

## Short Note

# Steller Sea Lions (*Eumetopias jubatus*) Along the Western Coast of Mexico

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Reports on the occasional presence of pinniped species along the Mexican Pacific coast, well beyond their known distribution range, are remarkable for implying long-distance swimming by these individuals. The pinniped species in those reports include the California sea lion (*Zalophus californianus*), Guadalupe fur seals (*Arctocephalus townsendi*), Pacific harbor seals (*Phoca vitulina*), elephant seals (*Mirounga* sp.), Galápagos sea lions (*Zalophus wollebaeki*) and fur seals (*Arctocephalus galapagoensis*), South American sea lions (*Otaria byronia*) and fur seals (*Arctocephalus australis*), and Steller sea lions (*Eumetopias jubatus*). The extralimital presence of these pinnipeds has been discussed by many authors and has been related to changes in sea surface temperature driven by climatic–oceanographic events such as El Niño, La Niña, or the Pacific decadal oscillation (Gallo-Reynoso & Ortega-Ojeda, 1986; Gallo-Reynoso & Solorzano-Velasco, 1991; Acevedo-Gutiérrez, 1994; Mesnick et al., 1998; Aurióles-Gamboa et al., 2004; Meraz-Hernando & Sánchez-Díaz, 2008; Ceballos et al., 2010; Gallo-Reynoso et al., 2010; Hoyos-Padilla & Gallo-Reynoso, 2015; Villegas-Zurita et al., 2015, 2016; Páez-Rosas et al., 2017, 2018; Barba-Acuña & Gallo-Reynoso, 2018; Orr et al., 2018; Masper et al., 2019; Ortega-Ortiz et al., 2019).

Such climatic–oceanographic events produce changes in sea surface temperature—either increasing or reducing it—that affect the direction, strength, or depth of ocean currents in the northeast tropical and temperate Pacific. This leads to drastic changes in the availability of prey species, likely resulting in prey shortages in some instances (Trillmich et al., 1991; Soto et al., 2004), which might prompt the

long-distance displacement of pinnipeds searching for prey. These individual movements are likely related to population recovery and expansion, one example being the population growth of the Guadalupe fur seal (Gallo-Reynoso, 1994; García-Aguilar et al., 2018) and their occupation of former rookery islands such as the San Benito Archipelago (Aurióles-Gamboa et al., 2010; Esperón-Rodríguez & Gallo-Reynoso, 2012). Another example is the recovery of the Steller sea lion population at the northernmost area of its range (Fritz et al., 2014; Maniscalco et al., 2015).

The Mexican Pacific coast and some isolated locations in El Salvador, Guatemala, Costa Rica, Panama, and Ecuador (Félix, 2002; Ibarra-Portillo et al., 2016; Villegas-Zurita et al., 2016; Páez-Rosas et al., 2017; Quintana-Rizzo et al., 2017) record examples of how these pinniped species are able to swim long distances from North America to Mexico and Central America, and from South to Central America and Mexico (Ibarra-Portillo et al., 2016; Villegas-Zurita et al., 2016; Páez-Rosas et al., 2017). Some of the records may be related to human–pinniped interactions during fishing operations (Gallo-Reynoso et al., 2010; Barba-Acuña & Gallo-Reynoso, 2018; Masper et al., 2019).

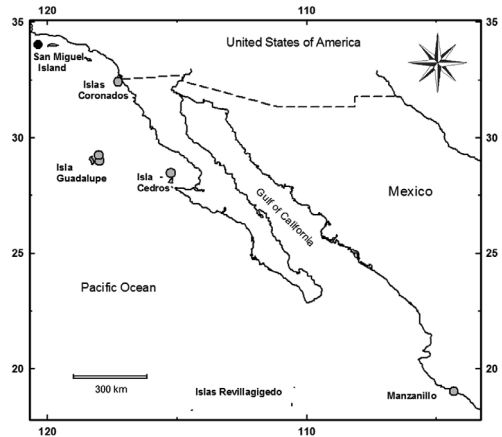
Occasional observations by the authors—or those made known to them from various sources, supported by photographic evidence—of live Steller sea lions spotted on various islands and the port of Manzanillo in the Mexican Pacific State of Colima are as follows:

1. In July 1991, we (J. P. Gallo-Reynoso & A. L. Figueroa-Carranza) observed one adult male

Steller sea lion resting at Isla Coronado del Centro, just south of the Mexico-U.S. border, 340 km off of San Miguel Island, known to be inhabited by a colony of Steller sea lions (R. DeLong, pers. comm., 6 September 2016).

2. In July 2000, fishermen from Isla Guadalupe photographed an “odd-looking, very large sea lion” they had never seen on the island; the sea lion was a large subadult Steller sea lion interacting with (sniffing) two female California sea lions. Despite the poor photo quality, the size of the individual, the incipient mane around the neck, the lack of a sagittal crest on the head, and the oval-shaped head in frontal view are all distinctive traits of a male *E. jubatus*.
3. On 1 April 2004, Mr. A. Lechuga informed one of us (J. P. Gallo-Reynoso) about the presence of a subadult California sea lion near the water outlet of the thermoelectric power plant located in the Manzanillo port, State of Colima. The animal remained in the area for more than 1 wk and was recognized as a subadult male Steller sea lion based on its large size, the absence of a sagittal crest, small eyes (relative to head size), and its standing posture—all typical of a subadult of this species.
4. Gallo-Reynoso observed one adult male Steller sea lion in August 2007 near Punta Norte in Isla Cedros, Baja California. This animal was growling, being visible from afar. The crew attempted to approach it, which was impossible given the high ocean swell and the extensive mantle of kelp (*Macrocystis pyrifera*). The sea lion was observed with binoculars from some 100 m away from the coast. Its most salient features were the body size, the mane around the neck, the growling (rather than the continuous barking typical of *Zalophus* males), and its general stance. This individual was spotted along with a group of male and female California sea lions that dwell in the area; this allowed us to compare their body size—smaller compared to the Steller sea lion.
5. On 7 August 2015, at a site close to Dos Arroyos (Figure 1) on the northeastern coast of Isla Guadalupe, we found a large sea lion whose coloration and size matched those of adult male California sea lions living in Isla Guadalupe. The sea lion was standing near several female and male Guadalupe fur seals, which were smaller than the target individual.

Upon observing this peculiar sea lion, we noticed that its body size was similar to that of a full-grown California sea lion but lacked the sagittal crest on its head, which is fully developed on adult male *Zalophus californianus*. As this individual also lacked a mane, we regarded it as a subadult male. When the sea



**Figure 1.** Observations of Steller sea lions (*Eumetopias jubatus*) in Mexico (1991-2015). Filled circles denote observations by the authors. The black circle is the former reproductive colony of Steller sea lions at San Miguel Island, California, the southern limit of the distribution range of this species. Straight-line distance from San Miguel Island to Islas Coronado is ~340 km, to Isla Guadalupe is ~580 km, to Isla Cedros is ~800 km, and to Manzanillo is ~2,300 km (distances as measured in Google Earth).



**Figure 2.** The black oval encircles the diastema between the last upper premolar and the molar situated near the palate that was observed as the sea lion opened its mouth to yawn and growl; such diastema is a distinctive characteristic of Steller sea lions. (Photography color balance, brightness, and contrast tuned with Adobe Photoshop, Version 7.0; photo by J. P. Gallo-Reynoso, 7 August 2015)

lion turned to face us, we observed the large, laterally compressed head typical of the Steller sea lion. This male was larger than a full-grown California sea lion but smaller than a full-grown Steller adult; therefore, it was probably a 4- to 6-y-old subadult male Steller sea lion. We determined this individual as a Steller sea lion based on the following diagnostic characteristics: (1) presence of a diastema between the last upper premolar and the molar situated near the palate; this structure was photographed (and later examined in the photographs) when the sea lion opened its mouth to yawn and subsequently to growl. The diastema is a unique feature of Steller sea lions (Figure 2); (2) large size and robust appearance; (3) large, laterally compressed head; (4) lack of a sagittal crest for

an individual of this size; (5) large and broad pectoral fins relative to body size; (6) resting position typical of the Steller sea lion; (7) oval-shaped mouth in frontal view; (8) eyes small relative to head size; (9) coloration typical of the species; and (10) skin folds over the shoulders, typical of males of this species. This individual was identified as a subadult male Steller sea lion (Figure 3).

Historically, Steller sea lions bred in the California Channel Islands (Wright et al., 2017). The last reported pup was born on San Miguel Island in 1982. Individuals of this species had been absent from San Miguel Island for the past two decades, but some adult males have recently been observed there regularly (R. DeLong, pers. comm.,



**Figure 3.** Subadult male Steller sea lion observed near Dos Arroyos on the northeastern coast of Isla Guadalupe (Photo by J. P. Gallo-Reynoso, 7 August 2015)

6 September 2016). Since the stock of Steller sea lions has been growing at about 4% annually over the past few decades, it was delisted from the U.S. Endangered Species Act (Gelatt & Sweeney, 2016). As the population continues to grow, more individuals are expected to reoccupy its former range. However, the continued warming of the oceans may restrain their recolonization of the southernmost portion of the species range in the Channel Islands (Wright et al., 2017).

Although the known distribution of the Steller sea lion ranges from the California Channel Islands (San Miguel Island) to Alaska, these five accounts of subadult and adult males observed at various locations along the Mexican Pacific Coast demonstrate their ability to move over long distances. Their occasional occurrence at lower latitudes such as Manzanillo in the tropical Pacific shows that these age classes can wander across wide areas of the Pacific Ocean and, as evidenced by the sporadic sighting record, this occurs regardless of the season, year, or oceanographic-climatic conditions that might influence their long-range foraging behavior. El Niño conditions affected the Channel Islands and the California current near Isla Guadalupe in 2015 and, nevertheless, a Steller sea lion was found resting on Isla Guadalupe, south of their range (Figure 3). The animal in the photograph appears well fed and its body shows no evident signs of foraging stress or famine. It is likely that their physiological diving capabilities allow Steller sea lions to withstand the foraging stress that affects other pinnipeds such as Guadalupe fur seals and female and juvenile California sea lions.

Ceballos et al. (2010) reported the extralimital occurrence of a Steller sea lion at the entry of the Manzanillo port in 2008. However, by further examining the characteristics of the individual in the available photograph, the massive head, short and uplifted rostrum, and overall build of the body led us to conclude that the specimen corresponds to a male subadult South American sea lion. This was confirmed by comparison with photographs of similarly aged subadults of this species. Nevertheless, this is an important record as it demonstrates the long-range movement of that individual, which probably came from the northernmost colonies of the South American sea lion rookeries in Ecuador or Peru all the way to the central coast of Mexico.

The dispersal of Steller sea lion individuals could enhance population resilience and help to understand their population recovery after decline (Hastings et al., 2017; Bishop et al., 2018). In a changing climate, the displacement of these pinnipeds can be regarded as a response to selection pressure, forcing the individuals to find and survive in conditions and locations other than their optimal habitat. Surviving

extreme oceanic conditions such as the 2014-2015 El Niño event that caused high mortality of pinnipeds in California, including Guadalupe fur seals and California sea lions in the Northeastern Pacific (National Oceanic and Atmospheric Administration [NOAA], 2017, 2019), shows the resilience of a species coming out of a steep population decline.

### Acknowledgments

We are indebted to Bob DeLong, who examined the photograph and confirmed the species identity of the individual found at Isla Guadalupe in 2015. We thank A. Lechuga for the photograph of the individual at the water outlet of the Manzanillo thermoelectric power plant. We thank the fishermen of Isla Guadalupe for sharing with us the photograph of the Steller sea lion found in 2000 and for field assistance during our monitoring of pinnipeds at Isla Guadalupe in 2013 to 2019. We also thank M. Torres-Aguilar, A. Romero, and M. Cano for their assistance at Reserva de la Biosfera Isla Guadalupe – CONANP. Field observations were conducted under Permit No. SGPA/DGVS/06869/15 issued by SEMARNAT. María Elena Sánchez-Salazar edited the English manuscript.

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