without the concern of harming vaquita porpoises.



## **ANNEX 5**

### **Socio-economics of Vaquita Conservation: Results of an Expert Panel**

Special Session at the North American Association of Fisheries Economists Forum 2017

La Paz, Baja California Sur

24 March 2017

The panel concluded that the best option at this point is to support Vaquita CPR in order to buy time while continuing to pursue the following goals as opportunity allows:

#### **Immediate**

- Improve and strengthen compliance. Strengthening compliance requires smarter rules, better fishery management, and fishing communities acting as stewards of their resources and therefore having buy-in for the conservation of vaquitas; in short, better institutions.
- Continue to develop alternative gear and markets. The need for economically viable ways to make a living in the region (to counter the opportunities offered by illegal activities) is critical. Strengthen support for motivated fishermen (Pesca ABC, EDF) so that they can serve to demonstrate the potential economic and social benefits of alternative fishing gear.
- Use the forces of the boycott to create something positive for the fishing communities in the region by promoting the use of alternative fishing gear to gillnets, developing traceability systems to eliminate information asymmetries, and to link “good” fishers with accessible and responsible markets.

#### **Medium and long term**

- Engage and incentivize communities (including women and children) to encourage buy-in.
- Address fishery management and fishing rights issues:
- Ensure that access to fisheries is limited and with secure rights and responsibilities for participants;
- Link any future compensation payments to productive actions (i.e. those that benefit vaquita conservation such as the development of alternative gears or participation in re-training);
- Re-orient subsidies from their tendency to overcapitalize – create clear, transparent, and attractive incentives for productive action. Subsidies should have specific sustainability performance metrics and aim to reduce fishing effort. Avoid single-sector management and instead encourage community-based schemes.
- Develop alternative livelihoods and address barriers to exit; move forward on ideas for “green” energy and nature-oriented tourism; cultivate partnerships with functioning institutions, e.g., community colleges.

# ANNEX 6 NECROPSY REPORTS PS4 – PS7

## NECROPSY FORM

FIELD #: Ps 4	NECROPSY DATE: March 29 2017
SPECIES: PHOCOENA SINUS	STRAND DATE: n/a
AGE CLASS: ADULT	STRAND LOCATION: FLOATING IN VAQUITA REFUGE, BAJA CALIFORNIA, MX AT 31 15.689N 114 50.382
SEX: MALE WEIGHT: 36.7 KG	THAW DATE: NOT FROZEN, KEPT ON ICE
PROSECTOR(S): LRB, FMDG, KD, SM, RLB,	CARCASS CONDITION CODE: 4
TOTAL LENGTH: EST 135-140 CM (MISSING FLUKES, SEE MORPHOMETRIC SHEET)	TIME: 11.30 AM

Cause of Death: Trauma, acute death (stomach full). Fisheries bycatch

### Samples collected:

Given to PROFEPA: Skin: 2 vials (ethanol & frozen); Muscle: 2 vials (ethanol & frozen), 1 frozen whirlpak  
Skeleton (whole) , teeth (2 bags, 3 teeth in each, front & mid left mandibular ), reproductive tract (frozen, pelvic bones included)

Transported to NOAA/SWFSC: Stomach contents

Feces (handed to "Nieto" from CICESE, Ensenada, for biotoxin analyses)

**STRANDING OR SAMPLING HISTORY:** Found floating by Sea Shepherd, extensively scavenged and decomposed on left side, right side more intact, flukes attached, Sunday March 19 2017. Collected by PROFEPA. Brought to vet clinic in Tijuana by PROFEPA March 29. Flukes missing when arrived at clinic for necropsy.



# NECROPSY FORM

FIELD #: Ps 5	NECROPSY DATE: March 29 2017
SPECIES: PHOCOENA SINUS	STRAND DATE: March 9 2017
AGE CLASS: FETUS	STRAND LOCATION: FOUND 33 KMS SOUTH OF SAN FELIPE, BAJA CALIFORNIA, MX 30 45.23N 114 41.67W
SEX: FEMALE	THAW DATE: NOT FROZEN, KEPT ON ICE
PROSECTOR(S): LRB, FMDG, KD, SM, RLB	CARCASS CONDITION CODE:4
TOTAL LENGTH: 61.0 CM	TIME: 12:45 PM

Cause of Death: Unknown

Samples collected: Given to PROFEPA: Skin: 2 vials (frozen & in ethanol), Whole dissected carcass

STRANDING OR SAMPLING HISTORY: Found floating March 9, given to Sea Shepherd on March 12, 2017, transferred to PROFEPA who kept on ice until necropsy.



BODY CONDITION (EXTERIOR): Dorsal fin folded over. Flukes flacid, foldeble. Skin separating from blubber, missing in multiple places. No descerbable marks or folds. Carcass weight 2.4 kg

# NECROPSY FORM

FIELD #: Ps 6	NECROPSY DATE: March 29 2017
SPECIES: PHOCOENA SINUS	STRAND DATE:
AGE CLASS: CALF	STRAND LOCATION: FLOATING IN VAQUITA REFUGE, BAJA CALIFORNIA, MX
SEX: FEMALE	THAW DATE: NOT FROZEN, KEPT ON ICE
PROSECTOR(S): LRB, FMDG, KD, SM, RLB,	CARCASS CONDITION CODE:4
TOTAL LENGTH: ESTIMATED 100 CM	TIME: 1:30 PM

Cause of Death: Unknown

Samples collected: Given to PROFEPA: ribs (2), vertebrae (4), carcass  
Transported to NOAA, SWFSC 1 vial red tissue probably embryonic rib

STRANDING OR SAMPLING HISTORY: collected by PROFEPA

BODY CONDITION (EXTERIOR): Partially mummified. Skull is absent. Blubber connects fat of melon and blowhole to remnants of caudal carcass and spine. The dorsal fin is folded against teh skin with a disclosed area beneath it.



SKIN / HUMAN INTERACTION: Blubber is very hard and yellow to purple in color, skin is missing.



# **NECROPSY FORM**

<b>FIELD #:</b> Ps 7	<b>NECROPSY DATE:</b> April 23 2017
<b>SPECIES:</b> PHOCOENA SINUS	<b>STRAND DATE:</b> n/a
<b>AGE CLASS:</b> JUVENILE	<b>STRAND LOCATION:</b> FLOATING IN VAQUITA REFUGE, BAJA CALIFORNIA, MX 31 09 16N 114 41 41.7W
<b>SEX:</b> FEMALE <b>WEIGHT:</b>	<b>THAW DATE:</b> FROZEN,
<b>PROSECTOR(S):</b> LRB, FMDG, KD, SM, RLB, OSWALDO (PROFEPA)	<b>CARCASS CONDITION CODE:</b> 4
<b>TOTAL LENGTH:</b> 107 CMS	<b>TIME:</b> 11.45AM

**Cause of Death:** Suspect fisheries bycatch (due to net marks on skin, full necropsy of thawed carcass needed)

## **Samples collected:**

Given to PROFEPA: Skin: 3 vials (ethanol & frozen); 5 teeth from left mandible (1 bag)

Carcass left in freezer at Tijuana zoo, Parque Morales

**STRANDING OR SAMPLING HISTORY:** Found floating and reported by vessel "Narval" of Museo de la Ballena 10.20 April 20 2017, brought to zoo in Tijuana by PROFEPA, examined April 23, carcass frozen solid. Photo below from April 20 2017.



# **NECROPSY FORM**

<b>FIELD #:</b> PS-8 2017.04.25.07	<b>NECROPSY DATE:</b> 4/27/2017
<b>SPECIES:</b> PHOCOENA SINUS	<b>STRAND DATE:</b> 4/25/2017
<b>AGE CLASS:</b> JUVENILE	<b>STRAND LOCATION:</b> 31°14.157', -114° 52.9', 5.5 KM NORTH OF CAMPO DON ABEL
<b>SEX:</b> UNDETERMINED (ORGANS LIQUIFIED)	<b>THAW DATE:</b>
<b>PROSECTOR(S):</b> KD, LG, CT, IV, GH	<b>CARCASS CONDITION CODE:</b> 4
<b>TOTAL LENGTH:</b> 113 CM	<b>TIME:</b> 1630

*E examined, NE not examined, NA not applicable*

**Cause of Death:** Trauma, entanglement

**Samples collected:** muscle: ETOH (3), teeth (5), stomach, and skeleton. All samples labeled as "2017.04.25.07". All samples, except skeleton (w/PROFEPA) remain with G. Heckel until export.

**STRANDING OR SAMPLING HISTORY:** This porpoise was found at 1530 on 5/25/2017, during a survey of dead marine mammals in the Upper Gulf by the San Diego Zoo, CICESE, and NOAA. PROFEPA retrieved the porpoise a couple of hours later and stored at their facility in San Felipe until necropsy. The carcass was originally stored on ice but was observed in a bath of water on the day of necropsy.

**BODY CONDITION (EXTERIOR):** Robust, skin sloughing. Right side is hard and dessicated, left side is moist. Spine is falling out of body cavity, ventrally. Genital region has deteriorated, exposing abdominal cavity, precluding sex identification via external examination.



## ANNEX 7

### VaquitaCPR Program Plan (26 April 2017)

#### EXECUTIVE SUMMARY

##### PROBLEM

The vaquita is the most endangered marine mammal in the world. Bycatch in gillnets has driven a precipitous decline of the species since it was first described in 1958 (Norris and McFarland 1958). In 1997, the entire population, limited to the Gulf of California, comprised fewer than 600 individuals. By the summer of 2016 only about 30 vaquitas were estimated to remain. The complete elimination of gillnet fishing in the range of the vaquita has been identified as the key element necessary for the survival of the species. As a result, essential regulatory efforts have been undertaken by the Mexican government, including a two year gillnet and longline ban over the range of the vaquita, and a long-term Vaquita Refuge Area in which all commercial fishing is banned. The continued decline of the vaquita population in spite of these efforts, however, is due in great part to the persistence of illegal gillnetting aimed at catching a large marine fish known as the totoaba, the swim bladders of which fetch large sums of money in Chinese markets. Thus, despite tens of millions of dollars invested by the Mexican government in preventing vaquita bycatch, the population continues to decline. *At the current rate of loss, the vaquita will likely decline to extinction in the next few years unless complete elimination of gillnet fishing is achieved and effectively enforced.*

##### NEED

As described in the Report of the 7<sup>th</sup> meeting of the Comité Internacional Para La Recuperación de la Vaquita (CIRVA-7), consideration of the best options for the prevention of vaquita extinction must include exploration of methods such as maintaining vaquitas under managed care within a sanctuary facility until their wild habitat is safe. Transfer of vaquitas from the wild to this temporary sanctuary would remove some members of the population from the threat of gillnets and provide an environment in which breeding could increase the population size prior to release back to the wild once all gill nets have been removed. While such a management and release plan is ambitious, it has proven to be a critical tool in the recovery of numerous species, including some large mammals. As detailed in the CIRVA-7 report, the committee (CIRVA) recommended development of a field protocol and program to evaluate and test the feasibility of locating and catching vaquitas, to include a proposed field team with the required skills and expertise. Further, CIRVA called for a plan to evaluate and test the feasibility of establishing housing facilities for vaquitas in the Upper Gulf of California. At the subsequent CIRVA-8 meeting in November 2016, CIRVA reviewed the draft plan and recommended that conservation efforts involving moving porpoises to a sanctuary begin immediately. The Government of Mexico, through Secretaría de Medio Ambiente y Recursos Naturales (SEMARNAT), has indicated it will lead these conservation efforts, specifically to locate, catch, house, care for and release vaquitas. *The plan detailed in this proposal is in direct response to CIRVA's recommendation and SEMARNAT's decision to move forward with conservation efforts to place animals in a sanctuary to help prevent the vaquita's extinction.*

##### PLAN

The vaquita conservation program plan has been developed with a phased approach. Phase One aims to find and catch vaquitas, followed by medical and behavioral evaluations of their suitability for holding in human care. This evaluation will be carried out while housing the vaquitas in purpose built sea-pens for acclimation to managed care. If Phase One is deemed successful, then Phase Two will be initiated, aiming to house and care for vaquitas within a vaquita sanctuary. Phase Three is dependent on the success of the previous phases and is aimed at long-term housing, care and breeding vaquitas in the sanctuary until complete elimination of gillnets in their natural habitat is accomplished. Phase Four involves reintroducing vaquitas back into a gillnet-free habitat and then actively monitoring them following reintroduction.

Each of these phases has unique challenges, costs and inherent risks, many of which involve procedures that to date have only been attempted on a limited number of individuals of other porpoise species. To address these challenges and mitigate risks, a Consortium for Vaquita Conservation, Protection, and Recovery (VaquitaCPR) has been assembled, comprising an international, interdisciplinary team with experts on all aspects of implementation of the plan. The VaquitaCPR conservation strategy is based on the best available science with regard to the vaquita and other porpoise species and takes into consideration the International Union for the Conservation of Nature (IUCN) Species Survival Commission's Guidelines on the Use of *Ex situ* Management for Species Conservation. *Given the current*

*rate of decline, the VaquitaCPR conservation program described here is now considered to be a critical element in the fight to prevent the vaquita's extinction, buying time while the necessary complete removal of gillnets from the vaquita's range is accomplished.*

Current plans call for initial implementation of Phase One with an effort to catch vaquitas in October 2017. The success of this initial season of catch effort, and the continued existence of free-ranging vaquitas, will dictate the necessity of a second catch effort. Any subsequent effort will be scheduled according to seasonal conditions in the Upper Gulf of California, guided by the protocols defined here for Phase One as modified on the basis of experience from the first field effort, and subject to the availability of financial, personnel and logistical resources. Housing and Care elements as defined here for Phases One, Two and Three, and as adapted through experience, will be applicable, to subsequent efforts.