VAQUITA PORPOISE CONSERVATION

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December 30, 2016

The Problem:

The *Phocoena sinus*, also known as the vaquita porpoise, is the most critically endangered marine mammal. The vaquita has the most restricted area of residence of all cetaceans because it lives in a small portion of the northern Gulf of California. According to the latest census taken in 2016 by the International Committee for the Recovery of the Vaquita (CIRVA), there are only about 60 vaquita porpoises currently alive, and less than 25 are females capable of reproduction (The Marine Mammal Center [MMC], 2016).

The main concern for the vaquita is that commercial fishing boats in the northern Gulf of California are often seek out a fish of a similar size to the vaquita, known as the totoaba. The totoaba (which is also critically endangered) can grow to be about two meters in length, while a fully-grown vaquita is about one and a half meters long (Cruz & Reyes, n.d.). Due to the size similarity between these animals, fishing nets meant for the totoaba also trap the vaquita porpoise. As many as 84 vaquita porpoises are caught in nets every year (International Union for Conservation of Nature – Species Survival Commission – Cetacean Specialist Group [ICUN-SSC], 2015). The goal of this project is to create something that will help the vaquita population recover from this brush with extinction.

Prior Projects:

Previous attempts to slow the decline of the vaquita have been unsuccessful. In 2004, the Mexican government named a Vaquita Refuge in the core region of the vaquita's habitat. An emergency two-year gillnet ban was instated by the Mexican President Enrique Peña Nieto in May of 2015 (MMC, 2016). However, these projects haven't been successful. If anything, the amount of totoaba fish killed during this time period has increased; the number of vaquitas caught in gillnets has increased similarly. In addition to the Mexican gillnet ban, the CIRVA has been urging the American and Mexican governments to help save the porpoise before its projected extinction in 2018 (ICUN-SSC, 2015).

Proposed Ideas:

One idea for the conservation of the vaquita porpoise is to redesign gillnets. Even though the totoaba is also critically endangered and should also be saved, there are other fish that are abundant and can be commercially caught. Redesigning gillnets to allow totoaba and vaquitas (which are of a similar size) to escape will allow both species to recuperate while minimizing the effect on the fishing industry in the northern Mexico region.

Another concept to save the vaquita is to create a special radar that senses the porpoise and alerts the boat to move to a different area. Irrespective of tagging the porpoises or tracking their sounds, the important part will be to enforce the use of the radars. With this radar, the fishing boats will know to steer clear of the vaquita and bycatch will potentially be avoided.

In addition, artificial breeding will help bring the population level back up to an acceptable range. While this plan will include removing some of the population from its natural habitat, this method will be one of the quickest ways to revitalize the vaquita population. However, artificial breeding will also be problematic, due to concerns around how to capture and transport the porpoises to a safe breeding location.

Plan V: Modified Gillnets:

A complete ban on fishing in the northern Gulf of California will be ideal, however, the amount of resources required to enforce the ban completely will outweigh the benefits. From the above options, the most practical will be to redesign gillnets. This plan will directly reduce the main threat to the vaquita. With a required modified gillnet, commercial fisheries will still be out on the water fishing. However, the chance of a vaquita dying as a result of bycatch will decrease.

Gillnets are a special kind of fishing net that are weighted at the bottom so that the net itself hangs vertically in the water. Fish swim into the net and their gills get stuck, hence the term “gillnets”. As a result, the vaquita porpoises and other mammals also get caught up in the net when they get too tangled up to back out. Large cetaceans are unable to sense these nets using echolocation is very difficult, and many porpoises (World Wide Fund for Nature [WWF], 2016). Because porpoises are mammals- not fish-, they need to breathe and when they are tangled up in the gillnets, they can’t get up to the surface to do so. Unless they manage to untangle themselves, the dolphins, porpoises, and whales that get caught in fishing nets end up drowning.

In order to lessen this problem, we plan on modifying gillnet design. Adding magnets in the netting will allow the vaquitas that get trapped to escape. The magnets will have to be strong enough that fish will not be able separate them, yet the porpoises will. These magnets will also be spaced out enough that, once separated, an opening will be big enough for the vaquita to escape.

One gillnet (six feet deep by 50 feet wide) costs around $50 (Texas Tastes, 2016). If 60 ¾ x ¾ x ¾ inch magnets are added to each net, the total cost per net will be around $970 (K & J Magnetics Inc., 2016). These magnets have a pull force of about 50 lbs., meaning that even juvenile vaquitas will be able to pull free. If we include all 600 boats that are currently (illegally) fishing in the northern Gulf of California and give them our modified gillnets, the total cost for the project will be around $582,000.

In order to distribute these modified nets, we will ship the nets to every fishery in the affected area. We will include instructions and information explaining why the use of our nets is important.

Anticipated Roadblocks:

One predicted impediment to the plan is the cooperation of the fisheries. The fisheries in the area will most likely be opposed to having to switch out their nets. This part of the proposal will be difficult, but not impossible, to enforce. One way to enforce the use of the modified nets will be to have officers stationed at each fishing dock/port in the northern Gulf of California to check each boat before it goes out into the Gulf. While there will still be ways to get around this method of enforcement, there is not much else we can do to make sure that the use of the nets is implemented.

Another anticipated hindrance is the fisherman's loss of the totoaba. Because the totoaba are almost twice the weight of the vaquita porpoise, the fish will have an even easier task in escaping the modified nets. This may be a good thing, considering totoaba are also critically endangered, but if fisheries aren't catching as many fish as before, they may be tempted even more to sneak around our officers (see above) and use harmful nets.

Funding:

As stated above, modifying gillnets to include magnetic breakaways will cost around $582,000. The next question to consider will be who is going to fund this project. The smartest option will be to ask for a government grant. If the United States government and the Mexican government split the cost, each government will only have to pay about $291,000. Since both governments have already made an effort to save the vaquita, it stands to reason that they will express interest in assisting us with manufacturing and distributing our gillnets.

Conclusion:

To summarize, the rarest marine mammal in the world has been driven to near extinction by being bycatch of the fishing of totoaba. The vaquita porpoise often gets tangled in the vertically-hanging gillnets and drowns because it cannot get back to the surface to take a breath. Our modified nets will include strategically-placed magnets that the porpoise, but not the fish, will be able to separate. The porpoises will then escape through the hole that was made. The expertise of mechanical engineers will

be helpful because they know how to design, build, and test prototypes. Our main concern is the illegal fishing that might continue to happen, even after the implementation of our plan. However, we do have a few methods to enforce the use of the new gillnets. In addition, the United States and Mexican governments will be paying for the manufacturing and distribution of the safe nets. If our plan is successful, the vaquita population will stabilize, if not increase, within a few years of the execution of Plan V.

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