

Magdalena Bay, B.C.S.

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Jutting out prominently from the Pacific peninsula of Baja California Sur in Mexico is the magnificent Magdalena Bay. Because of its unparalleled beauty and biodiversity, as well as the peculiar oceanic conditions unique to this region, it is ranked by the World Wildlife Fund as one of the nine most important coastal habitats needing protection in all of Mexico. However, as a result of increasingly evident environmental pressures, and with critical Mexican commercial fisheries management issues demanding attention, the future biodiversity and grandeur of this crown jewel of the eastern Pacific remains cloudy. If there were ever a time to be talking about protecting this area, it is now.



Satellite photo, looking northwest over the central part of Magdalena Bay. Shown is the central part of the open southern bay, including San Carlos, Isla Margarita, and the beginnings of the 70-mile mangrove system running north (right). This photo shows about 75 miles of the 140-mile long bay. (photo: NASA)

Oceanographic Conditions and Biodiversity of Magdalena Bay

Magdalena Bay is located at the meeting point for the two most influential currents of the Eastern Pacific: the cooler California current system from the north—an extension of the Alaska current—and the warmer Equatorial Countercurrent from the southern Pacific. This confluence creates water temperature fluctuations unique to the region, and this temperature variation is thought to be a primary contributor to the astonishing biodiversity of the region, which has been identified in the past as one of the richest, if not the richest, estuarine waters in the world.

What can be found here is startling in its variety: squid, crab, shrimp, snook, sea bass and other corvina, grouper, yellowtail, yellowfin, skipjack, sardines, mackerel, and other minor pelagics, flounder, halibut, many species of birds, scallops, turtles, different species of sharks, rays, and of course, the gray, humpback and occasional blue whales, attracting thousands of whale watchers to Magdalena Bay every winter.

Because Magdalena Bay is located at this vortex of north/south water movement, conditions are created offshore for huge upwellings of nutrients from the benthic - or bottom - regions of the sea (this process is known as the Coriolis Effect, which spins surface water offshore, creating cold-water upwelling to displace it nearshore). This effect results in explosions of phytoplankton, in particular the pelagic red crab, *Pleuroncodes Planipes*. It has been demonstrated in studies that many pelagic organisms, like yellowfin and skipjack tuna, marlin, and whales, as well as whale sharks and rays, are drawn from far away and preferentially congregate here because of the abundance of this planktonic creature.



Pelagic red crab (*Pleuroncodes Planipes*) upwelling, (photo: Phillip Colla, www.oceanlight.com)

Because the pelagic red crab can exist in water temperatures ranging from 9-28 degrees Celsius, they are at home here in the fluctuating water temperatures found around Magdalena Bay. They have been known to drift as far north as Vancouver with the currents at work in the region. This vast span of habitat gives one an idea of the kind of influence this region of the ocean has on the entire eastern Pacific coastline, from Canada to Mexico, and why it is in everyone's best interests to

work together in identifying the host of problems currently facing the region.

Commercial Exploitation and the Human Effect

The different problems currently pressuring this region are, without meaning to sound



The cash crop of Magdalena Bay, the Monterey sardine. (photo: Bain Smith)

poetic, legion, and we will begin by discussing the paramount issue to the continued biological health of the bay: **the sardine**. Magdalena Bay is considered by many to be the main breeding ground and nursery for much of the sardine population on the west coast of North America, because it's the one place that continually holds sardines year round in the Pacific. The total catch for Magdalena Bay was 328,986 metric tons for the

years 1990 to 2003. 70% of the sardine catch is the highly desirable Monterey sardine, of which 70% is burned in the reduction process, which will be discussed in further detail below.

ASUNTO: CAPTURA DE SARDINA POR VARIEDAD CORRESPONDIENTE A LOS AÑOS 1990 AL 2003.

| ANO: | CRINUDA: | MACARELA: | MONTERREY: | JAPONESA: | BOCONA: | OTROS: | TOTALES: |
|---------------|-------------------|-------------------|--------------------|------------------|-------------------|------------------|--------------------|
| 1990 | 2,735,591 | 0 | 6,565,420 | 0 | 1,641,355 | 0 | 10,942,366 |
| 1991 | 1,975,352 | 0 | 4,938,382 | 0 | 1,975,352 | 987,676 | 9,876,762 |
| 1992 | 7,047,264 | 0 | 2,806,714 | 0 | 5,337,335 | 0 | 15,191,313 |
| 1993 | 6,750,369 | 0 | 5,356,815 | 0 | 523,560 | 455,445 | 13,086,189 |
| 1994 | 463,960 | 48,365 | 23,847,313 | 0 | 157,805 | 60,200 | 24,577,643 |
| 1995 | 1,245,715 | 230,695 | 22,466,045 | 0 | 316,230 | 0 | 24,258,685 |
| 1996 | 1,870,475 | 2,647,750 | 18,008,588 | 138,510 | 187,500 | 194,025 | 23,046,848 |
| 1997 | 4,732,830 | 4,627,417 | 10,535,839 | 40,150 | 4,326,330 | 0 | 24,262,566 |
| 1998 | 8,820,079 | 2,714,400 | 1,434,090 | 343,500 | 3,690,030 | 235,050 | 17,237,149 |
| 1999 | 6,064,837 | 1,014,961 | 8,102,261 | 87,090 | 2,194,627 | 626,340 | 18,090,116 |
| 2000 | 1,371,500 | 398,580 | 32,494,790 | 0 | 1,812,769 | 92,160 | 36,169,799 |
| 2001 | 2,417,755 | 242,170 | 30,874,448 | 0 | 2,204,990 | 177,480 | 35,916,843 |
| 2002 | 2,179,985 | 3,384,656 | 33,705,804 | 251,490 | 1,084,620 | 307,450 | 40,914,005 |
| 2003 | 2,782,220 | 44,600 | 31,435,006 | 221,920 | 931,900 | 0 | 35,415,646 |
| Total: | 50,457,932 | 15,353,594 | 232,571,515 | 1,082,660 | 26,384,403 | 3,135,826 | 328,985,930 |

As Sea Watch observed recently in visiting the two sardine processing plants on Magdalena Bay, the only government regulation that currently applies to the sardine industry is a 15 cm minimum length¹. The sardines being caught in and around the bay are shrinking in size and many are under the 15 cm limit. A one-pound oval tin produced for human consumption, just two years ago, used to hold 7-9 sardines. Now, this year the same can holds 14-15 sardines per can.



Oval cans now hold 14 to 15 sardines, up from 7-9 just a year ago.



Mag Bay sardines in Calmex plant that employs over 400 people. (photo Bain Smith)

¹

Medidas de manejo; NOM-003-PESC-1993 (D.O.F. 31/12/93). Establece, entre otros, tallas mínimas de captura para sardina Monterrey (150 mm de longitud patrón LP), crinuda (160 mm LP), anchoveta (100 mm LP). Se limita el ingreso a la pesquería al norte del paralelo 20° N.



This 60 ton burner has been replaced with a 1000 ton burner. The 60 ton burner has been sold to the Moon plant, creating the capacity to burn 1060 tons per day of sardines for low quality fish meal.

Sardine Reduction, or burning, is where 70% of the total Monterey sardine catch goes. The reduction process—an outdated, 100 year-old method of creating fishmeal—is a process that eliminates most of the sardine’s nutrients and creates as a by-product a lot of solid organic waste, as well as the putrid stench wafting from the plant every afternoon - impossible to ignore in and around the town of Puerto San Carlos. Also impossible to ignore is

the profitability of this part of the industry, as it requires less than 12 employees to run the entire reduction plant and consequently is much more profitable than the canning process, which employs 400 people at the Calmex plant alone, as well as over 100 people at the Moon Industries plant next door. Unfortunately, the fishmeal created by reduction is in increasing demand from the chicken and pig industries, spurring a recent increase in capacity from 100 to 1000 tons/day. These animal industries rely on the fishmeal for protein, as does the burgeoning aquaculture industry, which prizes the sardine fishmeal for notoriously picky eaters like salmon and tuna. This new, added pressure on the sardines and sardine canneries from aquaculture--exacerbated by recent sardine permits granted to Mitsubishi for its tuna ranchers to take an additional large tonnage of sardines a day from Magdalena Bay--has caused increased levels of concern from the community, the sardine industry, and environmental organizations about the long-term sustainability of the sardine in Magdalena Bay. **Something needs to be done in creating a monitoring system of sardine size and biomass.** Otherwise, be assured that as the other fisheries continue to be depleted, there will be over fishing of sardines in Magdalena Bay.

It must be stated that the sardine industry has never been an obstacle to the idea of sustainable fishing. If anything, the canneries are extremely sensitive to the issue and have expressed an ongoing, vested interest in working with scientists to create sustainable fishing practices. Since there is still little in the way of definitive studies done on the region’s sardine population, at this point it is hard to say when or where the solution to sardine sustainability will come from.



Of additional concern to the ongoing health of the bay is the well-documented pollution created by the disposal of organic materials dumped in the bay by the sardine canning and reduction processes. Even though the massive tide movements into and out of the bay breathe sea water into the bay every day, **this addition of organic matter needs to be scientifically monitored.**



The Human Effect

The town of Puerto San Carlos, where the two main sardine canneries are located, receives substantial benefit from the industry's existence and profitability. Because it's the only industry that exists here year-round (the whale watching industry is confined to the winter season), it is the crucial contributor to an otherwise moribund economy. To visit the town, located at the end of a long, narrow peninsula, one would never know industry existed at all based on the pervading poverty, unregulated human growth, lack of municipal infrastructure, open sewage pits throughout the town, and high levels of untreated human pollution (fecal coliform levels are nine times the safety standard in the bay) seen in the water and the town. And because there is little in the way of employment outside the sardine industry, large numbers of unemployed locals here turn to drugs, and one can not avoid daily examples of this social detritus in the streets. It cannot be stressed enough, however, how important the sardine canneries are to the continued existence of the town. Calmex's cannery alone provides more than 400 jobs to the population of Puerto San Carlos, as well as the town of Constitution an hour away, and without this kind of opportunity for the townspeople, the town wouldn't survive.



Open sewage pit in the town of Puerto San Carlos. (photo: Bain Smith)



Tar paper houses with no sanitary facilities or water are springing up all around the estuaries.



The town of San Carlos has grown rapidly, with the scores of unemployed eking out a living on subsistence fishing in Magdalena Bay. The lack of regulation and enforcement in the area has caused a tremendous strain on a fragile marine environment. The lack of money and infrastructure, unregulated growth, and growing dependency on drugs all

preclude the chance for the town to develop what could be a booming tourism and ecotourism industry. **The now depleted estuarine waters of Magdalena Bay were some of the best snook, corvina and green grouper fishing in the world 25 years ago.** It is difficult to entertain this image of the bay in its current state.

Panga Gillnetting and the Fragility of the Bay's Habitat

Magdalena Bay wetlands are coastal wetlands. While most coastal wetlands are brackish (a mix of salt water and fresh water), the water found in the shallow bays and mangrove channels of Magdalena Bay is hypersaline (more salty than ocean water). Hypersalinity occurs, in part, because there is minimal fresh water input to the bay from the bordering desert. In addition, the intense heat of the area around Magdalena Bay causes the water to evaporate at a high rate, thus leaving behind water with salinity higher than that of the ocean. As a result, the plants and animals living in Magdalena Bay must not only be adapted to the common coastal wetland conditions, but also to the intense heat and high concentrations of salt present in a hypersaline wetland.



Many 100s if not 1000s of gillnets choke all the estuarine back waters of Magdalena bay. Almost everything is gone. (photo: Bain Smith)

Magdalena Bay's estuaries were home to many commercially valuable species of animals, and were once reputed to have been some of the best snook and white sea bass (corvina) fishing in the world. Because so many who have moved to Magdalena Bay are not employed by the sardine industry, they make their living the only way they know how, depending on the bounty of the bay for their livelihoods. Unfortunately, the two main fishing practices here—subsistence



This net, like many that day, yielded not a single fish. (photo: Bain Smith)

gillnetting and shrimp trawling—are incredibly destructive to the fragile ecology here.



Days catch of small fish including baby shark on top (Mike McGettigan)

We joined the panga boat gillnetters as they motored up into the Magdalena Bay estuaries and mangrove forests, a practice repeated daily by the hundreds, to catch corvina, flounder and other commercially viable fish species with monofilament gillnets. On the

trip that Sea Watch took with two subsistence gillnetters, the 500-foot gillnet was thrown into a small estuarial opening and gathered 30 minutes later. What they produced for this effort was 4 fish, only one of which was commercially viable, a solitary small corvina, or sea bass. The two fishermen told us they would repeat the process 5-6 more times that afternoon to make the trip worth it for a day's work. What was shocking was the scarcity of fish they caught. The estuaries appeared bereft of fish, acutely troubling because these mangrove estuaries act as nurseries, providing the perfect habitat to feed and protect immature fish and shellfish as they mature. As they become less vulnerable to predation, they will move out into the bay and continue to grow, but much of this pattern has been choked off by the hundreds of pangas fishing the



Subsistence panga fishermen with gillnet, applying their craft. (frame grab: Armando Figaredo) estuaries daily.

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Days catch is often only a few fish -1/2 milk crate of fish was typical during our time there.

Bay Shrimp Trawling



Deploying the shrimp trawling net "chongo". (photo: Bain Smith)

The final chapter of Sea Watch's journey to Magdalena Bay took us on a shrimp trawling expedition. This is a nightly ritual for many subsistence fishermen living in and around the bay, who, with or without the sanctioned permits allowing them to fish, take off at sunset as one of 300-500 panga boats that trawl the bay for shrimp by night.



For every “lanza”, 3 kilos of shrimp, 30 kilos of unintended, dead bycatch. (frame grab: Mike McGettigan)

At the end of the night a boat has killed 300 lbs of juvenile fish to get 30 lbs of shrimp that are sold for \$140.00. It has used 135-150 liters of fuel, 7 liters of oil, costing about \$105.00. The income for the nights work for two people is approximately \$35.00.

We jetted across the bay and stopped near Punta Belcher on Isla Margarita. While “chongo” trawl nets are officially proscribed as an illegal practice in Magdalena Bay (instead, they call the “chongos” “Mag. Bay Specials”) we were soon making a “lanza”, or throw, of the trawling equipment into the bay to a depth of 100 feet, and we circled slowly around the area for an hour, scraping and shaking hundreds of square meters of ocean floor for shrimp, which, not lost on the fishermen, has unseated tuna this year as America’s most popular seafood. After an hour’s trawling, the net and “bolsa”-where all the catch falls into-were brought up and dumped inside the boat. What we witnessed was nothing short of slaughter. For 3 kilos of the shrimp these fishermen prize, there were an additional 30 kilos of “bycatch”, or unintended catch, almost all juvenile groupers, baby flounders and other smaller fish and shellfish, all dead. When we did the math and realized that this boat would repeat the process 4-6 times that night, and multiplied that by the 300-500 boats out that night, one didn’t need to be a scientist to realize that there were 45-60 tons of bottom fish killed nightly in the bay by the “illegal practice” of shrimp trawling.

Positive Developments and Possible Solutions

In just the past month, a momentous first step was taken by the government of Baja California Sur to institute a “rule of law” in Mexico’s waters, and in effect, put the government’s money where its mouth is concerning enforcement and regulation. Signed into law by Governor Leonel Cota Montano and Secretary of Development Ernesto Lopez Cinco, the “Fideicomiso Fonmar” creates a trust fund from fishing permits and shifts responsibility for vigilance and oversight of fisheries and Baja waters from the federal to the civil level. This move, backed by Sea Watch and many other concerned people and organizations, will help create a monitoring system to tackle the chronic, ubiquitous problem of illegal fishing, and it will aid in protecting existing conservation zones like the Revillagigedo Islands.

Of paramount concern to the economic and ecological sustainability of Magdalena Bay, and towns like Puerto San Carlos, is the establishment of viable alternative industries like diving, sportfishing, and ecotourism as part of a large, committed investment to increasing tourism in the area. The unique ecological surroundings themselves can be leveraged to create jobs and bring more people to the towns that dot Magdalena Bay, lowering unemployment and shifting workforces—so that the same people who were trawling for shrimp in the bay could one day guide tours of people showing off the spectacular surroundings and the life endemic to the region. This increased interest and awareness at home and abroad can only be mutually beneficial to the people of the region and the future sustainability of all life in Magdalena Bay.