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# Sacrificing Conservation for Pesos: An Analysis of Select Marine Fisheries in the Political Environment of Mexico

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SACRIFICING CONSERVATION FOR PESOS:  
AN ANALYSIS OF SELECT MARINE  
FISHERIES IN THE POLITICAL ENVIRONMENT  
OF MEXICO

BY

STEPHEN W. BOURGEOIS, JR.

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UNIVERSITY OF RHODE ISLAND

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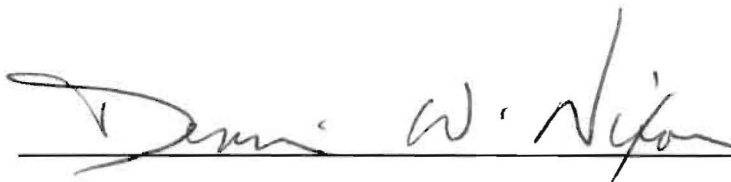
MASTER OF MARINE AFFAIRS

MAJOR PAPER

OF

STEPHEN W. BOURGEOIS, JR.

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DEAN OF THE GRADUATE SCHOOL

UNIVERSITY OF RHODE ISLAND

1996

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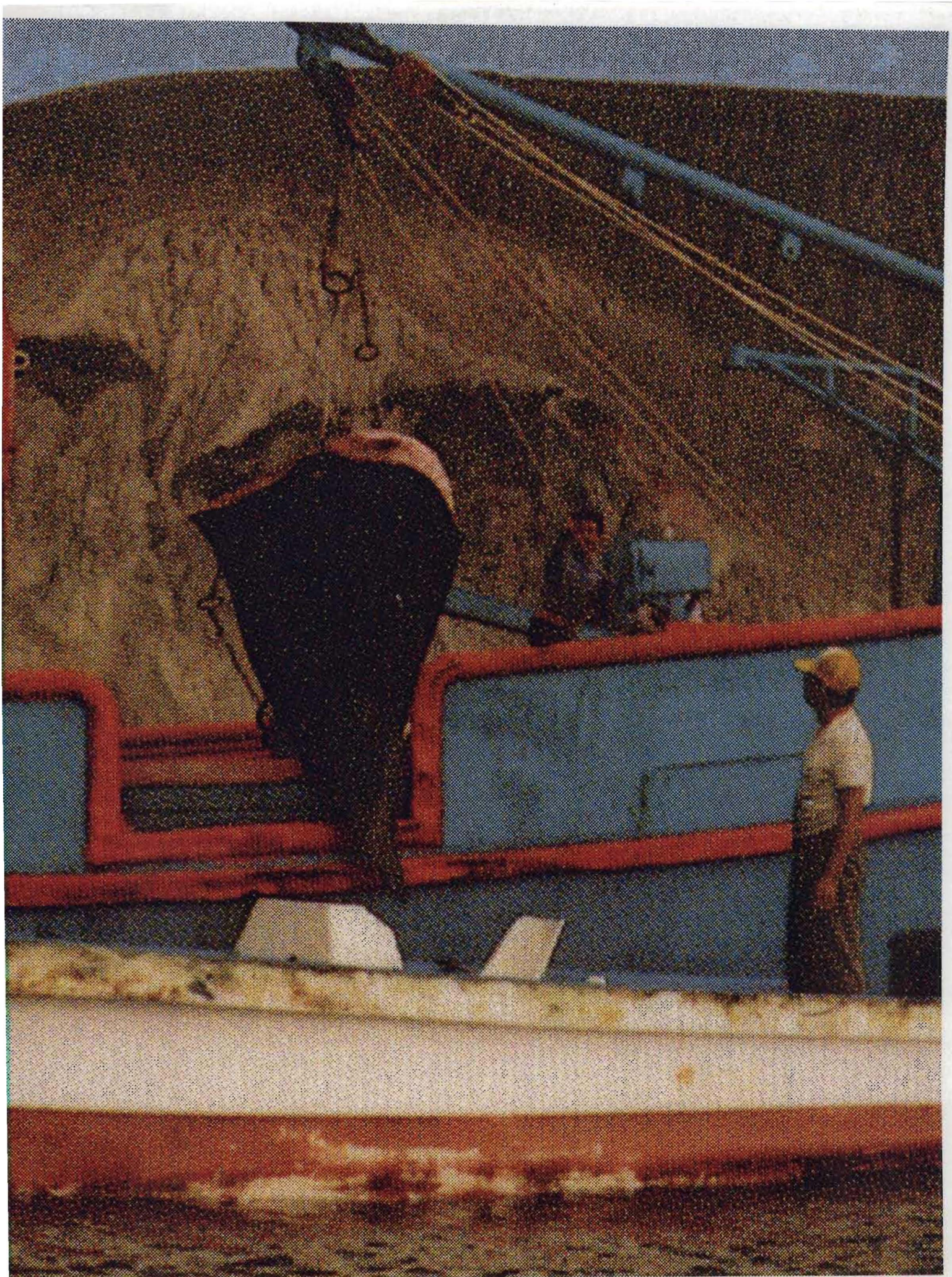
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## I. INTRODUCTION

In 1982, an elderly Mexican fisherman by name of Papa Diez was watching an American prospector friend giving classes in prospecting to the young children of the Bahia de Los Angeles area of Baja California. "You are wasting your time and their time, Herman," the fisherman said. "None of them will be prospectors when they grow up; they are going to make their living from the sea." Two years later, just before he died, the fisherman said to his friend, "I was wrong; the classes are a good idea, for none of the children will be able to make a living from the sea in the future" (McGettigan, 1994).

It is unfortunate that the Mexican *Secretaria de Pesca* (Department of Fisheries), *Secretaria de Turismo* (Department of Tourism) and *Sedesol* (Department of Ecology) didn't have the same vision. Today, in a battle of an embittered economy chasing scarce pesos and a marine environment that many say is dead and unsalvageable, the state of most Mexican fisheries has been sacrificed as Mexico continues to decimate every level of the marine food chain. The decline of most Mexican fisheries has occurred so rapidly that few Mexicans and Americans alike fully appreciate the loss. The major focus of

this paper will examine the false impression that Mexico is engaging in marine conservation; in reality, its conservation efforts are responses to after-the-fact actions brought on by world critics and as a vehicle to pacify conservationists. The Mexican government can pass a law but lacks the resources to administer and enforce the law and subsequently manage its fisheries in an effective manner.

Rather than survey the state of every fishery found in Mexican waters, this paper will examine only four fisheries because of their unique economic, political and ecologic impact, and how the Mexican government allowed their demise. These fisheries are California gray whale, Pacific manta, sea turtle, and totoaba. Although other species may be threatened or have a declining population, the aforementioned group has a major influence not only on Mexico's economy but its role as a participant in world marine conservation. The Mexican government has sadly sacrificed these species at the expense of strengthening their economy, or in some cases, attempting to convince their American counterparts that they are engaged in marine conservation in order to implement the North American Free Trade Agreement (NAFTA). Each of these fisheries

has declined, in part, to a political agenda that contributed to its downfall.

After a historical background on Mexican fisheries, the causes of the overall decline will be examined. Following an in-depth look at each of the selected Mexican fisheries, some pre-NAFTA political initiatives will be addressed. Next, the effects of NAFTA on the environment and what effect these may have on the marine environment will be examined. This will be followed by proposed solutions to Mexico's fishery problems.

## II. BACKGROUND

Mexico borders on both the Atlantic and Pacific Oceans. Many species of marine life on the Pacific Ocean side are sometimes affected by the El Nino/Southern Oscillation effect, bringing some Southern Hemisphere and equatorial fisheries farther north along the Mexican coast, occasionally reaching the United States. The Pacific side has traditionally accounted for over 80% of Mexico's yearly 1.5 million metric ton fish catch, with the majority of that, up until 1990, coming from the Sea of Cortez (formerly called the Gulf of California) (McGettigan, 1994). Of the fisheries to be examined, sea turtles are common on both Atlantic and Pacific coasts; while the remainder are primarily on the Pacific side. Nearly all Mexican fish stocks are in some state of decline, as evidenced in Table 1.

Before proceeding, it is important to realize some economic and cultural differences between the United States and Mexico. Mexico is still considered a third world country with most of the population living in poverty. Fishing is not only a means of making a living but provides a basic food staple for all Mexicans living in the littorals. Without premium education or even television, the concept of



conservation is hardly understood by the average Mexican. If told that a species of fish was nearing extinction or destruction, a Mexican is apt to still catch and eat the last one (Hendrickson, 1979).

TABLE 1: DECREASE IN MEXICAN FISH POPULATIONS SINCE 1982

	ZONE 1 SOUTH	ZONE 2 LA PAZ	ZONE 3 LORET O	ZONE 4 MIDRIF F	ZONE 5 NORTH	AVERAGE DECREASE
Yellowfin	60%	85%	85%	n/a	n/a	75%
Cabrilla*	80%	80%	80%	80%	n/a	80%
Black Seabass*	95%	85%	85%	90%	90%	90%
Gulf Grouper*	85%	85%	85%	85%	80%	85%
White Seabass*	n/a	n/a	n/a	80%	80%	80%
Yellowtail*	90%	100%	80%	80%	80%	85%
Manta Ray*	100%	100%	85%	?	?	100%
Striped Marlin	60%	70%	80%	n/a	n/a	70%
Blue Marlin	70%	70%	70%	n/a	n/a	70%
Roosterfish*	80%	95%	95%	n/a	n/a	90%
Sailfish	70%	70%	70%	n/a	n/a	70%
Amberjack	75%	75%	75%	?	n/a	75%
Dog Snapper*	80%	90%	80%	80%	80%	80%
Dorado	60%	60%	60%	60%	?	60%
Wahoo	75%	75%	n/a	n/a	n/a	75%
Sierra*	85%	90%	90%	n/a	n/a	90%
Vaqueta*	n/a	n/a	75%	75%	n/a	75%

Fish species shown with \* are commercially extinct. The above information was taken from the private U.S. environmental group *SeaWatch*, based on 17 years worth of fishing and diving on the Pacific side on a daily basis.

It may seem logical to paint a picture of the typical fisherman as money-driven and unconcerned about the state of his fisheries. But, in fact, he is simply making a living and probably providing food for his own family; his ignorance is



not his fault but rather his government's and indicative of his way of life. Unemployment benefits, quotas, subsidies, and vessel buy-back are just a sample of many terms that a Mexican fisherman is foreign to. The 1970s and 1980s saw a dramatic increase in the number of Mexican fishermen and fishing boats as the Mexicans realized just how profitable this mostly untapped asset was, and catching fish to sell became a major occupation for many Mexicans (Peterson, 1992).

There are several causes for the decline in Mexican fish stocks. The oldest cause, albeit not the major reason, is simply overfishing. The classic example of this is the Mexican *totoaba*, a highly-prized species similar to white sea bass. As late as the 1940's, these 300 lb. fish were so plentiful that author John Steinbeck wrote in *Sea of Cortez*, "the entire sea was a churning feeding frenzy of totoaba feeding off the smaller fish, so numerous you could seemingly walk across the water on their backs." With no management plan to protect the fishery, the totoaba is an endangered species today. It has been literally fished out of existence (Lagomarsino, 1991). This is true of many fish species on the Pacific side; the overfishing of a highly-sought species causes the fisherman to seek the next lower species. The Mexicans have engaged in this

vicious cycle, systematically depleting fishery after fishery over the past forty to fifty years. As in the United States, the advent of technological change has contributed to the problem. Not all-inclusive are stronger nylon lines and nets, fish-finding sonar, precise shipboard navigation systems, computer-controlled trawling, and the use of "fish factories," huge ships able to fish, clean, refrigerate or can large quantities of fish while able to stay at sea for extended periods of time.

The second cause for the fishery decline is the removal of a basic food source, the sardine. Greenpeace activist Matthew Gianni, in an interview with the *Boston Globe*, put it best: "As the higher value stocks diminish, the fleets go after lower value species. The danger is that lower value species are often the very food stocks the higher fish need if they are going to recover." From both the sportfishing and commercial point of view, popular species such as cabrilla, grouper, snapper, roosterfish, yellowtail and amberjack have been depleted in such a manner (Zieralski, 1993). Mexican fishermen then sought second class fish, such as chubs, piernas, triggerfish, bonita and yellow pargo; and subsequently depleted the stocks of these fish. In the early

1980s, in a search for a fishery to be profitable, several Mexican fishermen discovered the vast stocks of sardines in the Pacific Ocean below and in the Sea of Cortez. The Sea of Cortez, known for its cold, deep currents bringing nutrient-rich water to the surface in a condition known as upwelling, was a magnet for marine life. Sardines, the second link in the marine food chain, would feed off the zooplankton and phytoplankton attracted to the nutrients in the upwelling. The mid 1980s saw sardines removed at the rate of 500,000 metric tons per year (McGettigan, 1994). The Mexicans saw it as a source for the manufacture of chicken feed, and a frenzy developed between sardine trawlers (McGettigan, 1994). Eventually, the late 1980s saw the elimination of the sardine fishery, and in turn, the decline of nearly every other fish species in the Sea of Cortez (Kramer, 1994). The Mexicans had succeeded in removing the basic link in the marine food chain and therefore the small fish that bigger fish needed for food. The plankton would always flourish due to the tidal-pumped upwellings, but removal of the sardine food source effectively halted the ability of large fish to feed off of smaller fish.

The third contributing factor to the demise of several Mexican fisheries is the indiscriminate use of nets, whether

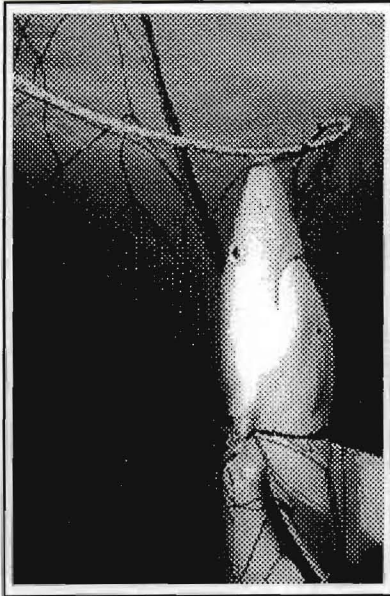
used from large fishing vessels or from a simple fisherman's panga.<sup>1</sup> The use of gill nets and shrimp nets has resulted in a swept water column in the popular Pacific fishing areas and in the Sea of Cortez. After sweeping the water column, nets would be dragged on the bottom to get the bottom species. In the 1980s, there were 1000 to 1500 shrimp boats in the northern Sea of Cortez, shrimping an area 150 miles long by 50-80 miles wide (Kramer, 1994). The intensity of netting by a small panga is illustrated in a 50 mile popular fishing corridor between Monserrate Island and Punta Pulpito on the Pacific Ocean side. In May 1993 there were between 200 and 250 pangas fishing. The pangas had between 1-3 nets, some stretching 1800 feet long but most about 1000 feet long, and capable of netting 3-5 tons of fish per night (McGettigan, 1995). Sadly, the only fish caught were large grouper and sharks (second class fish) but were kept nonetheless. The existence of "ghost nets," nets that have been lost or abandoned, will plague fish stocks forever. The Revillagigedo Islands in the Pacific and reefs in both the Pacific and Sea of Cortez are littered with ghost

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<sup>1</sup>A panga is a 22 foot open fishing skiff, often with one or two large outboard motors.



nets, trapping live species and often resulting in slow deaths (Figure 1).



**Figure 1** Shark trapped in Mexican "ghost" net.

Mexican fishermen were led to believe that changing the mesh size of a net would save certain fish. Until the mandatory use of turtle excluder devices (discussed later), fishermen would use large mesh shark nets, presumably to catch sharks, but instead snag sea turtles. Until the mandated

use of the turtle devices, using a large mesh size is believed to have been a guise for the actual catch of turtles (Walker, 1994).

The lack of a management plan and subsequent enforcement certainly contributes to the demise of Mexican fish stocks. In Mexico, it has been observed that a resource is fished by any method, at any time until it is sufficiently depleted to



**Figure 2** Turtle heads in the Sonora market in 1992.

be unprofitable, then it is abandoned (McGettigan, 1994). Bans of varying degree have been placed on sardines, totoaba, tuna, shrimp, marlin, lobster, clams, et.al. (Kramer, 1994). A biosphere reserve, designed to ban fishing in overfished areas, was established in the northern Sea of Cortez in the 1990s (LaRue, 1993). But what good is a law when there is no enforcement process in place to insure its success? The Mexican Navy at Guaymas is responsible for enforcing the upper Sea of Cortez. There is one Department of Fisheries inspector responsible for the coastline between Santa Rosalia and La Paz. There is one Mexican Navy boat to patrol the Revillagigedo Islands in the Pacific, an old World War II vintage patrol boat bought from the U.S. that can barely get underway every two weeks for its regular "patrol" (Campbell, 1994). During a total ban on sea turtle catches by the Mexican government, sea turtles continued to show up in the Sonora fish market (Figure 2). Fishermen in San Francisquito Bay openly admit they pay 5000 pesos (about \$750) to the Department of Fisheries representative to ignore all infractions (McGettigan, 1994).

During the summer of 1994, charter diver and commercial photographer Steve Drogin financed a study that revealed what

many had suspected for years. The Department of Fisheries cannot enforce the law. All fishermen he talked to thought all fisheries officials took bribes, or *mordida* (Knudson, 1995). The Department of Fisheries got out in the field only on token trips for political reasons. When interviewed, the Fisheries officials stated "Mexican fisheries are in good shape - the few drop-offs are due to nature" (McGettigan, 1994). Enriqueta Velarde, a professor at Universidad Nacional Autonoma de Mexico and a frequent visitor to the Sea of Cortez in her studies, says, "Fisheries inspectors go from fishing camp to fishing camp, gathering bribes. They allow people to continue to fish, whether they have a permit or not, as long as they get their bribe" (Knudson, 1995). During a trip to the Baja peninsula in July 1995, the author personally witnessed the illegal shrimp trawling at night of protected Conception Bay and the illegal taking of Catalina scallops by Mexican divers using scuba gear. The scallop divers, standing in water no deeper than 10 feet, would extract an embedded scallop, crack the shell, remove and bag the marble-sized scallop meat, then discard the scallop shell. Having air for at least two hours, two Mexican divers could reap two bushels of scallop meat and then sadly litter the ocean floor with literally hundreds of



scallop shells. When asked after surfacing what they were doing, they freely admitted that they were going to sell the scallops to a village restaurant and were not worried that it was an illegal activity because there was "no one to stop them." The most startling revelation comes from the Department of Fisheries inspector in Loreto, on the west side of the Sea of Cortez: "I must take an occasional *mordida* (bribe), but only so I can put gas in my (government-supplied) truck." The inspector's salary is \$50 per week, and has no vessel to patrol the waters (Knudson, 1995).

Finally, it should be noted that in many Mexican fishing villages education at any level is meager. The average Mexican has little concept of the terms "conservation" and "environment." Fish as source of the world's food supply is probably incomprehensible. There is no appreciation for protecting natural resources because it is not taught in third world secondary school systems. The advent of satellite television may have more of an impact than any classroom environment.



### III. SELECTED FISHERIES

#### CALIFORNIA GRAY WHALES

The first fishery to be examined is the California gray whale. Every year 20,000 gray whales migrate almost 12,000 miles from the Bering Sea off Alaska to breeding and calving areas off Mexico. They gather off the Baja California coast in several lagoons (Figure 3) because of the warm water temperatures, greater buoyancy caused by higher water salinity, and the protection the lagoons offer from predators (Sherman, 1995). At the turn of the 20th century, commercial whalers (such as the American explorer and whaler Scammon) almost devastated the gray whale population. Whalers turned to more profitable species because of the whale's scarcity. As the whales started to return in population in the 1930s, commercial whaling began to grow again. In 1946, the International Convention for the Regulation of Whaling prohibited the commercial hunting of whales (Seasholes, 1994). In 1988, under international pressure, the Mexican government established the Vizcaino Desert Biosphere Reserve, encompassing the lagoons, to protect the whales and other marine life (LaRue, 1993).



operation that has made Mexico the second largest salt exporter in the world (Morrison, 1995).

In early 1995, the salt company announced its intention to expand its operations to the next lagoon to the south, San Ignacio Lagoon. At that time, the Ojo de Liebre plant produced six million tons of salt per year, and the proposed San Ignacio expansion would increase capacity by more than seven million tons (Aridjis, 1995). Additionally, the expansion would create some 200 new jobs and bring in additional export revenues (Darling, 1995). It should be noted that Compania Exportada de Sal is 51% owned by the Mexican government and 49% by Mitsubishi Corporation of Japan (Morrison, 1995).

What transpired last year in a purely political process is the norm for Mexico environmentalism. The salt company hired "experts" to conduct an "environmental impact assessment." This was merely a play on words, in one of several attempts to placate both Mexican and U.S. environmental groups that were slowly hearing of the salt company's plans. The 465-page environmental impact assessment<sup>2</sup>

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<sup>2</sup>This assessment was a free-form document, not to be confused with the mandated format of U.S. assessments as required by the U.S. National Environmental Policy Act of 1969.



concluded that there would be no adverse impact on the lagoon, even though only 23 lines of the document addressed the impact on the California gray whale (Aridjis, 1995). The company ignored the fact that pumping more than 6600 gallons of water per minute out of the lagoon to extract salt would lower both the salinity and temperature of the lagoon saltwater (Darling, 1995). In order to avoid the accusation of using economic benefits to justify the loss of the gray whale's breeding habitat, the salt company merely insisted that the habitat wouldn't be lost and the gray whales would be unaffected.

The current economic woes of Mexico appeared to be bulldozing the few Mexican conservation and environmental policies as peso-hungry politicians stepped to the front. Baja California South Governor Guillermo Mercado expressed firm support for the project and cited environmentalists' concerns as "disinformation" (Darling, 1995). A local mayor stated that if the project was not allowed to continue, the salt company would be forced to shut down, knowing that his city depended on the company's existence. He objected to the "centralist stances" that were being put up in order to "thwart economic development" (Sherman, 1995). In perhaps what would be considered the worst in conflict of interest in the United

States, the Mexican Secretary of Commerce fully endorsed the project and began using his influence to sway agencies to lend support. It was then revealed that the Commerce Secretary, Herminio Blanco, is the President of the board of the salt company. However, conflict of interest is so rampant in Mexico that the local population thought nothing of the Secretary using his position to benefit his own personal interests (Morrison, 1995).

In March 1995, the Mexican National Ecology Institute rejected the company's proposal and disallowed the expansion, largely as a result of the efforts of the private ecology group *Group of 100* in Mexico City and heavy press coverage in the *Los Angeles Times* and *The San Diego Union-Tribune* (DaRosa, 1995). In a major victory over high-level government officials suppressing environmental issues, the salt company's economic goals will not be met. Whether this trade-off will spell doom for the local and/or national economy remains to be seen, but it established a precedent in the Mexican environmental arena. What Mexican officials failed to do was also assess the economic impact of the loss of several gray whale watching companies that do business in the area. Whether by bus or by airplane, tourists spend a great sum of money to travel to see

the whales' spawning area (Rodgers, 1996), and herein lies the potential problem: those companies operate from southern California and the majority of the tourist dollars are pumped back to the U.S. vice the local Mexican economy. Therefore, one is led to question if the press interest generated was the result of pressure by California excursion companies.

## PACIFIC MANTA RAYS

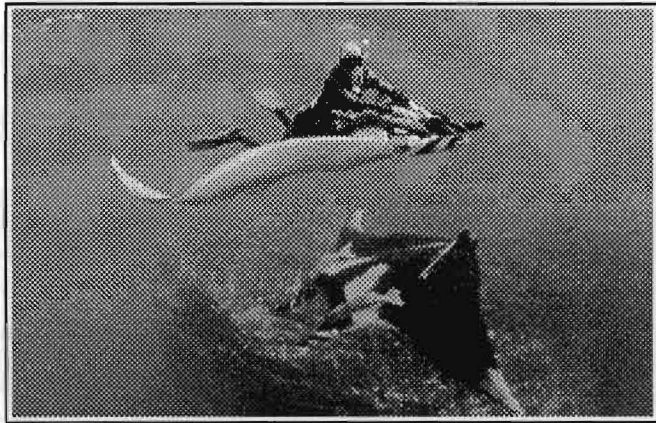
The giant Pacific manta ray has been known to the diving community for years (Figure 4). Weighing up to 2000 pounds and some having a wingspan of 25 feet across, the mantas are known to give divers and snorkellers rides underwater, by the diver gently grabbing the leading edge of the manta by its horns and the manta gliding underwater. Costa Rica and Mexico have been singled out by diving magazines as destinations to experience manta riding (Campbell, 1994).

Mexico has all but decimated the Pacific manta, and with it, the scuba diving business that this fish brought. The El Bajo Seamount, located off La Paz in the Sea of Cortez, used to teem with mantas as a result of the upwelling that took place there. The manta started to disappear in the 1970s when the Mexican fishermen began to take away the smaller food sources of fish that the manta preyed on. Large quantities of manta were also caught as bycatch in gillnets used to capture shark (Eyeles, 1994). Fishermen would harpoon the mantas several times before dumping them overboard, so "they won't foul their nets again" (McGettigan, 1994). Lastly, in a desperate act of needing some type of edible fish, Mexican fishermen have been known to cut off the small part of meated



wing of a manta and sell on the market. Not a particularly tasty fish, twenty pounds of manta might bring \$20 (Matthews, 1993).

In February 1994, underwater photographer and diver Terry Kennedy was anchored off the Revillagigedo Islands about 350 miles off the west Mexico coast in the Pacific Ocean. The Revillagigedos are a series of underwater volcanos rising abruptly from the ocean floor and a habitat for many species of marine life, particularly giant mantas. Mexican law prohibits any fishing activity within 12 miles of the island chain. Kennedy witnessed and filmed a Mexican Department of Fisheries boat, *being used personally by the fishery official, laying long lines and inshore gill nets on reefs within 3 miles of the islands* (Campbell, 1994). When



**Figure 4** Diver riding manta.

the nets were pulled up, two of the giant mantas were hopelessly tangled in the nets, unable to free themselves and rendering the net useless. The fishery official cut the net from his boat and the mantas



dropped in the water, monofilament net and all, to settle on the underwater reef to die. The official then pulled up his long lines and found nothing but reef sharks on the hooks; he then cut the line above the hooks, dropping the sharks onto the reef as well (McGettigan, 1994). It was not known what species of fish the fishing boat was targeting, but an underwater inspection of the reef revealed thousands of feet of old net line and dozens of dead sharks. Later, a passing manta was harpooned by the fishing boat and lifted with gaff hooks to the side of the boat. Men in small boats then cut the wings off the live mantas (Figure 5). In a matter of hours, 5 tons of fish were caught but only the near-useless manta wings were kept (Campbell, 1994). Just like the decimation of the mantas at El Bajo seamount in the Sea of Cortez, a senseless act to garner a few dollars at the fish market unknowingly cost the Mexican economy unknown tourist dollars as the mantas at Revillagigedo began to disappear.

Kennedy's video was shown on CBS Evening News, CNN and the Mexican equivalent of 60 Minutes, *Al Despartar*. Diving and tourist magazines did stories on the killing. Internationally embarrassed, Mexico President Carlos Salinas de Gortari made it unlawful to kill a manta, enacted a \$10,000 penalty for

anyone caught doing so, and put it on the "endangered species" list. This action came at a time when the environmental accord of the North American Free Trade Agreement (NAFTA) was under scrutiny by U.S. critics. Today, enforcement is all but non-existent. The Mexican Navy patrol boat alluded to earlier to protect and monitor the islands still gets underway once every 2 weeks, at a pre-set time. Enforcement is actually carried out by private fishing and dive charters, who report violators via radio to the Mexican authorities (McGettigan, 1994).

## SEA TURTLES

Sea turtles, which include Kemp's, olive Ridleys, green and black varieties, are considered one of the most imperiled creatures of the sea - Kemp's turtles on the endangered species list (Luoma, 1995). Sea turtles native to Mexican waters include both Atlantic and Pacific species. Of the marine species in decline in Mexico, the conservation efforts aimed at sea turtles hold the most promise; but again, enforcement is lax or non-existent. Some species that numbered 40,000 in the 1950s had plummeted to a few hundred in the middle 1980s (Luoma, 1994). Conservation efforts by the United States have helped save the sea turtle in Mexican waters. The once-abundant sea turtle has faced two major threats: entanglement in the nets of shrimp trawlers and the rampant poaching of sea turtle eggs on Mexican beaches. Sea turtle meat, particularly the green, is arguably the most delicious, due to the green being a vegetarian that grazes the pastures of sea grasses and algae (Darosa, 1994).

Male and female sea turtles mate offshore, and females come onshore to nest. Genetic tests suggest that the aforementioned sea turtles may only nest on the beach they were born (Darosa, 1994). Each female lays up to six clutches

of eggs, at ten to twelve day intervals, with about 100 golf ball-sized eggs in each clutch. Next there is a 60 day incubation period, where the eggs are subject to an array of natural threats: destruction by rain or sea water or eaten by birds, crabs, dogs or raccoons. Hatchlings that survive to break out of their shells and return to the sea face new predators in the underwater environment. Only a few from each thousand eggs make it to adulthood.

The Mexican shrimp trawler fleet, aggressively combing both Atlantic and Pacific waters, have a long history of entrapping sea turtles in the shrimp nets. In U.S. waters, the National Marine Fisheries Service (NMFS) mandated the use of turtle excluder devices, a type of "escape hatch" in the net that ejects large objects, including turtles, from the throat of the sock-shaped trawling net (Dept. of State, 1994). In 1993, Mexican authorities mandated the use of the devices on their own shrimp vessels. Mexican fishermen quickly learned what their American counterparts knew: the devices eject a number of shrimp as well. Both American and Mexican shrimpers purposely installed the devices incorrectly, some with the device door sewn shut, in an attempt to circumvent the regulations. In Mexico, the shrimpers were more blatant by

simply not installing the devices at all, knowing that enforcement was nearly non-existent (Luoma, 1994). During the summer of 1994, 350 dead Kemp's sea turtles washed ashore along the Texas-Mexico border in the Gulf of Mexico, apparent victims of net entanglement. The U.S. Coast Guard, after being sued by the Center for Marine Conservation, began aggressively monitoring and enforcing the exclusion device regulation in U.S. waters (Walker, 1994). Nothing happened on the part of the Mexican government. In a March, 1994 U.S. Department of State Dispatch, the government of Mexico reports that since it implemented its mandatory turtle excluder device law, it has not granted any commercial shrimp trawlers permission to fish unless "proper installation of approved devices has been verified by Mexican authorities." Again, the verification is non-existent (Lindquist, 1994).

Poaching has also decimated the sea turtle population. In addition to the turtle meat being sold as a delicacy in restaurants, sea turtle products such as sea turtle-skin boots, creams, and shell products made up an impressive trade. The eggs themselves are considered an aphrodisiac in some Latin American countries and China, and could garner as much as \$5 an egg in the black market (Fu, 1993).



In 1990, Mexico outlawed trade in sea turtle products in accordance with the Convention on International Trade in Endangered Species (CITES). But a loophole allowed Mexican vendors to sell off their "pre-1990 inventory," without provision to determine when the sea turtle product was made. Inspection was so lax that most vendors were unaware that the trade had been declared illegal (Steiner, 1994). As part of a NAFTA debate in 1993, Mexican President Salinas assured the U.S. that the Mexican government would act against the illegal trade - this too has turned into a false promise to push NAFTA. In November 1994, the Sierra Club and Earth Island Institute filed suit against the U.S. Secretaries of Interior and Commerce to force them to stop the slaughter and trafficking in endangered sea turtles in Mexico; specifically, require nations importing shrimp into the United States to reduce their turtle mortality (Walker, 1994). The 1978 Pelly Amendment requires investigation of charges that other nations are failing to enforce treaties protecting endangered species. The U.S. President could ultimately impose trade sanctions against Mexico, but the timing could not have been worse: in December 1994, the peso was seriously devaluated and the U.S. embarked on a plan to bail out the Mexican economy. The

lawsuit has stagnated and the U.S. government is seeking dismissal of the suit, claiming Earth Island Institute lacks authority to request the embargo (Walker, 1994). Had it progressed, the economic ramifications would have been a disaster for Mexico. A shrimp embargo against Mexico would have been considerably worse than the tuna embargo Earth Island Institute spearheaded years earlier due to the thousands of dolphins Mexico was killing in its tuna catch. The value of Mexican shrimp sales totalled \$1.7 billion for 1991 - tuna sales before the tuna embargo were \$800 million (Lindquist, 1994). If the Mexican economy had not crashed in 1994, it is questionable that the U.S. government would have allowed such drastic economic measures against Mexico.

However, there is a positive outlook concerning the sea turtles. Surprisingly, it has been the efforts of private citizens, scientists and environmental groups that have begun to rebuild the sea turtle population. The Sierra Club, Caribbean Conservation Corporation, Earth Island Institute and the U.S. Fish and Wildlife Service have contributed to this effort (Fitzsimmons, 1992).

In the Mexican state of Michoacan lie beaches where Kemp's and black sea turtles return to nest. Conservationists

and scientists voluntarily patrol the beaches during the nesting season and track the female turtles until they lay their eggs. The eggs are immediately dug up and then sequestered in protected coral on the beach and guarded for the nearly 2 months until they hatch. Whether the prey is natural or a poacher, the eggs are being protected by a respectable international effort, and the turtle numbers appear to be rising (Luoma, 1994). A recent classified ad in the *San Diego Union-Tribune* recruited volunteers for the turtle project in Mexico, Costa Rica and Nicaragua. Interestingly, the scientists have considered human needs as well. They are developing alternate sources of income for local residents who used to rely on the turtles. Eco-tourism and sales of handicrafts have replaced turtle hunting, particularly among the Mexican Indians (Steiner, 1994).



## TOTOABA

The demise of the totoaba fishery is a classic example of Mexican inattention, mismanagement and lack of enforcement of a treasured and valuable marine natural resource. The totoaba is similar to the Pacific white sea bass and at one time one of the more tasty fish species found in both Mexican and U.S. seafood restaurants (Hendrickson, 1979). Weighing up to 300 pounds and as large as six feet long, the totoaba was also an excellent sportfish, often providing anglers excitement and challenge in landing one of these aggressive giants. A combination of overfishing, habitat alteration and bycatch reduced the totoaba population to qualify as an endangered species in 1979 (NMFS, 1979). In the past three years, there have been no known documented totoaba catches and it is feared the species may be extinct (Lagomarsino, pers.comm. 1996).

As early as 1940, Mexican authorities recognized the rapidly declining numbers of totoaba and implemented totoaba fishing seasons as early as 1955 (Alvarez-Borrego, 1983). The totoaba was particularly exploitable because of its natural confinement to the northern half of the Sea of Cortez and its proven annual breeding migration every February to the mouth

of the Colorado River. So proven, in fact, that adult totoaba were naturally funneled into a small area to lay their eggs, where fishermen waited in numbers (Flanagan and Hendrickson, 1976). As late as the 1950s, a thousand or more totoaba would trap schools of smaller fish against the shore, chase them and eat them, thrashing the water into a "frenzied foam" (Cannon, 1966). With the established totoaba fishing seasons largely ignored, fishermen continued to illegally fish to satisfy, oddly enough, a large U.S. restaurant market willing to pay top dollar for the tasty fish (Lagomarsino, 1991). With no monitoring or enforcement mechanisms in place, seasons were ignored because "everyone else ignored them" (Seibert, 1994). The agency responsible for enforcement was the Mexican Navy 250 miles south in the port city of Guaymas, who rarely ventured north (McGettigan, 1994). Because of a lack of enforcement, it was not uncommon for fishermen to "domino," whereas if one fishing vessel was seen to be fishing, several would join. In 1976, the Mexican government placed a moratorium on all totoaba fishing, but again, was ignored by Sea of Cortez fishermen because of lack of enforcement. Due to environmental pressure from the United States, Mexican President Salinas enacted strict prison sentences in 1991 for

anyone illegally catching a totoaba (Lagomarsino, 1991). In 1992, large-mesh gillnets were banned in the northern Sea of Cortez, commonly used to catch totoaba. Whether the Mexican government's actions were timely enough is immaterial: with no means of monitoring and enforcing the Mexican regulations, Mexican fishermen continued to fish.

As a sidelight, a seemingly unrelated event may have also contributed to the loss of the totoaba. As the U.S. built dams on the Colorado River and as the Colorado's fresh water was diverted to agricultural projects and farms in the Coachella and Mexicali Valleys in California and Mexico, respectively, the flow of fresh water into the Sea of Cortez came to a standstill. The point at which the Colorado River flowed into the Cortez is coincidentally the site of the totoaba breeding ground. Scientists have theorized that the combination of salt water and fresh water, coupled with the right sediment mix from the Colorado River, produced the right "nursery conditions" for the totoaba eggs to hatch and the hatchlings to mature (Arvizu and Chavez, 1972).

Lastly, the totoaba was a victim of two sources of incidental bycatch. Shrimp trawlers, aggressively combing the northern gulf for shrimp in the same area as the totoaba

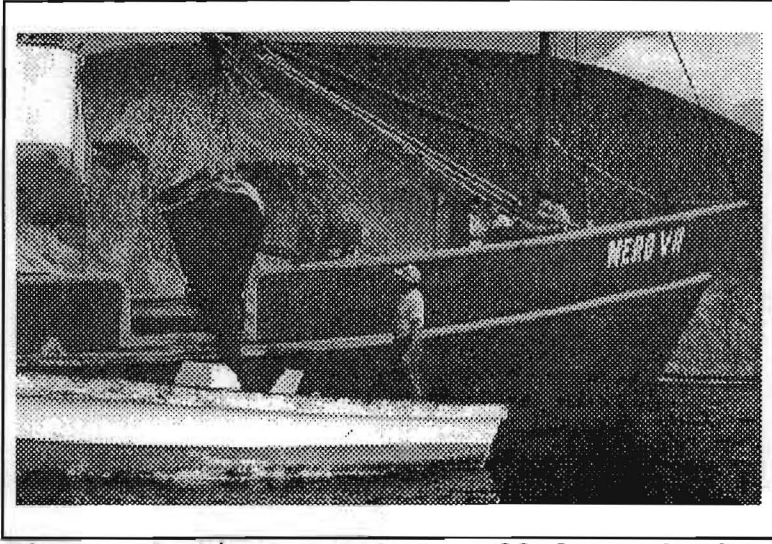
breeding ground, often caught juvenile totoaba in their nets. The ratio of bycatch to useable shrimp was placed at 10:1 (McGettigan, 1994). The breeding area was designated as a protective sanctuary in 1975. The 1980s saw a further reduction of totoaba stocks when adult totoaba, now considered an endangered species, were incidentally caught in the nets being set for shark. Because of a lucrative black market for totoaba, it has been suggested that totoaba was really the target species (Lagomarsino, 1991).

In 1991, two scientific centers were established in Sonora, Mexico to research ways to raise totoaba in captivity. Promised funding from the Salinas government never materialized and research on the part of Mexico is stalled (Lagomarsino, pers. comm. 1996).

## SHARKS AND CLAMS

Two fisheries that will not be examined but only mentioned due to their senseless and aggressive overfishing are those of the shark and chocolate clam. The decimation of the shark fishery is a world-wide problem, not inherent to Mexico. However, the search for more and more species and fisheries to sustain Mexican fishermen's quest for a market eventually led to the shark. Dried shark fins bring about \$40 a kilo in the Ensenada, Mexico fish market (Matthews, 1994). Particularly in the Sea of Cortez, fishermen set their nets for schooling hammerhead sharks, which are brought aboard a vessel, "finned," and then the *shark carcass is thrown back into the sea*. The Chinese purchased 6600 million pounds of dried shark fins in 1990 (Gruber, 1993). Because the marine food chain has been disrupted in the Sea of Cortez, hammerheads have been seriously reduced there (McGettigan, 1994). Still, about 200 boats per night visit the Midriff Islands with night gillnets to try and net any remaining hammerheads. Over 40% of the shark catch is pregnant females. To make matters worse, Mexican fishermen are killing sea lions and porpoises to bait the sharks, as mammal blood attracts sharks better than fish blood (McGettigan, 1994).





**Figure 5** Giant manta, gaffed on hooks, about to be slaughtered by Mexican fishermen.

In the summer of 1994, a group of students from a University of Arizona marine ecology class was permitted to ride and observe the fishing activities

on an 80 foot Mexican shrimp boat out of Puerto Penasco on the eastern shore of the Sea of Cortez at night. The vessel laid a 9000 ft. gill net (12 inch mesh size), primarily for sharks. Twice during the night, giant mantas had to be removed from the net, as they weighted the net down. When the net was retrieved the next morning, the catch was as follows:

- 11 bigeye and common thresher sharks
- 5 hammerhead sharks
- 1 dusky shark
- 14 sailfish
- 1 black marlin
- 2 manta rays
- 74 skipjacks



After the net was completely retrieved, the sharks were "finned," and the jaws removed. The aspect that is most disturbing is the waste of non-target species. None of the sailfish, marlin, mantas or skipjacks were saved, they were thrown back overboard dead without any attempt to salvage the meat. When the crew was asked why they were not utilizing these fishes, their answers were simple: they did not have enough space or ice to store "inferior" species (data and background provided by Alex Kerstich and Dr. Don Thompson, University of Arizona). The fishermen related that this was a "typical" catch, that in recent years overall harvests had been seriously declining.

A delicacy in Baja California restaurants has long been the chocolate, or *chocolata* clam. In 1991, a *chocolata* rage struck Mexico City restaurants and public ads were placed in Mexican newspapers offering good prices for the clams. A fleet of pangas and hooka divers descended on Bahia Concepcion in the Sea of Cortez. Each panga could take half a ton of clams per day, and the average monthly take in Bahia Concepcion was 350,000 clams. In less than a month, the bay was depleted of chocolate clams. The panga fleet then headed to other bays, in somewhat of a "commercial strip mining" of chocolate clams.

The only environmental criteria used was, when there was nothing left, it was time to quit (McGettigan, 1994).

#### IV. NAFTA: POLITICS OF MEXICAN MARINE CONSERVATION

Controversy over its potential environmental effects dogged the passage of the North American Free Trade Agreement (NAFTA). Environmental groups were concerned that the treaty would bring U.S. and Canadian environmental standards down to notorious Mexican levels. Growing industrialization caused by NAFTA could worsen Mexico's already poor public services, such as water supplies, sewage treatment, solid waste disposal and air quality. President Clinton, given his strong stand on the environment, placed enormous pressure on Mexican President Salinas to raise the level of Mexico's environmental standards. Salinas made an impressionable attempt to tie marine conservation with NAFTA, which will be discussed shortly. Since the passage of NAFTA in November 1993, however, direct effects on marine conservation have been largely unheard of. Instead, other environmental issues have been exacerbated. It is important to examine how those issues are being dealt with, because of the strong likelihood that later marine environmental issues may be handled in a similar fashion.

## "MEXICAN ENVIRONMENTALISM" AS A PRECURSOR TO NAFTA

### Longliner Issue.

In 1990, the United States enacted a tuna embargo against Mexico because Mexican tuna seiners were not using fishing techniques that were considered "dolphin safe" (Zieralski, 1993). As a result, the tuna fishing industry in Mexico went near-bankrupt, and the Mexican government considered issuing longline permits to 10 to 12 Japanese fishing vessels that would allow the Japanese to fish within Mexico's exclusive economic zone (EEZ) of 200 miles on the Pacific Ocean side but no closer than 50 miles. The Japanese longliners were known to set some 2500 hooks a day on lines that stretched 60 miles, and could catch in one fishing trip what an eight-boat sportfishing charter could catch in two years. La Paz fishermen estimate these Japanese "fish factories" could haul in 4800 marlin per trip (Zieralski, 1993).

When news of the permit contemplation broke out (due to exposure by an English-language newspaper in Baja California), sport-fishing charters, Mexican fishing co-ops and environmentalists protested to the government and President



Salinas. In early 1993, Salinas ordered a delay in the issuance of any permits for one year to further study the impact. Shortly thereafter, a Japanese-operated longliner was confiscated within the Mexican EEZ for taking 80 tons of marlin, 20 tons of yellowfin tuna, two tons of filleted swordfish and two tons of shark - species taken indiscriminately (Zieralski, 1993).

The case against the longliners was supposedly strong. However, what occurred next typifies Mexican politics: in the next year, six Japanese longliners (who had previously applied for the EEZ permits) showed up in Mexican waters fishing *under Mexican flag* (McGettigan, 1994). The Mexican government had sold out its own people - rather than refuse the Japanese (and the income generated by the foreign longliner permits), the government simply re-flagged the vessels! One can only imagine the monetary compensation that passed in order for this to happen. Was it a coincidence that Salinas ordered the delay in the permit issuance to the Japanese because NAFTA was being debated, and subsequently enacted in November 1993? Was the re-flagging done quietly and specifically after the passage of NAFTA? Salinas attempted to pacify both businessmen and environmentalists, and his timing was excellent.

### Mexican Biospheres.

In June, 1993 Mexican President Salinas established a "biosphere" reserve in the north Sea of Cortez. The reserve established a 3700 square mile sanctuary for marine life stretching from San Felipe on the east coast of Baja California to Puerto Penasco on the west coast of mainland Mexico. The preserve places a vast area of the upper gulf off-limits to commercial fishing, sport fishing and oil drilling; and hopefully will protect the spawning grounds of the endangered totoaba fish and vaquita dolphin. The vaquita is often trapped in the gill nets set by fishermen legally fishing for shark and other species and illegally fishing for totoaba in the northern gulf; while the fishermen are laying their nets in known areas of the Gulf where migrating totoaba are known to frequent (Hendrickson, 1979). Additionally, the shrimp trawlers have sharply reduced the shrimp population in the northern gulf.

The demise of the vaquita and totoaba and the reduction of shrimp stocks in the Sea of Cortez had been known for some time prior to 1993. Salinas' move to declare the preserve in an attempt to save these species presented him with an

opportunity to demonstrate his concern about environmental issues as parallel agreements to NAFTA were being negotiated. A U.S. National Marine Fisheries Service official stated, "I think Mexico is concerned about the environment, but we also know that one of the sticking points with NAFTA is environmental issues" (Walker, 1993).

Was Salinas really concerned about saving these fish, or was he pushing NAFTA? The vaquita and totoaba had been declared nearly extinct in the mid 1970s, and Mexican shrimp boats had long overfished the northern gulf, and had moved their nets considerably farther south (Larue, 1993). At the time, and even today, there was no monitoring effort or enforcement plan in effect to protect the "biosphere." Salinas announced that the Mexican Navy would patrol the area, but from a naval base 300 miles south in Guaymas. There are currently no Mexican patrol boats in the northern gulf (Lagomarsino, pers.comm., 1996).

Instead, Mexican officials trumpeted the President's action with rhetoric and fanfare, such as "this will protect Mexico's heritage, a stunning heritage - it's an incredibly valuable move to protect the unique habitat of the northern

Gulf of California" (Walker, 1993) and "we have decided that here ecology has priority over politics" (Larue, 1993).

U.S. environmental groups politely applauded Salinas' actions, but realize it falls well short of real environmental concern. Concurrent with the biosphere establishment, Defenders of Wildlife conducted radio and television ads in Mexico in an attempt to increase public awareness of the true status of the northern gulf. The only enforcement visible was that of NMFS' special agents verifying fish imports at select U.S.-Mexican border crossings (Walker, 1993).

Salinas took advantage of many issues that could have swayed the U.S. decision on NAFTA and attempted to show that Mexico was concerned about marine conservation, but only when the issue arose. The salt factory expansion at the Guerrero Negro whale breeding grounds would have been a boon for the Mexican economy, but risking bad publicity and possible non-passage of NAFTA, Salinas sided with the environmentalists. By the same token, the sea turtle issue was raised at the same time NAFTA arguments were being made, and Salinas pushed the mandated use of TEDs in Mexico, presumably to show his support for environmentalism. Again, monitoring and enforcement in the Gulf of Mexico was nearly non-existent. The slaughter of the



giant mantas was an embarrassment for Salinas and he promptly enacted laws to punish any offenders, despite his lack of enforcement resources in the Pacific. The Japanese longliner issue is a travesty to the Mexican people, and Salinas' biosphere reserve establishment was an attempt to be proactive; but as previously mentioned, the biosphere was established and laws passed with no mechanisms in place to monitor and enforce. It is easy to see in hindsight that passage of new laws and regulations that could not be enforced, or initiatives and research (e.g. contemplated totoaba research) that were announced but never enacted were rhetoric to convince the U.S. that Mexico was pro-environment and push the passage of NAFTA.

As a sidelight, the real intentions of Salinas have now come under scrutiny as well. After stepping down as President in December 1994, Mexico's economic woes may have been worsened by more than just the peso devaluation. Salinas has now been accused of embezzling some \$84 million from the Mexican government, in addition to charges of fraud, money laundering and drug trafficking. In his obsessive quest to head the World Trade Organization, which he could not do if NAFTA was not passed in the U.S., Salinas falsely impressed

both Americans and Mexicans that environmentalism was a major agenda for his administration. Salinas now resides in Cuba (Walker, 1996).

## POST-NAFTA ENVIRONMENTAL ISSUES

Unfortunately, natural resource protection and marine conservation are not addressed in the NAFTA environmental side accord (Dept. of Commerce, 1993). However, certain parallels and assumptions can be made based on what action/inaction is conducted on the growing industrial complex generated as a result of NAFTA, which will be addressed shortly. Marine environmental issues share an important commonality with many of Mexico's other environmental problems: the government attacks problems one by one, and only after public outcry or they have reached the critical stage or the point of no return.

It is important to examine how environmental issues were to be dealt with after the passage of NAFTA. The U.S., Canada and Mexico met in 1993 and signed the NAFTA environmental side accord, properly known as the North American Agreement on Environmental Cooperation (NAAEC). NAAEC establishes a means of monitoring and addressing environmental issues due to effects of NAFTA-induced trade and industrialization, particularly water quality, air quality, sewage and hazardous waste disposal (Nader, 1995). The environmental agency is called the Commission for Environmental Cooperation (CEC) and

is made up from representatives from the U.S., Canada, and Mexico. Additionally, the U.S. and Mexico created the Border Integrated Environmental Plan (BIEP). One of the functions of BIEP would be for the U.S. to train Mexican federal inspectors and create a regional network of environmental workers (Sanchez, 1993).

Although well-intentioned when established, the CEC does not have the "policeman" status it should have. When established, National Wildlife Federation and Environmental Defense Fund recommended CEC should have an annual budget between \$30 million and \$70 million. Their current budget is \$9 million (Nader, 1995). As the Commission currently stands, there are too many restrictions on what they may investigate, they have no power to investigate on their own, and there are no provisions to prevent conflict of interest on the part of Commission members (Nader, 1995). The CEC has turned into an ineffective environmental overseer, not a condition that was desired after the pro-environment positions of the U.S. and Canada. Its ineffectiveness is evidenced by the continued environmental abuse seen in the U.S. - Mexico border areas. Although the Clinton Administration said in 1993 that NAFTA



would cause the maquiladoras<sup>3</sup> to dissipate into the Mexico interior, the majority are still crowded around the border towns and have experienced a 20% increase in growth since NAFTA was passed (Collier, 1995). The major maquiladora areas all report greater environmental problems now than pre-NAFTA: air quality and sewage in Tijuana/San Diego; air quality, water quality and hazardous waste dumping in El Paso/Ciudad Juarez; untreated sewage in Laredo, TX/Laredo, Nogales, AZ/Nogales and the Rio Grande River south of El Paso; and water quality problems in Del Rio, TX/Ciudad Acuna (Nader, 1995). Some of the reasons for CEC's inability to take action have been mentioned, but the continued devaluation of the peso (and subsequent failure to free funding for environmental purposes by the Mexican government), coupled with the U.S. Congress' own funding cut for environmental purposes, spells doom for these industrial border areas (DePalma, 1995).

The NAAEC was supposed to have provided new financing for environmental clean-up (Nader, 1995). Funds never materialized, and in order for Mexico to buy clean-up equipment, it must be imported. This translates into a 50%

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<sup>3</sup>Maquiladoras are the industrial factories, employing Mexican labor, that exist only for exported products.

price increase of equipment as of late 1995 due to the 50% peso devaluation since 1993 (Nader, 1995). The Mexicans simply cannot afford it. Despite a bail-out attempt by the U.S. government in 1995 (DePalma, 1995), the peso devaluation has resulted in the inability of Mexican federal, state and local governments to fund environmental clean-ups and regulate the maquiladora industry.

The first test of a wildlife-related NAFTA issue (and the only environmental issue the CEC has investigated) involved the killing of thousands of migrating birds at a lake in central Mexico called Silva Reservoir (Nauman, 1995). The lake had become a dumping area for the national oil company PEMEX and several industries that, among other hazardous wastes, were dumping DDT and chemicals indiscriminately. The *Group of 100*, the Mexican environmental group who actively protested the salt company expansion in Guerrerro Negro, again brought the issue to light and with other non-government organizations (NGOs) filed a petition with the CEC to determine the cause and stop the dumping. A Mexican team of inspectors under the CEC reported the cause of the bird killings to be *botulism*. The *Group of 100* protested; and accused the CEC and Mexican government of downplaying the

toxins that were industrially dumped (and verified by independent scientists), in order to exonerate the factories (Nader, 1995). This is a case of the Mexican government bowing to pressure from environmentalists and allowing the NAFTA-mandated investigation; but fabricating an unrelated cause to prevent factory shutdown.

Is this an indication to how a fishery problem or marine environmental issue will be handled? Marine natural resources have thus far avoided the decreasing environmental standards seen in the border cities or in an incident similar to Silva Reservoir. But the message is disconcerting. Despite the rhetoric that was presented by Mexico before the passage of NAFTA, the Mexican government cannot tend to marine environmental problems, especially on the scale that it is facing in terms of air and water quality, sewage treatment and hazardous waste dumping, whether generated by NAFTA or not. Serious action on the part of the Mexican government dealing with fisheries or marine resources should not be expected.

## V. RECOMMENDATIONS

The Mexican government currently faces grave national economic problems. Economic recommendations will not be addressed here, but specific initiatives are suggested to improve the state of Mexican fisheries. Comment on the likelihood of success will be made shortly.

Remove ALL nets from the Sea of Cortez. Although this body of water encompasses only 5% of Mexico's total waters within the 200 mile limit, it has historically accounted for 75% of all fish taken in Mexican waters (McGettigan, 1995). Nearly every fishery that occupies the Cortez has been significantly reduced, and indiscriminate use of nets is one of the catastrophic reasons. The net removal must be targeted at the small, panga fisherman in addition to the commercial industry. These pangas, numbering in excess of 3000, have contributed to the fisheries decline. It is pointless to enact a regulation on what a fisherman can or cannot fish for with gill nets: enforcement is so weak that a TOTAL ban is necessary. Trying to determine what legal fish a gillnetter is seeking based on mesh size, size of nets, etc. is too difficult. The total ban would serve several purposes: halt



the illegal taking of species, reduce incidental bycatch, bring the Cortez' fishing stocks back up, and make enforcement easier, since the mere presence of nets would indicate illegal fishing.

The sardine fishery must be re-established and protected. It is critical to maintain the sardine fishery in all Mexican waters. The sardine is the one link in the marine food chain that can bring the large fish back.

Assist the Mexicans in education processes. The U.S. government, non-government organizations (NGOs), and other marine environmental groups can assist Mexico in education programs aimed to acquaint the Mexican population with conservation methods and techniques. This can be done at the secondary school level, village or fishing co-op level, as well as national television exposure. NMFS Southwest Region has printed English and Spanish handouts describing the dilemma of the totoaba and vaquita. It has been mentioned that Defenders of Wildlife have run radio and television ads. The Discovery Channel did a series on marine ecology issues and ran the program in Spanish on Mexican TV. Several NGOs are voluntarily patrolling the Revillagigedo Islands to stop the manta killings and others are patrolling the sea turtle

nesting beaches in the Gulf of Mexico. The private group Seawatch distributed 3000 copies of its *First Annual Report on the Health of the Sea of Cortez* to Mexican local, state and government officials, as well as fishermen in major fishing ports. The Mexican *Group of 100* stages plays in Mexico City to demonstrate environmental issues (Aridjis, 1995).

Assist the Mexicans in developing management plans. The U.S. can assist the Mexican Department of Fisheries with developing marine management plans, of which are nearly non-existent today. Fishing seasons, quotas, limits, licensing and monitoring are a few initiatives that could be taught to Mexican officials.

Put mechanisms in place for the enforcement of existing fishery laws and regulations. This will be extremely difficult, and an undertaking the Mexican government must devote assets to. It is easy to task the military to enforce an area, but if the patrol boat is in repair or if there is no fuel for the boat, the tasking is meaningless. The enforcement resources, whether they are fisheries or military officials, must be plentiful, honest and genuine if enforcement is to be a success. The historical corruptness of officials and police

is a difficult obstacle to overcome in a country where it has been the norm for some period of time.

Assist the Mexicans in developing alternate sources of employment. Indians who used to catch sea turtles in the Gulf of Mexico have been re-trained to use the turtles as an eco-tourism resource, developing employment related to sea turtle watching and thereby drawing tourists and tourist dollars to the area. This could be done in the scuba diving sites and sea kayaking areas as well. In the shrimp village of Puerto Penasco, for example, the shrimpers could be re-trained in taking business advantage of the huge influx of Arizona vacationers that frequent the area.

Continue research in maricultural projects. Although research funding for the totoaba hatchery never materialized, Hubbs-Sea World Research Institute in conjunction with San Diego Gas and Electric Company have started a hatchery for white sea bass in Carlsbad, California. Although the initial return of the hatchlings is quite low (only 2500 of the first 100,000 hatchlings are expected to survive one year), it is the beginning of a revolutionary means of re-introducing depleted species. Since the white sea bass is similar to

totoaba, there is hope that technology gained from the U.S. project may help develop a totoaba hatchery (Bigelow, 1994).

Allow local communities to manage their own resources.

The Mexican city of Loreto has petitioned the Mexican federal government to give it municipal maritime jurisdiction on an eighty mile long "preserve" that would straddle the city on the Sea of Cortez. The city is concerned over federal incompetence and mismanagement, and has seen its commercial fishing, sportfishing and dive industries decline as a result of the decimated fisheries. The city desires to manage, regulate, license, monitor and enforce all activities within this zone. It will include re-planting clam beds, regulate fishing licenses, beach clean-ups and self-policing. If the federal government approves of the plan, it will set a precedent (Aparicio, 1995).

Enlarge the Border Integrated Environmental Plan (BIEP).

As part of the NAFTA accord, this program was designed to allow U.S. inspectors to train their Mexican counterparts in areas of management and conservation. NMFS has successfully done this with TED implementation, but enforcement is lacking. Fisheries biologists from NMFS could be training Mexican officials in all aspects of marine ecosystem management. The



major stumbling block is that the Mexican government cannot afford to add scientists, biologists or fisheries officials to its payrolls. This is an area where U.S. funds or help from NGOs may assist.

The U.S. Congress must take action. Congress must demand withdrawal or re-negotiation of NAFTA if environmental conditions worsen. A NAFTA transaction tax could be added to help fund environmental clean-ups. This is necessary so the lack of action in the poor industrial environment worsened by NAFTA does not have the same effect and domino into the marine environment.

## VI. CONCLUSION

A major concept that the Mexican government, and to a minor extent the Mexican people, have failed to grasp is that they have destroyed the very resource that provides them their livelihood; not just the actual fisheries they have decimated, but the economic benefits that the associated tourism could bring. Dive shops and sportfishing charters in La Paz and Loreto have seen steadily decreasing business as a result of the shrinking marine life. In the Sea of Cortez, for example, there are no more mantas to ride, hammerhead sharks to swim with, or unlimited numbers of gamefish for anglers. There is some good news, however: there has been an increase of whale-watching, sea turtle watching and sea kayaking tours ("eco-tourism") originated by U.S. businesses, but these too are in jeopardy because of the mismanagement of Mexico's marine resources. There in lies a major point: if an issue is raised that affects American businesses or American tourist dollars, the protests are loudest. Therefore, U.S. initiatives are required to protect Mexico's marine resources.

The current disarray of the Mexican economy presents a bleak picture on whether the Mexicans can save their marine resources on their own. Of the aforementioned recommendations,

those that must totally rely on Mexican assets to implement will be regrettably unable to achieve. By the same token, those recommendations that require more financial assistance in areas of increased personnel (larger payroll) or research and development will unlikely see success. As unfortunate as it appears, the Mexican government, in its present state of economic stress, corruptness, lack of direction and double standards, is unable to attain a level of marine conservation and environmental protection of its rich marine resources.

However, those areas where assistance or *public outcry* originates from the U.S. government, NGOs, and private citizens stand a fair chance of success. Public participation will be mandatory for resources like the Sea of Cortez to not become the next "dead sea." Letting government officials know of the public's concerns and having the public speak out loudly, coupled with pressure from NGOs will be key in order to stop the devastation. NGOs have been highly instrumental in the public education process. Other actions holding promise include an environmental transaction tax on NAFTA trade, enlarging the BIEP, assistance in the education process and encouraging the "self policing" that the Baja city of Loreto is proposing.

Bottom line is that it is unlikely that Mexico will recover from the destruction of its marine resources.

Finally, in a television documentary *Mirage of the Sea* that Jacques Cousteau produced for TBS in 1993, he listed the Sea of Cortez as one of the top three waters that had been fished to devastation. This ultimately leads to a much larger problem that Cousteau had no solution for: it is the dramatic and rampant increase in the world's population that drives the demand for fish, a most valuable food source. Since 1950, the world's total catch has grown from 20 million tons to just under 100 million tons (Laurence, 1993). By using the United Nations as a forum, it is imperative to address the population growth of our planet and how it is affecting the world's food supplies. This is the ultimate long term issue that the world must come to grips with.

*"No ecological problem will ever be solved until it becomes a political problem and it will never become a political problem until public opinion demands it."* Paul Armand.



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