

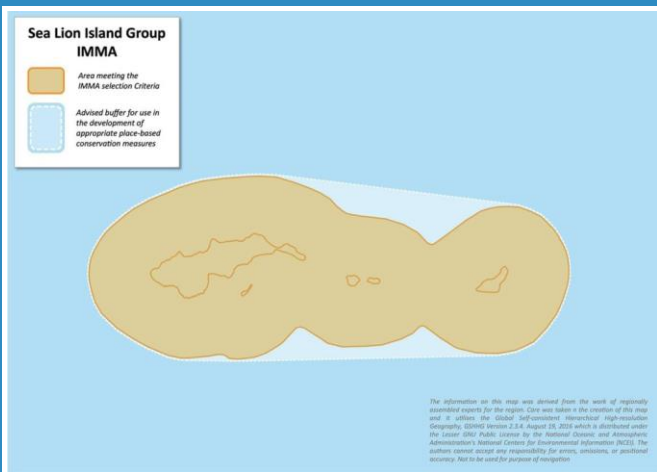
Sea Lion Islands Group IMMA

“Since 1965 the nomenclature used by the United Nations for statistical processing is Falkland Islands (Malvinas), which acknowledges the dispute that exists concerning the sovereignty of the Islands.

Description:

The Sea Lion Island Group (52°26' S, 59°04' W) comprises five small islands (Sea Lion, 905 ha; Rum, 7 ha; Brandy, 25 ha; Whisky, 13 ha; Sea Lion Easterly, 85 ha) at the south-east of the Falkland Islands (Malvinas) (hereafter referred to as the « Islands »). All the five islands are quite flat (maximum altitude Sea Lion Island 37 m, other islands: 0-18 m) and densely covered by tussac grass (*Poa flabellata*), the dominant native grass of the Islands. The coastline is a mixture of pebble beaches, steep cliffs, and flat rocky plateaus, while sand beaches are present at Sea Lion Island only. The immediate surrounding waters are shallow (max depth about 55 m) and characterized by a dense giant kelp forest (*Macrocystis pyrifera*).

The sand beaches at the eastern end of Sea Lion Island host the main breeding colony of southern elephant seals (*Mirounga leonina*) in the Islands with 730 breeding females recorded in 2022 (Galimberti & Boitani 1999; ESRG, unpublished data). The pebble beaches and the inland tussac habitat throughout the Sea Lion Island group are very important molting sites for this species with thousands of individuals coming from all populations of the South Georgia stock (ESRG, unpublished tagging data). Sheltered coastal inlets and tidal pools are the ideal habitat for elephant seal pups during the post-weaning fast, in which they group, socialize and practice swimming and diving in preparation for their first feeding trip at



Area Size

162 km²

Qualifying Species and Criteria

Killer whale – *Orcinus orca*

Criterion C (2); D(1)

Southern elephant seal – *Mirounga leonina*

Criterion C (1)

Summary

The Sea Lion Islands Group IMMA comprises five small islands at the south-east of the Falkland Islands (Malvinas)*. Sea Lion Island, the only habited one, hosts the main breeding colony of southern elephant seals (*Mirounga leonina*) in the Islands. The Sea Lion Islands Group is used as a haul out site by a large number of moulting southern elephant seals during the summer months. The Sea Lion Islands Group is the only area of the Islands that is regularly visited by killer whales (*Orcinus orca*), primarily during September-April. Various family units and groups have been observed over a timeframe of several decades, supporting high fidelity to this feeding area. Killer whales successfully predate different classes of southern elephant seals, including breeding females, weaned pups, and moulters, using unique hunting techniques. They also use the area to socialize, play, and train the calves to hunt.



Figure 1: Shallow water bathymetry around the SLI group. Bathymetry is taken from GEBCO 2022 (https://www.gebco.net/data_and_products/gridded_bathymetry_data/). Red polygon is the proposed IMMA. Credit: Elephant Seal Research Group

sea (ESRG, unpublished data). A rocky plateau at the south of Sea Lion Island shelters a breeding colony of South American sea lions (*Otaria byronia*; 107 pups produced in 2021-2022, ESRG, unpublished data), a species that suffered a dramatic population crash in the Islands and is still rare (Baylis et al., 2015). Sea Lion Island is also one of the main breeding sites of gentoo penguins (*Pygoscelis papua*) and an important breeding site for various species of marine birds, which also use nearby waters for foraging and transit, including rockhopper penguins (*Eudyptes chrysocome*), Magellanic penguins (*Spheniscus magellanicus*), king cormorants (*Phalacrocorax atriceps albiventer*), rock cormorants (*Phalacrocorax magellanicus*), kelp gulls (*Larus dominicanus*) and dolphin gulls (*Larus scoresbii*).

Sea Lion Island is a National Nature Reserve, a RAMSAR convention site, and an Important Bird Area. It has been a sheep farm for a long time (from the beginning of the 20th century), but all domestic stock were removed many years ago (full farming until 1997, remaining sheep removed 2006/2007).

Although killer whales (*Orcinus orca*) can occasionally be encountered throughout the Islands, Sea Lion Island is the only place where sightings of the species are regular. The killer whales that inhabit the waters in the IMMA have developed distinctive hunting tactics, including: 1) patrolling of sand beaches during the southern elephant seal breeding season to hunt breeding females when they return to sea after lactation and mating; 2) hunting of weaned elephant

seal pups (weanlings) in a flat rocks area that includes a tidal pool called “the weanling pool” that is only accessible during medium/high tide from a narrow access channel; 3) opportunistic hunting of molting southern elephant seals during their haul out in the summer months (ESRG, unpublished data). Sea Lion Island is also an important meeting ground for different Killer whale family units and groups that exhibit distinct social behaviors, including socio-sexual interactions (Sanvito and Galimberti 2022) and possibly mating, play behavior among calves and adults, and simulated hunting (ESRG, unpublished data). Sea Lion Island is the only place in the Islands where killer whales have been regularly studied and monitored (ESRG, 2013-ongoing, www.eleseal.org).

To calculate the IMMA area a 3 km buffer to the coastline of the five islands of the Sea Lion Island group was applied. The 3 km criterion was chosen because this is the maximum distance from the coastline of observations of killer whales successfully hunting southern elephant seals.

Criterion C: Key Life Cycle Activities

Sub-Criterion C1: Reproductive Areas

SLI is the main current breeding colony of southern elephant seals in the Islands, with 730 breeding females in 2022 (the only other notable colony is Carcass island with 173 breeding females in 2016, Galimberti & Boitani 1999). The whole Sea Lion Island population (i.e., all individuals aged 1 year or older) is estimated at 2542 individuals. The number of breeding females has been almost steady from the late 1980s to 2003, and then started increasing at a mean annual rate of 2.1%. Even if it represents only a small proportion of the regional breeding stock (South Georgia, ~113,000 breeding females: Boyd et al., 1996; Valdés Peninsula, Argentina, ~14,000 breeding females: Lewis et al., 2004) it is the biggest

share of southern elephant seals breeding in the Islands. It is the remnant of a previously-large breeding population that was decimated by intensive and indiscriminate sealing in the 1800s (Strange, 1972), and its slow recovery is therefore considered an important contribution to local biodiversity and to gene flow between the South Georgia and Valdés Peninsula breeding areas (Fabiani et al., 2003).

Sub-Criterion C2: Feeding Areas

The Sea Lion Island Group is the only documented area of the Islands that is regularly visited by killer whales and in which killer whales of different family units and groups aggregate, mainly for the purpose of hunting pinnipeds. Anecdotal evidence, including stranding of individuals, indicate that killer whales have been visiting Sea Lion Island for a long time. A brief study was carried out in November 2004 and November 2005, documenting 82 sightings (Yates et al., 2007). Since 2013 Sea Lion Island killer whales have been regularly monitored by the Elephant Seal Research Group (www.eleseal.org) both from land and using unmanned aerial vehicles (UAVs). Killer whales visiting SLI can be classified as resident and transient. Resident individuals are killer whales observed for long periods of time during the year and during consecutive seasons, while transient individuals are killer whales that appeared multiple times but irregularly during the years and for short periods. Altogether, the Sea Lion Island photo-identification catalogue (available online from the ESRG website) includes 45 live individuals (2 individuals died during the study), 15 of which are currently resident.

In the Sea Lion Island Group, killer whales hunt mainly southern elephant seals, although they often try to hunt southern sea lions, in most cases unsuccessfully. They hunt adult elephant seals



Figure 2: Two killer whale family units (PUMA's family labels in red; LOLA's family, labels in blue) meet in the shallow water of Sea Lion Island North Beach, taken from UAV. Photo credit: Elephant Seal Research Group

(mainly females, but occasionally also males) during the breeding season (Sept-Nov), weanlings during the post-weaning fast (Nov-Dec) and different classes of seals during the moulting season (Dec-Apr). Although southern elephant seals are probably not the main food source of Sea Lion Island killer whales (ESRG, unpublished observations and simulation of energy budget), their regular and extended presence during the seal breeding and molting season suggests that seal predation is an important seasonal component of the diet (for the resident individuals), and is definitely a very important part of the social behavior, and the learning of hunting and prey handling skills.

While most direct observations of killer whales hunting are at Sea Lion Island and Rum Island, all the islands in the group are included in the IMMA because: 1) there are time gaps in the killer whale daily presence at Sea Lion Island, and direct and UAV observations show that when they leave they frequently move towards the outer islands; 2) anecdotal observations reported by overflying airplanes and vessels indicate that killer whales visit the outer islands, and Sea Lion Easterly in particular, which is an important elephant seal molting site; and 3) all the five islands of Sea Lion Island Group show favorable conditions for the hunting of southern elephant seals, in particular during the molting



Figure 3: Killer whales entering the Sea Lion Island weanling pool, taken from land. Photo credit: Elephant Seal Research Group

season. It is therefore reasonable to conclude that the entire island group provides habitat suitable for killer whale foraging.

Criterion D: Special Attributes

Sub-Criterion D1: Distinctiveness

At Sea Lion Island, killer whales show peculiar social behaviours, including socio-sexual behaviour, play behaviour among calves and adults, and socialization among different groups. Moreover, they exhibit a range of specialised southern elephant seal hunting tactics, including patrolling in front of harems waiting for breeding females to return to sea and hunting of weanlings in and around tidal pools and inlets.

Although foraging at elephant seal haul out sites is common among killer whales, a specific family unit uses a unique hunting technique for southern elephant seal weanlings that consists of entering a very small tidal pool, called the “weanling pool”, connected to the open sea by a narrow channel (about 2-3 m large and deep) and only accessible during medium/high tide and when swell is not too strong. The “weanling pool” is an aggregation point for southern elephant seal weanlings that use it as a place to socialize and train for swimming and diving. Killer whales capture weanlings inside the pool or around the nearby flat rocks, and carry the live prey into open water where it is often played with for a long period and then shared amongst the family unit

and with other groups that might be present (including the two resident males). This behaviour is potentially risky for the killer whales that could get trapped into the pool if the sea conditions are not evaluated carefully, and there is some evidence that it is transmitted across generations within the family group, although only a very limited numbers of individuals use this technique regularly.

An additional interesting feature of the site is that killer whales sometimes strand alive on the Sea Lion Island sand beaches (total of 7 recorded stranding since 1986, including an adult male that subsequently died; Otley (2012) and ESRG unpublished data, but likely more since most of the Islands coasts are remote and uninhabited). These are non-intentional stranding and seem to be related to the southern elephant seal hunting techniques, which involve patrolling very close to the beaches, often in very shallow waters, and to the calves play behaviour, that often happens just a few meters away from the shoreline.

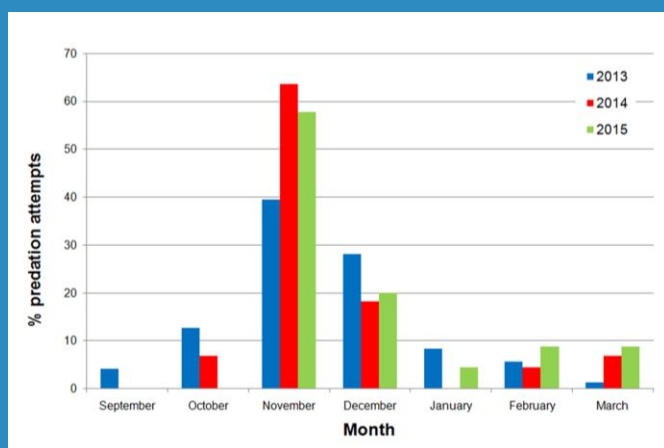


Figure 4: Monthly distribution of predation attempts during three years of the study. Note peaks in November and December (return to sea of elephant seal breeding females, post-weaning fast of pups). Credit: Elephant Seal Research Group

Supporting Information

General reference web site for the killer whale research project: www.eleseal.org/kw/kw_intro.html.

Killer whale photo-identification catalogue: www.eleseal.org/pdf_vari/KW_SLI_catalogue.pdf.

Videos of the peculiar behaviours and hunting tactics shown by killer whales at Sea Lion Island: <https://www.youtube.com/c/ElephantSealResearchGroup>.

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Acknowledgements

We would like to thank the participants of the 2023 hybrid IMMA Regional Expert Workshop for the identification of IMMAs in the South West Atlantic Ocean. Funding for the identification of this IMMA was provided by the Global Ocean Biodiversity Initiative funded by the German government's International Climate Initiative (IKI). Additional funds were provided by OceanCare and the Animal Welfare Institute. Local support and hosting for the workshop was provided by the Instituto Baleia Jubarte. Support to the IMMA programme is provided by Whale and Dolphin Conservation, and the Tethys Research Institute.

