

GRAY WHALES AND THE  
ECOSYSTEM SCIENTIFIC MONITORING PROGRAM FOR  
LAGUNA SAN IGNACIO WETLANDS COMPLEX:

2007 ACCOMPLISHMENTS AND 2008 WORK PLAN

**Principal Investigators:**

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**June 2007**



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## **Gray Whales and the Ecosystem Scientific Monitoring Program for Laguna San Ignacio Wetlands Complex:**

### **2007 Results and 2008 Work Plan**

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**Project Description:** The “Ecosystem Science Program” at Laguna San Ignacio strives to promote social awareness and stakeholder participation in the conservation of this unique marine protected area, while promoting science based sustainable development alternatives, and local economic development that is in balance with the natural components of the region. The program focuses on monitoring the status of gray whales that winter in Laguna San Ignacio, the lagoon as a habitat, and its marine wildlife as an entire interrelated system. The program’s purpose is to establish a long-term sustained science based “ecosystem” monitoring program for the Laguna San Ignacio Wetlands Complex (LSIWC) that will provide scientific information on the ecological status of the lagoon and its living marine resources that is relevant to resource management questions and concerns about development, eco-tourism and the sustainability of the lagoon ecosystem as a viable habitat for marine wildlife.

The program provides graduate students opportunities to participate in applied wildlife conservation field research methods and to learn skills that will serve them in their careers as wildlife conservation scientists. As appropriate, the program forms partnerships and coordinates its activities with other groups investigating various aspects of the LSIWC (e.g., Pronatura-Noroeste, Biosphere El Vizcanio). Annual post-field season peer review workshops review program findings and conclusions. Independent subject experts provide recommendations on the appropriateness and adequacy of monitoring methods, and validity of the results and conclusions drawn from them. Representatives of the responsible regulatory agencies, affected industry and resident groups, environmental organizations, and interested public participate in these workshops. Beginning in 2007-2008 the program findings and workshop recommendations will be distributed by publication in peer reviewed journals, and via a dedicated internet Web-Site.

**Conservation Status:** Laguna San Ignacio is the center of a unique marine ecosystem surrounded by, and part of the “Vizcanio Biosphere Reserve.” It is included in the UNESCO World Heritage Site: “Whale Sanctuary of El Vizcanio.” The “complex” comprises 248-miles of wetlands coastline that includes intertidal mudflats, salt flats, sandy beaches and red-mangrove estuaries. As one of the world's most biologically significant coastal sites (Wildcoast 2006), the lagoon is best known for the gray whales

that congregate there each winter to breed and calve. However, it is also home to dolphin, sealions, commercially important fish and shellfish, and multitudes of migratory waterfowl, and shore birds. Protected species such as Osprey, sea turtles, Peregrine falcons, and desert iguanas are included in its fauna. World wide attention was focused on Laguna San Ignacio in the late 1990s when it was targeted as the site for an industrial scale solar salt production facility; a project that would have significantly altered the lagoon ecosystem, perhaps irreversibly. Since the defeat of that proposal, local residents, fishing co-operatives, and eco-tourism entrepreneurs have begun developing eco-tourism focusing on the winter-time abundance of gray whales. Today these companies annually host thousands of whale-watchers and eco-tourists from many countries. Through education and responsible management, they are striving to become stewards of the “ecosystem” and to maintain a balance between eco-tourism and the biological integrity of the lagoon as an alternative to industrial development of the area. As a hedge against future development threats, a consortium of environmental groups and local business organizations led by the non-profit organization Wildcoast have developed a “Conservation Plan for the Laguna San Ignacio Wetlands Complex” (Wildcoast 2006), and have begun to purchase and/or secure the future development rights for the wetlands surrounding the lagoon.

**History of the Laguna San Ignacio Ecosystem Science Program:**

Dr. Steven Swartz and Ms. Mary Lou Jones conducted the first systematic studies of gray whales in Laguna San Ignacio from 1977-1982. Dr. Jorge Urban R. resumed these studies in 1996, and the two investigators have collaborated on ecosystem based scientific investigations in Laguna San Ignacio since 2004. They have joined forces with Pro Peninsula which was conceived from a master’s thesis by two students, Ms. Kama Dean and Mr. Chris Pesenti, at the University of California at San Diego’s Graduate School of International Relations and Pacific Studies. Pro Peninsula is a 501c3 nonprofit organization that began offering support to organizations throughout the Baja California peninsula in September 2001, and has grown into one of the leading conservation organizations working on the peninsula dedicated to empowering communities and organizations on the Baja California peninsula to protect and preserve their environment. Pro Peninsula envisions the creation of a network of strong and effective environmental organizations backed by an educated, empowered and active public working for the common goal of environmental preservation and responsible stewardship for Baja California. It strives to promote social awareness and stakeholder participation to counter the relentless threats to the region’s environment, while promoting science based sustainable development alternatives.

## **2007 Accomplishments:**

1. **Gray whale abundance monitoring:** Twelve complete census surveys of the lagoon were conducted from February 5 to March 30, 2007. The maximum count of adult whales was 217 on 22 February (197 "single" whales and 20 cows with calves). The highest count of single whales was 197 and occurred on 22 February, and the highest cow-calf pairs count was 37 on 17 February. The high count of adult whales was 46% less than the highest recorded count of 407 adult whales on 14 February 1982, and occurred later in the season than 10 of the previous February highest count surveys suggesting a continuing decline in the number of whales utilizing this lagoon and a delay and shortening of the winter occupation of the lagoon by whales. Counts of female calf pairs also demonstrated declines from 137 pairs counted on 14 February 1982 to 37 pairs on 17 February 2007, or a decline of 73%.
2. **Gray whale photo-identification:** Photographic data for individual gray whales photographed in Laguna San Ignacio was compared for the periods 1978-1982, 1996-2000, and 2006-2007. The minimum residency time in the lagoon for single adult whales ranged from 2.6 days (95% CI 1.7 - 3.5) in 1996, to 6.8 days (95% CI 3.6 - 10.0) in 2000, to 7.29 days (95% CI 3.67 - 10.91) in 2006-2007, and for females with calves of the year was 19.1 days (95% CI 14.3-23.9) in 1996, to 25.5 days (95% CI 20.1-30.9) in 1999, and 14.50 days (95% CI 11.81 - 17.19) in 2006-2007. The interval between producing calves was estimated from photographic data by Jones (1990) at 2.11 years (SD = 0.0403) for the period 1978 to 1982, and was estimated at 2.82 years (95% CI 2.46-3.16) for the period 1996-2000.— summary of results from SMM abstract
3. **Skinny Whales:** The photographic data indicated that a number of individual whales exhibited obvious signs of mal-nutrition and/or disease that has been termed evidence of the "skinny whale syndrome" (Weller et al. 2000). While most gray whales observed within Laguna San Ignacio appeared to be normal, some individuals possessed noticeable "post cranial depression" and hump in the dorsal neck region of the body. Others were observed with protruding leading edges of their scapula, and concave rather than a convex profiles to their dorsal flank areas.
4. **2007 Workshop and discussion of Ecosystem Science Program** for Eco-Tourism Operators, lagoon fishermen, and local residents held 24 February 2007 at Kuyima facility at Laguna San Ignacio.
5. **Preliminary report** of the 2007 findings was submitted to the International Whaling Commission's Scientific Committee for review. The report reference is:

Swartz, S.L., J. Urbán R., S. González C., A.Gómez-Gallardo U., B. Troyo V., M. Nájera C., and L. Rojas B. 2007. Preliminary report of the 2007 gray whale studies at Laguna San Ignacio, B.C.S. Mexico. Rep. Intl. Whal. Commn. SC/59/BRG39. 15pp.

6. **Internet Photo-ID web site** to be launched in summer 2007 to allow internet based photo archiving and management, and expanded availability to other gray whale investigators.
7. **Laguna San Ignacio Ecosystem Science Program Web-Site** development initiated. Expected launch in fall 2007.
8. **Workshop to review 2007 program findings** and plans for 2008 to be held at the Autonomous University of Baja California Sur (UABCS) in La Paz in September 2007. - POSPONED TO 2008 -
9. **Preliminary benthic inventory** surveys supported by Earthwatch Teams under William Megill, University of Bath (In Progress).
10. **Gray Whale health and condition sampling** by Lorenzo Rojas and Teri Rowles supported by NOAA Fisheries Service (In Progress).

### **2008 Activities and Objectives:**

The 2008 Ecosystem Science Program will build on the previous winter-time monitoring of gray whales and other aspects of Laguna San Ignacio, and it will initiate two new projects to expand the ecological "indicators" monitored in the lagoon; Project Grupo Tortuguero is a year-round sea turtle monitoring and assessment program, and Acoustic Noise and Gray Whale Vocalization Monitoring and Evaluation. The 2008 proposed projects are:

**1. Seasonal Abundance and Distribution:** Standardized vessel surveys to monitor gray whales winter abundance and distribution during the calving and breeding season will be continued in 2008. These vessel surveys were historically conducted during two time periods: from 1978 to 1982, and from 1996 to the present. These weekly small boat surveys use a standardized line transect survey methodology developed for Laguna San Ignacio. From these surveys indices of abundance and distribution within the lagoon are compared within and among years. Estimates of the number of other apex predators (e.g., dolphin, sealions) will also be collected during the surveys, and will serve as indices of relative abundance of those species.

**2. Gray whale "Photo-Identification":** This is an on-going research activity within Laguna San Ignacio since 1977. The program will continue to obtain photographic identification data on individual gray whales to document the winter-time utilization of the lagoon by individual whales (i.e., site fidelity, duration of stay, and dependence), and to estimate life history parameters (e.g., calving rate, annual production, survivorship) that are indicative of population trends. The photographic data archive will be transferred from a PC-based system to the internet which will provide Web-base access for gray whale researchers throughout the gray whales' geographic range, and it will facilitate the uploading of photographic data and searching for matching individuals.

**3. NEW PROJECT: Pro Peninsula's Grupo Tortuguero project:** This project conducted independent monthly in-water mark and recapture programs to monitor the distribution and seasonal movements sea turtles in Laguna San Ignacio for five consecutive years. This program will continue in 2008 as part of the Ecosystem Science Program in Laguna San Ignacio. Investigators present data at the Group's Annual Meeting and Monitoring Workshop convened in Baja California. This ongoing data capture and information exchange allows the quantitative tracking of sea turtle population changes. In 2006 the San Ignacio team incorporated participation of tourists for the first time in the monitoring program, an effort they will seek to expand on in 2008.

**4. NEW PROJECT: The Acoustic Noise and Gray Whale Vocalization Monitoring and Evaluation project:** In 2008 the acoustics project will focus on documenting and measuring the ambient noise in the lagoon from whale-watching and other human activities (e.g., fishing) and from naturally occurring sources (e.g. snapping shrimp, fish, currents, etc.). Objectives of the project include: 1) comparing current noise types and levels in the lagoon to historical data from the 1980's; 2) documenting gray whale vocal behavior and frequency of calls; and 3) comparing the seasonal density of gray whales in the lagoon with the frequency of gray whale calls as a possible means for estimating the relative abundance of whales in the lagoon system.

**5. Primary production and specific physical and chemical water variables** in the lagoon were investigated and measured in 1981 (Jones 1981), and again in 1997-1998 (Gutierrez de Velasco and Winant 2003). This program will resume these measurements and compare current water quality, chemistry and primary production with historical values to evaluate changes in the water chemistry that may have resulted from the removal of commercially important species of filter-feeding shellfish and other human related development (e.g., shore-based eco-tourism camps and local residences).

**6. Whale-watching tourism within Laguna San Ignacio** was documented each winter during the period 1978 to 1982 by Jones and Swartz (1984) and more recently by two students from the Autonomous University in La Paz (A. Gallardo, pers. comm.). Levels of present day eco-tourism related visitation and whale-watching were documented by the Kuyima Eco-Turismo Cooperative Association from 1996 to the present as part of the local management of the lagoon's eco-tourism activities. In partnership with Kuyima Eco-Toruisimo levels of whale-watching and fishing boat activity will be determined from records maintained by the ecotourism operators and compared with historical levels to evaluate the impact of this commercial development within the lagoon.

**7. A Peer Review Workshop** will be convened in September 2008 on the campus of the Autonomous University of Baja California Sur (UABCS) in La Paz, Baja California Sur. The workshop participants will evaluate the findings of the 2008 ecosystem science program, and to formulate recommendations for the 2009 program.

**Long-Term Objective:** The intent of the investigators to incrementally expand the scientific content of the program over time to include monitoring a range of marine wildlife that reside or otherwise utilize the LSIWC throughout the year - winter, spring, summer, and fall. It is hoped that this science program will eventually become a permanent component of the LSIWC conservation effort and will be financially supported by the beneficiaries of the LSIWC, namely local governments, business interests, and stakeholders that have economic and social-cultural interests in a healthy sustained lagoon ecosystem.

**Qualifications of key personnel:**

**Jorge Urban R., Ph.D.,** Autonomous University of Mexico, La Paz, B.C.S., Mexico is a graduate and Professor of marine biology at the Universidad Autonoma de Baja California Sur and has led gray whale research in Baja since 1996. He is widely published in the scientific literature on marine mammals and marine conservation. He serves on the IUCN Cetacean Specialist Group, the Scientific Committee of the International Whaling Commission, and is the current President of the Mexican Society for Marine Mammalogy (SOMEMMA). He currently teaches marine science and conducts research on large whales.

**Steven L. Swartz, Ph.D.,** Maryland, USA is a 1986 graduate of the University of California at Santa Cruz and has researched gray whales in Baja California since 1977. He has published numerous books, scientific and popular articles on gray whales and their breeding lagoons in Baja California, served as a marine mammal and protected species researcher, consultant and scientific director for the Mexican government's Ministry for the Environment, Natural Resources, and Fisheries (SEMARNAP), the Ocean Conservancy (previously the Center for Environmental Education), the U.S. Marine Mammal Commission, the National Marine Fisheries Service, and the International Whaling Commission. He currently conducts research on gray whales and on ecosystem approaches to marine science to support sustainable development and marine conservation.

**Chris Pesenti, M.P.I.A.,** has worked with community-based conservation efforts throughout the Baja California peninsula for over 5 years as his role as Co-Director of Pro Peninsula. Chris also chairs the Board of Directors of *Vigilante de Bahía Magdalena* (Magdalena Baykeeper), a group whose development he has supported since its inception in 2005, and plays an active role in the Grupo Tortuguero sea turtle conservation network.

**Ranulfo Mayoral, Grupo Tortuguero** has conducted sea turtle monitoring in Laguna San Ignacio for five years running with the academic support of individuals such as biologist Dr. Wallace J Nichols (Pro Peninsula Conservation Scientist). Ranulfo is also a RARE trained guide with advanced first aid training and SECTUR certification.

**Melania Guerra:** is a native of Costa Rica in her third year of a Ph.D. program in marine acoustics at Scripps Institution of Oceanography under the guidance of her major professor Dr. Aaron Theod. Melania previously spent two winters at Laguna San Ignacio

conducting preliminary baseline studies to establish a foundation for her dissertation research project. She has worked collaboratively with UABCS students to train other graduate students in the methods and techniques for acoustic monitoring in Laguna San Ignacio.

**Collaborators:**

**Gustavo Danemann of Pronatura-Noroeste** are proposing to implement assessment and evaluation programs for the lagoons' wetlands, water fowl and migratory birds with support from the U.S. Fish and Wildlife Service.

**Teri Rowles, D.V.M., Ph.D. NOAA Fisheries**, National Marine Health and Stranding Response Program, and **Lorenzo Rojas Bracho, Programa Nacional de Mamíferos Marinos, Institución Nacional de Ecología (INE) de Mexico**, and their colleagues have initiated studies to evaluate the health and condition of individual whales by sampling their breath and measuring physical condition indices from stranded individuals.