INTRODUCTION

Golfo Nuevo is located on the Patagonian coast of Argentina with the city of Puerto Madryn on its western shore (Figure 1). Puerto Madryn is one of the most important natural harbors of Argentina, and has become a center of increasing industrial activities related to fishery and aluminum processing. The gulf itself is about 70 km long and narrows from 48 km in its central part to 17 km at its mouth. With a maximum depth of 158 m it is characterized by being deeper than the adjacent continental shelf. Inside Golfo Nuevo the circulation is tide-dominated. Puerto Madryn has a range of 5.85 m for spring equinocial perigean tides. The main tide affecting the basin is the semidiurnal lunar M₂ (Rivas, 1997), which accounts for almost 90% of the total tidal energy of the Golfo Nuevo tide.

From the viewpoint of biological oceanography, Golfo Nuevo is known because every year some 600 southern right whales (Eubalaena Australis) return to its waters from the open sea for breeding purposes (Payne, 1986); an excellent opportunity for whale-sighting widely exploited by tourism. Peninsula Valdés (Figure 1) shelters an important breeding population of southern elephant seals and southern sea lions. The orcas in this area have developed a unique hunting strategy to adapt to local conditions. For these reasons Península Valdés has been declared a Wildlife Reserve by the United Nations Environment Program (UNEP) World Conservation (UNESCO, 1999). Golfo Nuevo is also important in connection with tidal power. Different investigators, as well as Argentine and foreign official institutes, have proposed and discussed several projects to build a tidal power station taking full advantage of the difference between the tides in Golfo Nuevo and Golfo San José (Figure 1) (SOGREAH, 1959). The difference in height between the tides in Golfo Nuevo and Golfo San José is about 4.5 m, whereas the differences in time are about 3 h 50 min at low water and 4 h 30 min at high water (Mazio and Dragani, 2000). Among the advisers to the Argentine authorities was Dr. Robert Gibarat, chief of the pioneer group that built the first large-scale tidal power station in the world at La Rance, near Saint-Malo, Brittany, France, operated since 1966 (Gibrat, 1966). The basic idea of these projects is to cut a channel 7000 m long and 300 m wide through the isthmus of the peninsula Valdés to let the water flow between both gulfs (Figure 1), and to build a tidal power station of at least 600 MW at the channel entrance in Golfo San José or at some other specific site within the channel. Many possible environmental impacts have been pointed out.