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# Involvement of a Fishing Community in the Eradication of the Introduced Cactus Mouse (*Peromyscus eremicus cedrosensis*) from San Benito Oeste Island, Mexico

Federico Méndez Sánchez <sup>1,2,\*</sup> , Alfonso Aguirre-Muñoz <sup>1</sup>, Araceli Samaniego <sup>1,†</sup>, Yuliana Bedolla Guzmán <sup>1</sup>, Ana Cárdenas Tapia <sup>1</sup>, Evaristo Rojas Mayoral <sup>1</sup> , Mariam Latofski Robles <sup>1</sup>, Patricia Koleff <sup>3</sup> , Aradit Castellanos Vera <sup>2</sup>, Gustavo Arnaud Franco <sup>2</sup>, Luis Felipe Beltrán Morales <sup>2</sup> and Alfredo Ortega-Rubio <sup>2</sup> 

<sup>1</sup> Grupo de Ecología y Conservación de Islas, A.C. (GECI), Ensenada 22800, Baja California, Mexico; alfonso.aguirre@islas.org.mx (A.A.-M.); SamaniegoA@landcareresearch.co.nz (A.S.); yuliana.bedolla@islas.org.mx (Y.B.G.); ana.cardenas@islas.org.mx (A.C.T.); evaristo.rojas@islas.org.mx (E.R.M.); mariam.latofski@islas.org.mx (M.L.R.)

<sup>2</sup> Centro de Investigaciones Biológicas del Noroeste, La Paz 23096, Baja California Sur, Mexico; arcas04@cibnor.mx (A.C.V.); garnaudo4@cibnor.mx (G.A.F.); lbeltran04@cibnor.mx (L.F.B.M.); aortega@cibnor.mx (A.O.-R.)

<sup>3</sup> Comisión Nacional para el Conocimiento y Uso de la Biodiversidad, Ciudad de México 14010, Tlalpan, Mexico; pkoleff@conabio.gob.mx

\* Correspondence: federico.mendez@islas.org.mx; Tel.: +52-6461734943 or +52-6461734997

† Present Address: Manaaki Whenua—Landcare Research, Auckland 92170, New Zealand.



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**Abstract:** San Benito Archipelago is internationally important for the conservation of 13 species of seabirds. San Benito Oeste, the largest and only inhabited island, was declared mammal-free in 2000 after a series of eradications conducted in collaboration between the fishing cooperative *Pescadores Nacionales de Abulón*, the Mexican conservation organization, *Grupo de Ecología y Conservación de Islas, A.C.*, and the Mexican Government. The archipelago remained mammal-free until 2006, when an unusual invader, the Cedros island cactus mouse (*Peromyscus eremicus cedrosensis*), was accidentally introduced to San Benito Oeste island. The same collaboration scheme involving locals, conservationists, and authorities was once again put in motion, delivering tangible results. Research informed the mouse eradication strategy, the local community supported the operation, and the mouse eradication was successfully implemented in December 2013. To date (8 years later), no mammals have been recorded in the archipelago, which suggests community-led island biosecurity is working. In addition, this collaborative restoration work contributed to the creation of the Baja California Pacific Islands Biosphere Reserve, protecting 21 islands, including the San Benito Archipelago, and 97 islets in the Mexican Pacific.

**Keywords:** invasive mammals; islands; rodents; biosecurity; local community; fishermen; conservation; restoration; Pacific Ocean

## 1. Introduction

Islands are key sites of biodiversity and key breeding sites for seabirds [1–3]. Mexico is home to a third (126 spp.) of the world's 368 seabird species [4,5]; the Baja California Pacific Islands are important seabird sites of regional and global relevance [6,7]. Invasive alien species are among the greatest threats to seabirds, affecting 165 (45%) of the 364 species of seabirds worldwide, with most seabirds (70%) facing multiple threats [4,5]. Invasive mammalian predators, such as rats (*Rattus* spp.) and cats (*Felis catus*) are the most damaging globally [8]. Rodents alone are responsible for 30% (75 species) of all modern bird, mammal and reptile extinctions [8], and are also implicated in 84–86% of all extinctions on islands worldwide [8,9]. In Mexico, black rats (*R. rattus*) and cats have been the main reason for 71% of all land vertebrate extinctions, all insular species (i.e., 9 birds

and 8 mammals) [10,11]. Fortunately, the eradication of invasive mammalian predators has been a successful conservation tool for decades [12,13], with projects being implemented on increasingly large and complex settings, including inhabited islands [14,15]. Eradications of invasive mammals have greatly benefitted seabirds [16–18].

Over two decades, Mexico has successfully eradicated 60 populations of invasive mammals from 39 islands [10,11], including the eradication of 16 rodent populations (12 *R. rattus*, 3 *Mus musculus*, 1 *Peromyscus eremicus*) from 15 islands, ranging in size from 2 to 539 ha [19,20]. Mexico stands out in the number of islands restored, notably conducting almost half (45%) of the projects on inhabited islands, in all cases with the consent of local communities, and in many with their active participation [21].

The San Benito Archipelago (SBA), off the Baja California Peninsula, comprises three islands. The largest, San Benito Oeste (SBO), is inhabited by fishermen from the fishing cooperative *Pescadores Nacionales de Abulón* (PNA). PNA supports and participates in island restoration projects [21,22]. For example, PNA backed and provided logistical support for the eradication of European rabbit (*Oryctolagus cuniculus*), donkey (*Equus asinus*) and goat (*Capra hircus*) conducted on SBO by the Mexican conservation organization *Grupo de Ecología y Conservación de Islas, A.C.* (GECI) in 1998–1999, which benefited the native vegetation, including threatened species [10,11,23]. Thanks to these efforts, by 2000 the SBA was free of invasive mammals. In 2006, PNA alerted GECI about an introduced rodent on SBO, noting that they believed rodents were accidentally introduced during their fishing operations when fishermen arrived from Cedros to SBO in December 2006. Since the beginning, PNA communicated their commitment to help removing the rodents. In 2007, GECI confirmed the cactus mouse (*Peromyscus eremicus cedrosensis*), an endemic subspecies from nearby Cedros Island, had been introduced to SBO but not to the other islands. To avoid further invasions and to protect the whole archipelago's biodiversity, the eradication of the cactus mouse became a new collaborative project. Most seabirds on SBO are small burrowing species; therefore, they are highly susceptible to disturbance by mice.

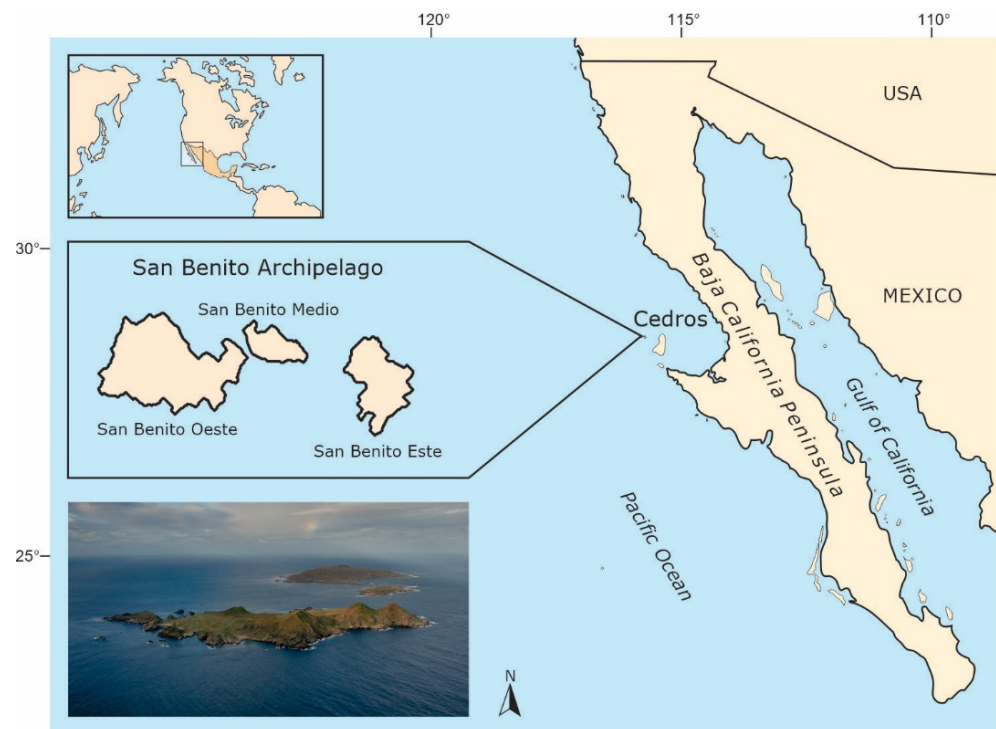
Here, we describe the eradication project and, particularly, how PNA contributed to the detection of the mice, planning and supporting the operation, and their ongoing implementation of an active biosecurity program.

## 2. Materials and Methods

### 2.1. Study Site

The SBA is located in the Pacific Ocean, off the central portion of the Baja California peninsula (Figure 1). It comprises three islands: SBO (400 ha); San Benito Medio (SBM, 45 ha); and San Benito Este (SBE, 146 ha). These islands are washed by the California Current System, which has significant influence on the region's marine productivity and, thus, its seabird populations [24,25]. These islands feature remarkable biodiversity and are part of the protected area *Reserva de la Biosfera Islas del Pacífico de la Península de Baja California*, created in December 2016, managed by the federal government through the National Commission of Natural Protected Areas (CONANP) [22,26]. These islands are of continental origin and feature an arid climate. The dominant vegetation is maritime desert scrub [27]. They support 51 species of plants and 80 vertebrate species, including one endemic reptile (San Benito side-blotched lizard, *Uta stellata*), four pinnipeds (Guadalupe fur seal, *Arctocephalus philippii townsendi*; Northern elephant seal, *Mirounga angustirostris*; Harbor seal, *Phoca vitulina*; and California sea lion, *Zalophus californianus*) and 75 birds [27–29]. Native terrestrial mammals have never been recorded [29]. The SBA is an Important Bird Area (IBA) and is of central ecological importance for seabirds in the region [6,7,30–35]. Of all the Pacific islands off the Baja California Peninsula, the SBA has the greatest number of breeding seabirds with 13 species, and also the highest number of breeding pairs at 281,285 (CI<sub>95%</sub>: 657–634,988) on average between 2014–2019, with cassin's auklet (*Ptychoramphus aleuticus*) and three storm-petrels (Leach's storm-petrel, *Hydrobates leucorhous*; black storm-petrel, *H. melania*; and least storm-petrel *H. microsoma*) the most

abundant species [6]. To date, the SBA remains the largest and most seabird species-diverse colony in all the US and Mexico Pacific islands [6,7].



**Figure 1.** Location of the San Benito Archipelago in the Mexican Pacific off the Baja California Peninsula. The photo is an aerial panoramic view of the archipelago with San Benito Oeste Island in the foreground. Photo: © GECI/J.A. Soriano.

## 2.2. PNA

PNA was founded in 1943 and has been harvesting abalone (*Haliotis* spp.) and lobster (*Panulirus interruptus*) in the waters around Cedros Island (located 40 kms east of SBO) and the SBA ever since. PNA has received long-term leases, granted by Mexico's federal government, conferring exclusive fishing rights within a well-defined area surrounding the islands. PNA is part of a regional federation of cooperatives, *Federación Regional de Sociedades Cooperativas de la Industria Pesquera Baja California* (FEDECOOP), that oversees the cooperatives' interests [36,37]. Since 2004, the FEDECOOP cooperatives have had their spiny lobster fishery certified as sustainable by the Marine Stewardship Council (MSC) [38–40]. The lobster fishery was the first in Mexico and Latin America, as well as the first artisanal lobster fishery in the world, to obtain MSC certification [36,40].

SBO harbors a small PNA fishing village (ca. 20 constructions) located in its southern east portion, which between 10–60 people inhabit throughout the year (Figure 2). The whole island, including the land where the fishing village is located, is owned by Mexico's federal government, although the existing infrastructure and its maintenance and improvement has received investment from PNA. Peak season of human presence and activity on SBO is during the abalone harvest (January to July) and lobster season (mid-September to mid-February).





**Figure 2.** Panoramic view of *Pescadores Nacionales de Abulón* fishing camp on San Benito Oeste Island. This was the base of operations for the mouse eradication project. Photo: © GECI/J.A. Soriano.

### 2.3. Rodent Detection and Monitoring

Mice were first detected and reported by PNA in December 2006. There were sightings by fishermen on SBO who had reported it to PNA's members without any proof; the confirmation came with a photo of a dead individual caught on a trap. In August 2007, GECI conducted a survey to identify the species and to map its dispersion, as we knew the point of introduction was the township. We used live traps (H. Sherman, Tallahassee, FL, USA) for three consecutive nights and chew-blocks (made of a mixture of oats, peanut butter, and wax), as well as direct searches for signs of rodents at different locations across SBO. Live trapping for three consecutive nights was also performed on SBE and SBM.

Once the rodent species was identified through its morphological features and confirmed to occur only on SBO, we conducted further monitoring to collect ecological information on its population to inform the eradication plan. Live trapping was conducted systematically on SBO two or three times per year from 2008 to 2013. To estimate the mouse population density, a grid of 100 Sherman traps was installed at the top of the island:  $10 \times 10$  traps separated by 10 m and baited with oat flakes. The mark-recapture method was applied with individual marking (metallic numbered ear tags) for five consecutive nights (Figure 3). The modified Schnabel method [41] was used to estimate the population density. The home range was estimated by fitting radio-collars on adult mice. The tracking was conducted at different hours of the day and night. The home range estimations were based on the minimum convex polygon method [42].



**Figure 3.** Cedros island cactus mouse (*Peromyscus eremicus cedrosensis*) invaded San Benito Oeste island in December 2006. Photo: © GECI/J.A. Soriano.

#### 2.4. Eradication Planning

The feasibility planning was done by GECI in collaboration with PNA and the Mexican government [43]. GECI managed all the scientific and technical aspects of the project, while PNA committed to communicate its management board's approval of the project to all of its members and staff to ensure community support. Besides their genuine interest in the island's biodiversity, particularly its seabirds, PNA's Management Board also raised the concern about the mouse invasion becoming a public health issue for SBO inhabitants and thus wanted to implement control to lower this risk while the eradication occurred. Informal talks and semi-structured interviews [44] were held with members of the management board and with fishermen on SBO to assess the impacts of mice on their livelihoods.

The logistical support of PNA was essential during the project since they provided boat transport to and from SBO for every expedition, as well as housing on both Cedros and SBO islands. This in-kind support was provided as a commitment made by PNA, who also assumed tacit responsibility. PNA also performed an in-depth cleaning of their fishing camp on SBO before the eradication, which included the dismantling of several old houses and the collection and transport of these materials plus scrap, old unused wood and metal, and general waste, to Cedros.

#### 2.5. Implementation

The selected method for the eradication was aerial baiting from a helicopter, with the operation following standard operating procedures [45] that had been previously conducted on other Mexican islands [19,20]. The bait used was the dry version of the rodenticide CI-25 (brodifacoum; Bell Laboratories Inc., Madison, WI, USA), specifically developed for ecological restoration purposes. The bait was delivered from a helicopter (Bell 206 Jet Ranger, Aspen Helicopters, Inc., Oxnard, CA, USA) equipped with a differential global positioning system (TracMap, Mosgiel, New Zealand) to ensure an accurate baiting and a DataLogger (TracMap, Mosgiel, New Zealand) to acquire detailed information about each baiting session to estimate bait density. A sowing bucket (Helicopters Otago, Ltd., Mosgiel, New Zealand) was used to spread the bait. To assess the aerial baiting and confirm bait distribution and application rates, we used a geographical information system procedure and developed the mathematical model we named as NERD: Numerical Estimation of Rodenticide Dispersal [46]. Two aerial baiting applications were conducted 7 days apart in November and December 2013, followed by a thorough hand baiting along the shore of the island. To avoid non-target impacts, particularly on birds, the eradication campaign was undertaken during the low breeding season. Attending to PNA's concerns of potential contamination with rodenticide, the helicopter avoided flying over human settlements for safety reasons. This meant that baiting within PNA's fishing camp was performed by hand and by setting up bait stations filled with bait blocks inside and underneath all the constructions.

Following a precautionary approach, an on-site aviary was installed and maintained to protect the savannah sparrow (*Passerculus sandwichensis sanctorum*)—an endemic species of the archipelago—since pre-eradication experiments demonstrated it consumed inert bait. To assess whether birds traveled between the three islands, and they belonged to the same population, we conducted two experiments, one consisting of banding birds with different color bands for each island and another consisting of a genetic analysis of feathers. Mist-nets and funnel traps were used to capture sparrows. Each captured bird was tagged with a numbered aluminum band and banded with a plastic color band: blue, green and black for SBO, SBM and SBE, respectively. Two tail feathers (rectrices number 6) and three breast feathers were collected for genetic tests. Feather samples were sent to EcoGene® ([www.ecogene.co.nz](http://www.ecogene.co.nz), accessed on 20 October 2021) for testing.

## 2.6. Confirmation

To confirm the eradication's success, we used a statistical model known as Rapid Eradication Assessment (REA) [47], which consisted of a  $150 \times 150$  m grid of 160 chew-blocks throughout the island that was checked monthly after the eradication, up to November 2014. As an additional measure to confirm success, we continued rodent monitoring on SBO for two years after the mouse eradication.

## 2.7. Wider Surveillance and Biosecurity

Over the years, and on different occasions, we deployed Tomahawk live traps (Hazelhurst, WI, USA) in the fishing camp and its surroundings to record the presence/absence of rats. We continued monitoring SBE and SBM, mostly with chew-blocks and not systematically, to confirm that these islands remained rodent-free. PNA, including all of its members and employees, also committed to enforce the island's biosecurity in preparation for the eradication to avoid future rodent introductions, with a particular emphasis on the black rats that were present on Cedros.

On SBO, immediately after the eradication, we installed a total of 12 detection devices, called "rodent motels", comprising three different devices: tracking cards, chew-blocks, and snap-traps, for both mice and rats. The devices were set particularly around the boat-landing area near the fishing camp and along the east coast of the island, in the peninsula that is closer to SBM. The aim of these devices is to detect, and even stop, the incursion of rodents. The devices were checked for signs of rodent activity regularly by the fishermen living on SBO, and every time we visited the island, we conducted a check-up and maintenance.

## 3. Results

### 3.1. Pre-Eradication Monitoring

The total trapping effort was 119 trap-nights on SBO and 30 trap-nights on SBM and SBE. Captures or signs of rodents were only found on SBO, where the trapping success was 58.8%. The only species caught was the cactus mouse, and it was widespread across the island (Figure 3). We recorded mice using seabird burrows, which alerted to a potential threat either by predation or competition, particularly because all of the nine breeding seabird species on SBO except the western gull (*Larus occidentalis*) are burrow-nesters [6]. In September 2008, we conducted another expedition to the SBA. Once again, we confirmed that SBM and SBE remained rodent-free. On SBO, after an effort of 210 trap-nights we had a 47% trapping success, similar to that recorded in August 2007. By March 2009 (spring), we estimated a mouse density of  $101.1 \text{ mice ha}^{-1}$  while in September (autumn) it was  $58.7 \text{ mice ha}^{-1}$ ; home range varied from 142 to  $2973 \text{ m}^2$  [48].

### 3.2. Eradication Planning and Implementation

Interviews and informal talks with fishermen on SBO revealed that the mouse population was not only a threat to native flora and fauna but was also a concern for public health [48]. Mice were continuously getting into the houses, negatively affecting the livelihoods of fishermen and their families. An additional concern was over the known capacity of rodents to carry zoonotic diseases and transmit them to humans [49]. Because of these negative impacts, fishermen started using a second-generation anticoagulant called *Difenacoum* (Sorex<sup>®</sup> Blocks, BASF The Chemical Company, Mexico City, Mexico) to control mice in their households. To avoid mice becoming resistant to this kind of rodenticide and thereby jeopardize the forthcoming eradication, which involved the use of Brodifacoum—also a second-generation anticoagulant—GECI staff asked PNA to stop using chemical control on SBO and proposed the use of lethal traps (e.g., Victor<sup>®</sup> Easy Set<sup>®</sup> Mouse Trap, Woodstream Corporation, Inc., Lancaster, PA, USA) as the preferred option, or first-generation anticoagulants.

Baseline monitoring to inform the eradication plan started in 2008. In 2009, PNA provided its approval and support to the project and formally committed to provide in-

kind support and participate in different activities, particularly biosecurity. Between 2010 and 2012, GECI conducted the pre-eradication monitoring, formulated the operational plan, conducted the necessary logistics, and developed and implemented island biosecurity; these last two activities were performed in coordination with PNA (Table 1). Funding for the mouse eradication on SBO was secured by GECI in 2012. The total cost was US \$ 659,056.15 (Table 2), excluding pre- and post-eradication activities. The first and second aerial baiting took place on 27 November and 4 December 2013, respectively, one week apart as planned (Figure 4). The median application rate estimated with NERD [46] after the two bait drops was 8.6 kg ha<sup>-1</sup>. A total of 25–30 people participated in the whole operation, with overall coordination by experienced personnel from GECI.

**Table 1.** PNA's involvement at the different stages of the mouse eradication on San Benito Oeste Island.

Phase of Project	PNA Input	Technical Input
Detection of mice	Passive surveillance	PNA
Species identification	Transport and housing	GECI
Ecology of mice	Transport and housing	GECI
Feasibility and planning	PNA management board	GECI
Logistics	Transport and housing	GECI, SEMAR
Funding	In-kind support	GECI and external
Eradication	Ground baiting	GECI
Non-target mitigation	Transport and housing	GECI
Validation of absence	Transport and housing	GECI
Biosecurity	Active surveillance	GECI, CONANP

**Table 2.** Cost estimates of the mouse eradication on San Benito Oeste Island.

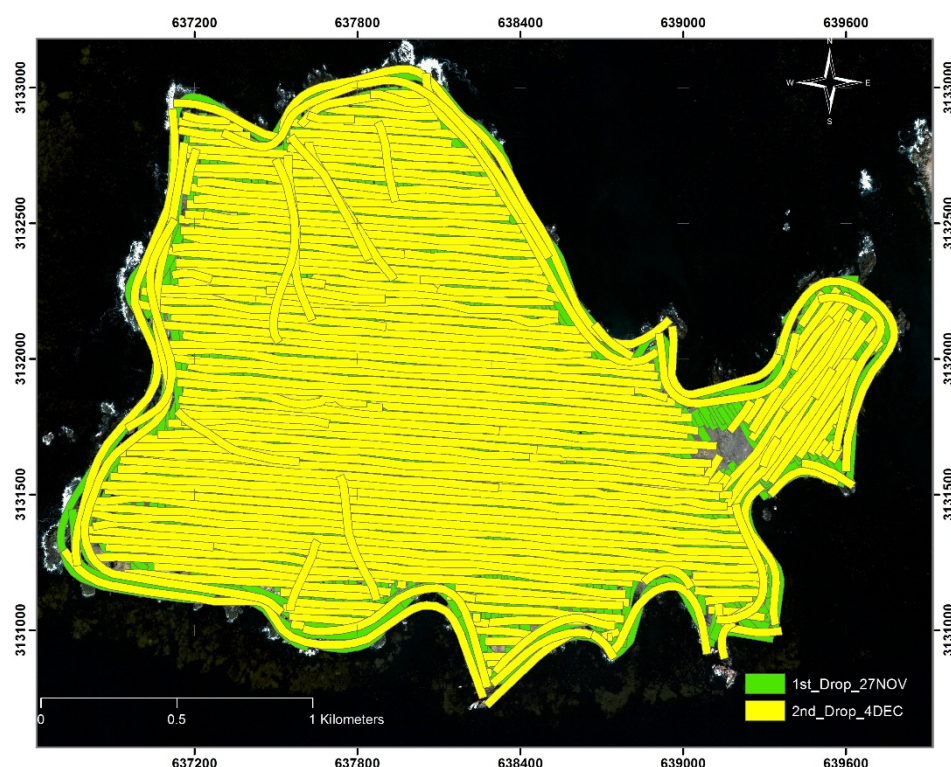
Item	Cost (USD)
Preparation and planning	55,615.07
Helicopter	56,529.90
Aerial bucket	<sup>1</sup>
Bait	3191.30 <sup>2</sup>
Boat expenses	110,000.00 <sup>3</sup>
Staff	194,067.71
Food, travel, fuel, materials	165,403.15
Lodging and air and ground transportation	36,202.58
Field equipment and materials	38,046.44
Total	659,056.15

<sup>1</sup> The aerial bucket was already owned by GECI. <sup>2</sup> A total of 8000 kg of bait was donated by Bell Laboratories Inc. The cost shown is for the shipment and importation from USA to Mexico. <sup>3</sup> In-kind support from the Mexican Navy that provided the long-range oceanic patrol vessel *ARM Bretón*, and from the fishing cooperative *Pescadores Nacionales de Abulón*, which provided continuous trips from the Baja California Peninsula (Punta Eugenia) to Cedros island and then to San Benito Oeste.

We found that the San Benito Savannah Sparrow travels among the islands [48,50]. We also confirmed that all the birds of the three islands belong to the same population. Genetic tests confirmed similar levels of genetic diversity across all three island populations; there was low differentiation between SBM and both SBE and SBO, while there was moderate differentiation between SBE and SBO populations. This suggests that high gene flow is occurring via migration between SBM and neighboring SBE and SBO, with slightly less gene flow between SBE and SBO. The overall migration rate, as estimated through allele frequency comparisons, was an average of 6.43 breeding individuals being exchanged between populations/generation [51]. Despite these findings, as a precautionary measure, 47 birds were kept in captivity during the eradication and while the bait was still available on the ground (from November 2013 until June 2014). Eleven birds, all females, died on 28 December 2013. The cause of death was not consumption of bait but rather environmental conditions: low temperatures and cold winds. Measures such as insulation with tarps and added foliage to



the nests were taken to improve conditions for the birds in the aviary and no further deaths were recorded. The remaining 36 birds were released in June 2014, 11 of which were fitted with bands and radio-telemetry transmitters to assess acclimatization and movements. All the birds survived post-release. By 2016, three years after the eradication, SBE had the highest average density (2009–2016) of this species ( $33.25 \text{ ind. ha}^{-1} \pm 42.19 \text{ SE}$ ), followed by SBM ( $19.51 \text{ ind. ha}^{-1} \pm 3.86 \text{ SE}$ ), and SBO ( $6.08 \text{ ind. ha}^{-1} \pm 5.59 \text{ SE}$ ). The population in SBO remained stable and was not affected by the mouse eradication [50].



**Figure 4.** Map showing the helicopter coverage during the first (green; 27 November 2013) and second (yellow; 4 December 2013) bait drops during the mouse eradication on San Benito Oeste island. The gap shown to the east is where the fishing camp is located, which was treated by hand and bait stations after each bait drop.

A 30 min documentary was produced to tell the story of the island’s seabirds and restoration project; the film, called “San Benito Archipelago: A Symphony for the Seabirds” in Spanish and featuring English subtitles, is publicly available: <https://youtu.be/4Kv5np70ETs> (accessed on 26 October 2021).

### 3.3. Confirmation

The REA indicated a high probability of success (93–99%) one month after completing the second bait application. We complemented the latter with systematic post-eradication monitoring during 2014 and 2015, confirming that SBO was rodent-free and thus the success of the eradication. The other two islands remained uninvaded. To date, the SBA is free of invasive mammals.

### 3.4. Wider Surveillance and Biosecurity

Using intuition and with no formal implementation, fishermen on SBO enforced the early detection phase of island biosecurity when they detected and reported the mouse invasion in late-2006. They were aware of the importance of keeping these islands pest-free from previous restoration projects conducted there and from the somewhat frequent exchange with GEICI’s personnel, who were conducting a restoration project on Cedros Island to control feral dogs at the time. At the same time, PNA and GEICI, along with



FEDECOOP and other affiliated fishing cooperatives, were already working together to convince the federal government to designate these islands as a protected area [22]. Ever since, biosecurity and a conservation culture has been shaped for the Cedros–San Benito island complex and the region as a whole [52–54]. To develop a formal biosecurity program, the first step was creating awareness, so we conducted community workshops and talks with fishermen on SBO and Cedros. We complemented this comprehensive approach with outreach materials such as brochures, posters, and offset printed blankets, followed by detailed biosecurity measures, to prevent accidental introductions. Since 2013, we have held biosecurity workshops with the fishermen in SBO and Cedros with the goal of involving all PNA members and staff working on the SBA. Furthermore, to ensure that every person that visits SBO learns about biosecurity, since 2017 we have held Environmental Fairs in Cedros Island, with activities regarding environmental education for children and adults, spanning from music workshops, mural painting, photography and film exhibitions, and sculpture contests. Each year, approximately 200 people participate in the fairs [55].

PNA's knowledge of island biosecurity was also derived from the participation of two of its members in the first of its kind in Mexico: "Workshop on island biosecurity for managers, park rangers and users of natural protected areas", in March 2014, co-organized by the National Commission for the Knowledge and Use of Biodiversity (CONABIO), US Fish and Wildlife Service, Pacific Invasives Initiative, and GECI. This was part of the activities of a Global Environment Facility (GEF)-funded project "Enhancing National Capacities to Manage Invasive Alien Species (IAS) by Implementing the National Strategy on Invasive Species", executed by the United Nations Development Program (UNDP) in Mexico, CONABIO and CONANP [56]. As an outcome of this workshop, a first island biosecurity protocol for the Cedros–San Benito island complex was drafted [52]. This island biosecurity protocol has been updated, reviewed, and adapted over the years, with its formal implementation and enforcement by CONANP since 2017 after the creation of the Baja California Pacific Islands Biosphere Reserve. In 2019, in a meeting with CONANP, PNA and GECI staff, we reviewed the biosecurity protocol and updated it. Furthermore, we had a special workshop in Cedros and SBO to build capacities for CONANP's park rangers and PNA staff.

#### 4. Discussion

A key to the success of this project has been the long-lasting collaboration between GECI and the fishing cooperatives on the Baja California Pacific Islands, and between GECI and the Mexican Navy and other federal government agencies. This project is the first and only eradication to date of a *Peromyscus* in the world [12,57], the first mouse eradication using aerial baiting in Mexico [20], as well as the largest island in the country from which mice have been successfully removed [10,11]. It is also a project that stands out from other eradications conducted in Mexico since, in the case of SBO, the local community was involved and committed throughout the project. PNA recognized and took responsibility for the accidental introduction of the Cedros island cactus mouse to SBO and made every effort to be involved and implement a permanent solution with GECI. This commitment reveals how this fishing cooperative, like the other cooperatives in the region, are environmental stewards of the islands they live in and depend upon. These local fishing communities not only practice sustainable management of their fisheries but they also care for and embrace a hands-on approach for island conservation and restoration [37]. PNA's island condition provides the cooperative with strong incentives to protect not only the marine resources it depends on but also the ecosystem it inhabits, because it is aware that any impact on the terrestrial ecosystem could impact the marine ecosystem, as recent research has revealed [58–60]. In this sense, the cooperative has become a strong steward of Cedros island and the San Benito Archipelago. Similar involvement of island communities has been documented in other countries, such as Chile [61], New Zealand [62], and Australia [14].

The strong support from the local fishing community was an enabling condition to secure funding since it made clear that they would not raise any concerns nor opposition. Such support was also relevant during the acquisition of permits and to obtain logistical support from the Mexican Navy. Overall, this project was a success because of the partners involved: a well-organized and mature fishing community (PNA), a consolidated and experienced civil society organization (GECI), and a strong network of federal government agencies. Trust among the partners was essential. For instance, PNA and GECI had already been collaborating for almost 15 years, and personal relationships between members of the two organizations have been unfolding for more than 40 years. Similarly, GECI had been working closely for several years with government agencies such as the ministries of Interior (SEGOB), Navy (SEMAR) and Environment (SEMARNAT) to restore island ecosystems in Mexico and to develop public policies on island conservation [21,63]. If PNA had not backed the project as it did, it might have taken more time to develop. Since the whole island is federal property, the decision might have been made by the federal government as a must-do action despite PNA's opposition or indifference. However, the cost-effectiveness of such a project might have been jeopardized, since there would have been no commitment from the local community to enforce biosecurity, making the risk of reintroduction very high. Opposition by local communities has already halted eradication projects on many islands, such as Lord Howe Island and Great Barrier Island [15]. Therefore, PNA's support and involvement made the eradication project on SBO very straightforward and with no additional challenges other than those intrinsic to these types of operations.

Eight years since the mouse eradication on SBO, no rodents have been recorded, despite these species occurring on the nearby Cedros island. PNA continues with its regular fishing activities, which involves practically moving households from Cedros to SBO during abalone and lobster seasons every year. This suggests that the island biosecurity practiced by PNA and enforced by CONANP, with technical assistance from GECI, is working, as well as indicating that fishermen are more aware about the implications of living with rodents, thus making it an intrinsic incentive to implement island biosecurity measures. Such behavior and rationale have been observed on other inhabited Mexican islands where invasive rodents have been eradicated [52,53,64].

Although the SBO mouse eradication cannot be viewed as a rapid response since the introduction occurred in 2006 and the eradication took place in 2013, from a precautionary approach perspective for the island ecosystem, the response was methodical and efficient. In seven years, the science behind the project was produced [43,48], funding was secured, and interinstitutional coordination took place to implement the eradication project. Seabirds were the group that benefited the most since the SBA archipelago is a major seabird site, especially because mice of the *Peromyscus* genus have been recognized as predators of terrestrial invertebrates and ground-nesting birds, and they can also prey on and compete with burrow-nesting seabirds such as storm-petrels and alcids [65,66]. Thanks to these collective and interinstitutional efforts, the most important seabird islands in the Mexican Pacific remain a safe haven for seabirds. Additionally, the restoration work conducted under such a close partnership between one of the most prominent fishermen cooperatives in the country, government agencies, and GECI—as a social construction [67]—also contributed to building the trust and culture that gave birth to the Baja California Pacific Islands Biosphere Reserve [22], a highly significant outcome.

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