Contributed Paper

Qualitative impact evaluation of a social marketing campaign for conservation

Gabby Salazar (iD),[1] * Morena Mills (iD),[1,2] and Diogo Veríssimo (iD)[3,4]

[1]Imperial College London, Silwood Park, Buckhurst Road, Ascot SL5 7QN, U.K.
[2]Centre for Biodiversity and Conservation Science, The University of Queensland, St. Lucia 4072, Australia
[3]Department of Zoology and Oxford Martin School, University of Oxford, Oxford OX1 3BD, U.K.
[4]Institute for Conservation Research, San Diego Zoo Global, 15600 San Pasqual Valley Road, Escondido, CA 92037, U.S.A.

Abstract: *Social marketing campaigns use marketing techniques to influence human behavior for the greater social good. In the conservation sector, social marketing campaigns have been used to influence behavior for the benefit of biodiversity as well as society. However, there are few evaluations of their effectiveness. We devised an approach for evaluating the influences of social marketing campaigns on human behavior and conservation outcomes. We used general elimination methodology, a theory-driven qualitative evaluation method, to assess the long-term impacts of a 1998 Rare Pride campaign on the island of Bonaire that was designed to increase the population of the Lora (*Amazona barbadensis*), a threatened parrot. We interviewed stakeholder groups to determine their perceptions of the drivers of the changes in the Lora population over time. We used these data to develop an overall theory of change to explain changes in the Lora population by looking at the overlap in hypotheses within and between stakeholder groups. We then triangulated that theory of change with evidence from government reports, peer-reviewed literature, and newspapers. The increase in the Lora population was largely attributed to a decrease in illegal poaching of Loras and an associated decrease in local demand for pet Loras. Decreases in poaching and demand were likely driven by a combination of law enforcement, social marketing (including the Rare campaign), and environmental education in schools. General elimination methodology helped show how multiple interventions influenced a conservation outcome over time. There is a need for evidence-based evaluations of social marketing interventions to ensure that limited resources are spent wisely.*

Keywords: Bonaire, general elimination methodology, parrot conservation, Rare Pride, theory-driven evaluation

Evaluación del Impacto Cualitativo de una Campaña de Mercadotecnia Social para la Conservación

Resumen: *Las campañas de mercadotecnia social usan técnicas de mercadotecnia para influenciar al comportamiento humano para el mayor beneficio social. En el sector de conservación, las campañas sociales se han usado para influenciar al comportamiento para el beneficio de la biodiversidad y de la sociedad. Sin embargo, existen pocas evaluaciones sobre su efectividad. Diseñamos una estrategia para evaluar la influencia de las campañas de mercadotecnia social sobre el comportamiento humano y los resultados de conservación. Usamos la metodología de eliminación general, un método de evaluación cualitativa llevada por la teoría, para evaluar los impactos a largo plazo de una campaña de Rare Pride de 1998 en la isla de Bonaire, la cual fue diseñada para incrementar la población de la lora (*Amazona barbadensis*), un psitácido amenazado. Entrevistamos a grupos de accionistas para determinar sus percepciones de los causantes del cambio en la población de loras con el tiempo. Usamos estos datos para desarrollar una teoría general de cambio para explicar los cambios en la población de loras al observar el traslape en las hipótesis dentro y entre los grupos de accionistas. Después triangulamos esa teoría de cambio con evidencia tomada de los reportes gubernamentales, la literatura revisada por pares, y los periódicos. El incremento poblacional de*

loras se atribuyó en su mayoría a una disminución en la demanda local de las loras como mascota. La disminución de la caza furtiva y de la demanda estuvo probablemente causada por una combinación de la aplicación de la ley, la mercadotecnia social (incluyendo a la campaña de Rare), y la educación ambiental en las escuelas. La metodología de eliminación general ayudó a mostrar cómo las múltiples intervenciones influyeron sobre un resultado de conservación con el tiempo. Existe una necesidad por tener evaluaciones basadas en evidencias de las intervenciones de mercadotecnia social para asegurar que los recursos limitados se usen racionalmente.

Palabras Clave: Bonaire, conservación de psitácidos, evaluación llevada por la teoría, metodología de eliminación general, Rare Pride

摘要: 社会营销活动利用市场营销技术来影响人们的行为, 以获得更高的社会利益。在保护领域, 社会营销活动也被用来影响那些有利于生物多样性和社会的行为。然而, 目前还少有对其有效性的评估。我们设计了一种方法来评估社会营销活动对人类行为和保护成效的影响。我们用一般消元法 (一种理论驱动的定性评估方法) 来评估博内尔岛 1998 年为增加受胁迫的劳拉鹦鹉 (*Amazona barbadensis*) 种群数量开展的瑞尔保护协会自豪项目 (*Rare Pride campaign*) 的长期影响。我们采访了利益相关群体, 以确定他们认为是哪些因素导致了劳拉鹦鹉种群随时间变化而产生的变化。我们利用这些数据设计了变化的总体理论, 通过分析利益相关者群体内部和群体之间都认同的假说来解释劳拉鹦鹉的种群变化。接下来我们用来自政府报告、同行评议文献和报纸的证据, 对这个变化理论进行了三方面分析。劳拉鹦鹉数量增加主要是因为非法偷猎的减少, 以及当地对宠物劳拉鹦鹉需求的相应减少。偷猎和需求的减少可能是执法、社会营销 (包括瑞尔保护协会运动) 和学校的环境教育等因素共同作用的结果。一般消元法有助于说明长期以来多种干预措施如何作用于一项保护的成效。未来还需要对社会营销干预措施进行以证据为基础的评估, 以确保有限资源的合理利用。【翻译: 胡怡思; 审校: 聂永刚】

关键词: 瑞尔自豪项目 (Rare Pride), 理论驱动的评估, 一般消元法, 鹦鹉保护, 博内尔岛

Introduction

Human behavior is the underlying driver of the world's most pressing environmental problems, from climate change to habitat loss (Schultz 2011; Veríssimo 2013). To protect biodiversity, conservation efforts must do more than raise awareness; they must motivate changes in human behavior (Schultz 2011). One approach to influence human behavior is social marketing, which applies insights from marketing to change behaviors for the greater social good (Andreasen 1995). Social marketing has been widely applied in the health sector to address issues such as smoking and family planning (Cheng et al. 2011). It has also been used to promote sustainable behaviors and conservation actions, from recycling. (McKenzie-Mohr 2011) to fisheries management (Andriamalala et al. 2013). Despite the use of social marketing in conservation, there are few rigorous evaluations of its effectiveness (Veríssimo et al. 2018). To decide whether to invest limited conservation funding in social marketing, it is critical to understand the degree to which social marketing campaigns influence both human behavior and the biodiversity they are trying to protect (Ferraro & Pattanayak 2006).

The need for evaluation and evidence-based analysis is a priority in the social marketing field (Kotler & Lee 2008) and in conservation (Sutherland et al. 2004; Baylis et al. 2016). Although the conservation field has typically prioritized quantitative evaluation methods these methods can be resource intensive and require large sample sizes (Baylis et al. 2016) or baseline data that is unavailable (Botrill et al. 2011). Quantitative methods also focus on the magnitude of an effect without revealing the underlying mechanisms that have led to that effect. In other fields, theory-driven qualitative evaluation methods have been developed to address the attribution of cause and effect where baseline data and sample sizes are limited (White & Phillips 2012). Unlike black-box evaluations, which only look at the outcome of interventions, theory-driven evaluations can help one understand how an intervention works by revealing the underlying processes that have led to observed outcomes (Chen 2012). General elimination methodology (GEM) is a theory-driven qualitative evaluation method that improves understanding of cause and effect relationships by systematically ruling out alternative explanations for the outcome of interest (Scriven 2008; White & Phillips 2012). Qualitative approaches, like GEM, offer an opportunity for the conservation sector to attribute causal effects to interventions, even in contexts were data are limited. Qualitative approaches can also help reveal the underlying mechanisms that lead to the outcome of interest, providing a more nuanced understanding of complex conservation issues.

Rare, a conservation nongovernmental organization, has been using social marketing campaigns for over 30 years to change behavior and to promote biodiversity conservation in developing countries around the world (Jenks et al. 2010). There have been over 300 Rare Pride campaigns worldwide, all using a locally relevant flagship species (Rare 2017). Rare initially evaluated its programs through interviews with staff and local partners and subsequently used pre- and postprogram surveys and in some cases before-after-control-intervention experimental designs (Jenks et al. 2010; Veríssimo et al. 2018). However,

the time frames of previous evaluations have been too short to measure impacts on biological targets, which may require longer recovery times.

We used GEM to evaluate the long-term impacts of a Rare Pride campaign that started in 1998 on Bonaire and used the Yellow-shouldered Amazon Parrot (*Amazona barbadensis*), locally known as Lora, as its flagship species (Scholtens & Butler 1999). We aimed to understand the extent to which the Rare campaign contributed to the observed increased in the Lora population over the last 20 years. There are 3 primary steps in GEM (Scriven 2008). First, identify the possible causes (e.g., decreased poaching) for the impact of interest (increased population of Lora on Bonaire). Second, identify the necessary conditions (e.g., existing environmental laws) for each possible cause to affect the impact of interest. Third, assess whether the conditions for each possible cause are present (e.g., were environmental laws regularly enforced). We solicited rival explanations for what has led to the increase in the Lora population over time from 8 stakeholder groups on Bonaire to devise an overall theory of change (TOC) supported by multiple stakeholder groups to reveal where the Rare Pride campaign fits into the larger history of Lora conservation. This case study contributes to a gap in the conservation evaluation literature by providing an example of how theory-driven evaluation methods can be used to understand the long-term impacts of a conservation intervention.

Methods

This study took place on Bonaire (12°N, 68°W) a small Caribbean island (288 km^2) that is part of the Kingdom of the Netherlands. Bonaire is home to the Lora, a vulnerable parrot species which is threatened by poaching for the pet trade and habitat loss (BirdLife International 2017). The population of the Lora had dropped to under 300 individuals in 1998, leading the government and local conservation groups to collaborate with Rare on a social marketing campaign to mitigate threats to the Lora population. Since 1998, other interventions have taken place, including education, rehabilitation, and release programs and other campaigns (Fig. 1). Annual roost counts since the campaign began show the population has increased; 294 Loras were recorded in 1998, 429 in 2008, and 1023 in 2018 (DCBD 2018). This increase led us to ask to what extent the Rare campaign contributed to this increase.

Theory of Change Development

Following the first 2 steps of GEM, we first identified the list of possible causes for the impact of interest and then identified the necessary conditions for each possible cause to affect the impact of interest. To identify the factors (e.g., interventions or events) that may have influ-

enced the Lora population, we reviewed the Rare Pride campaign report, websites of and reports by Bonaire's conservation organizations and government bodies, and gray literature on Loras (Supporting Information). We used these factors to develop a TOC to understand the causal pathways by which the Rare campaign may have influenced the Lora population.

Participant Interviews

The third step of GEM is to assess whether the conditions for each possible cause to have an effect are present. To elicit further rival explanations and to test our TOC, we sought to interview a diverse set of participants from 8 stakeholder groups on Bonaire: veterinarians, biologists, tourism professionals, educators, government officials, media representatives, local residents, and conservation professionals (including forestry game wardens and conservation organization employees). In selecting these groups, we attempted to strike a balance between relevance and diversity. To select participants, we used both purposive and snowball sampling. We first developed a list of key informants including volunteers from the original Rare campaign (Scholtens & Butler 1999), leaders of conservation-related organizations, members of local government, and authors of reports (Supporting Information). Participants were sorted into groups based on their primary profession or volunteer role. The local residents group included individuals who did not have professional ties to the other groups (including farmers and former Lora owners) but who were recommended as participants by at least 2 sources.

Our survey was divided into 3 parts (Supporting Information). The first part focused on the individual's background, their involvement with Loras, their estimate of the current Lora population, and their knowledge of current threats to Loras. The second part tested our TOC by eliciting rival explanations for what has led to the change in the Lora population since 1997. The third part focused on the impacts of the Rare campaign. Before conducting interviews, we piloted the survey on 2 individuals. We then added a question to elicit information on the relative influence of different factors perceived to have affected the Lora population.

Theory of Change Testing

To test our TOC, we created a card exercise using the factors we identified during the TOC development. Each participant was provided with a deck of cards with the factors (Supporting Information) as well as blank cards so they could add new factors if needed. Before each interview, we shuffled the cards to randomize them. We asked participants to sort the cards into 3 piles: A, factors that have affected the Lora population since 1997; B, factors that have not affected the Lora population since
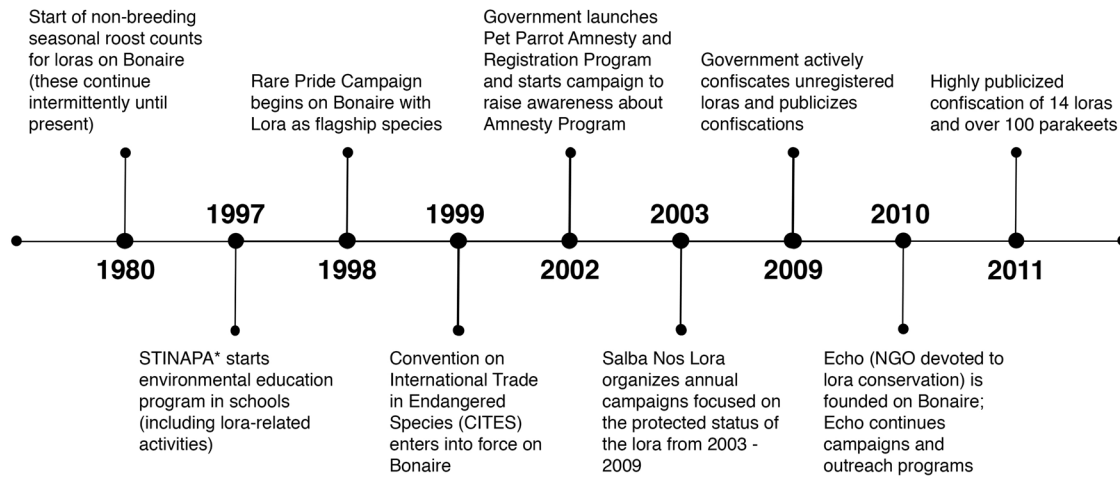
Figure 1. A timeline of important interventions and events that affected the conservation of the Lora on Bonaire (STINAPA, Stichting Nationale Parken Bonaire, nongovernmental, nonprofit foundation that manages the 2 protected areas of Bonaire).

1997; C, and unsure or do not know. We used consistent prompts when participants asked for clarification about the meaning of a card (Supporting Information).

To determine the relative influence of the factors that affected the population of Loras, we removed all cards in piles B and C and asked participants to group the cards from pile A on a scale of influence (from most influence on the left to least influence on the right). We then asked follow-up questions about how participants thought each intervention had affected the Lora population and questions about any causal relationships they had noted between different factors (Supporting Information). We also asked questions specific to the participant's profession. Three participants were unable to complete the influence exercise due to time constraints or difficulty with the exercise. One interview was conducted simultaneously with 2 respondents and was treated as a single data point. After each card exercise, we photographed the piles to document card placement.

To look at how participants related the cards to one another, we recorded audio from all interviews with an Olympus LS-10 recorder, transcribed the interviews using OTRANSCRIBE and coded the interviews using NVIVO 11.3.2 to identify how interviewees described the causal pathways between different factors. We followed the Code of Ethics of The Society for Conservation Biology, and the study was approved by the Imperial College London Ethics Assessment (2016-01273848).

Data Analyses

We used descriptive statistics to analyze the answers to questions about the Lora population and current threats to the Lora. To summarize participants' estimates of the current Lora population, we took the mid-point when a population range was given. For the population trend, we tallied responses into 3 categories: increased, decreased, or no change. To assess current threats faced by Loras, we grouped responses into categories as defined by the IUCN threats classification scheme (version 3.2) (IUCN 2012).

To analyze the card exercises, we counted the number of times a card was identified as having or not having affected the Lora population since 1997. To quantify which factors had the most and least influence, we calculated the midpoint between the cards that were farthest apart on the influence scale and classified the cards as having: most influence (left of the midpoint), medium influence (intersected with the midpoint), or least influence (right of the midpoint).

To elicit each participant's TOC, we coded responses using deductive content analysis (Elo & Kyngäs 2007). Each of the 29 card topics was used as a separate code, 1 code was included for blank cards added by participants, and 2 additional codes were added through an iterative coding process (Supporting Information). We used Microsoft Excel version 16 to summarize and chart each participant's responses to the 29 cards. In the chart, we noted whether participants perceived each factor to have had a positive or negative affect on the Lora population and any causal links between different cards. To check the validity of our coding system, a second, independent researcher coded 5 randomly selected transcripts. We compared our coding for each interview and found an overall intercoder reliability of 72%, calculated by dividing the total number of agreements for all codes by the total number of agreements and disagreements for all codes combined (Campbell et al. 2013).

We created an overall TOC for the campaign (Foundations of Success 2007) by triangulating responses within and between stakeholder groups. To be included in the overall TOC, a factor had to meet 2 criteria: at least

two-thirds of participants within a stakeholder group had to agree that the factor had affected the Lora population since 1997 and on the direction of the effect (e.g., positive or negative) and at least 3 out of the 8 stakeholder groups had to agree that the factor had affected the Lora population. To select this threshold, we looked at different thresholds of agreement within groups (e.g., one-fourth, one-half, two-thirds, and three-fourths agree) and between groups (e.g., 3, 4, or 5 groups agree) (Supporting Information). We selected a threshold of two-thirds agreement within groups because lower thresholds gave too much power to a single respondent in groups with only 2 respondents. For the between group threshold, we selected 3 groups or more because higher thresholds tended to exclude specialist knowledge as well as factors with fewer direct effects (Supporting Information). We eliminated factors that did not meet these criteria from further consideration, accepting that the lack of stakeholder support for these rival explanations meant they were unlikely to have played a major role.

Following Scriven (2008), we assessed whether there was evidence that the conditions for each of the remaining factors to have an effect were present. To do this, we searched both Google and Google Scholar for each of the factors perceived to have had a positive effect on the Lora population with a minimum of 3 keywords or phrases related to each factor (Supporting Information). We reviewed the first 50 results for both search engines for each keyword. We focused on the positive factors because we were interested in factors that may have led to the increase in the population described by the available species census data. We also reviewed documents shared with us by participants and reports published by Bonaire's conservation organizations (e.g., Openbaar Lichaam Bonaire 2010; Debrot et al. 2011). Additionally, we keyword searched 395 issues (April 2004–May 2017) of *The Bonaire Reporter*, Bonaire's English newspaper, for the words *Lora* and *parrot*.

Results

Theory of Change Development

Through our review of the literature, we identified 29 factors that may have influenced the Lora population over the last 20 years, including direct conservation interventions and economic changes on Bonaire (Fig. 2).

Participant Interviews

We identified 47 potential key informants for interviews and conducted 33 interviews in 2017. Thirty interviews took place in person and 3 took place via Skype. There were 14 female and 19 male participants, and they ranged in age from 19 to 87; 45 to 54 was the most common age bracket.

Of 33 respondents, 28 said that the Lora population increased over the last 20 years, 2 said it decreased, 2 said it had not changed, and 1 respondent did not know. Participant ($n = 24$) estimates of the current Lora population on Bonaire today ranged from 400 to 3000. Thirteen (39%) respondents were within 20% of the latest published estimate at the time of 883 for 2016 (DCBD 2018).

When threats were sorted into the IUCN threats classification scheme, 48% fell under biological resource use, which includes persecution and poaching (Table 1). Seven responses were not specific enough to classify and were not included in the analysis.

Of the 24 (72%) participants who remembered the Rare Campaign, 10 described it as a catalyst for other conservation interventions and 4 described its role in capacity building on Bonaire (2 participants described it as both). One participant said,

"... it stimulated the government to do their thing. I think they needed this push... the Amnesty program would not have been possible at that moment without the Rare Program because then the time wouldn't have been ready. It would have maybe taken at least another 10 years or so, when it really got out of hand."

Theory of Change Testing

Out of the 29 factors listed on the cards, 18 factors met the threshold of two-thirds agreement within a stakeholder group and were also perceived to have had an effect by a minimum of 3 out of 8 stakeholder groups. Of these 18 factors, 12 were perceived to have a positive effect on the Lora population, and 6 factors were perceived to have a negative effect (Table 2). We did not find support for the 11 other factors, or rival explanations, that were in our original TOC including a conservation champion, Bonaire becoming part of the Netherlands in 2010, business involvement in conservation, change in government support of conservation, change in the size or influence of Stichting Nationale Parken Bonaire, the creation of the Dutch Caribbean Nature Alliance in 2005, ecotourism, invasive species eradication, national pride in Loras, reforestation and habitat restoration, or the rehabilitation and release of captive Loras. Following GEM, these 11 factors were eliminated from further consideration. No new rival explanations emerged through the interview process; participants used the blank cards to add 7 additional factors, none of which overlapped.

Of the 29 participants who said that poaching had affected the Loras, 26 said poaching had decreased since 1997. One participant commented,
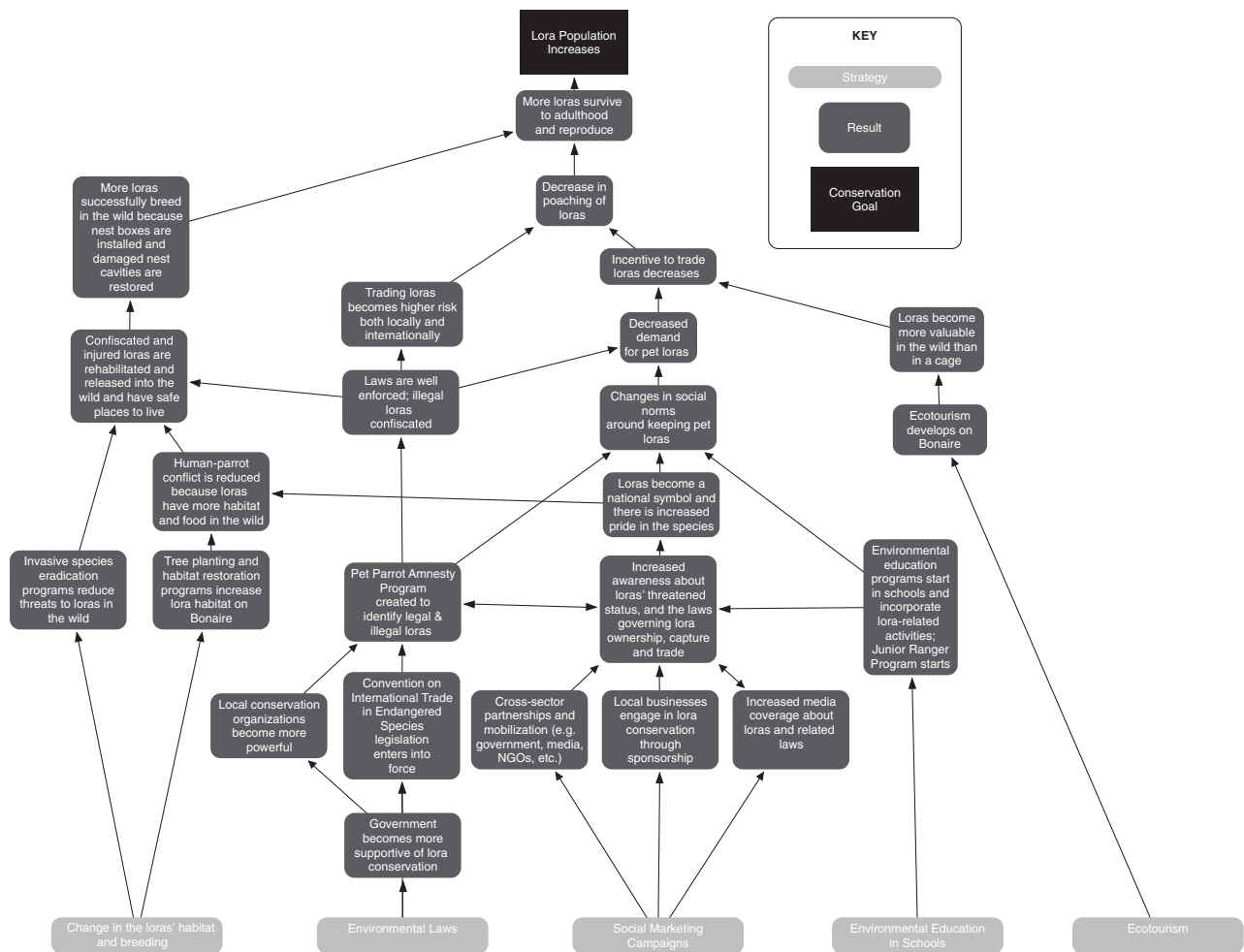
Figure 2. The original theory of change developed to determine the causal pathways by which the Rare Campaign and other factors may have influenced the Lora population on Bonaire since 1997.

Table 1. Interview respondent perceptions of the current threats to the Lora on Bonaire sorted into categories of threat as defined by the International Union for Conservation of Nature's threats classification scheme (version 3.2).

Category of threat	No. of responses
Biological resource use (e.g., poaching or persecution)	36
Climate change and severe weather	14
Invasive and other problematic species, genes, and diseases	12
Residential and commercial development	7
Transportation and service corridors	2
Pollution	1
Other	2

" . . . the diminishing of poaching had the most effect. And . . . it was this combination of campaigns [Rare and Salba Nos Lora], which basically caused the diminishing of poaching pressure."

The 5 cards most frequently placed on the most influence side of the scale were Pet Parrot Amnesty and Registration Program (19 times), poaching of Loras (19 times), Echo (a local organization) (18 times), Salba Nos Lora Campaign (18 times), and environmental education in schools (18 times).

The 12 factors perceived to have a positive effect (Table 2) included environmental education programs, social marketing campaigns, environmental laws and regulations, cooperation between conservation groups, nest box provision, and nest cavity restoration, and the creation of local conservation organizations.

Evidence from government reports and gray literature supported the effect of 9 of the positive factors and rejected the influence of the provision of nest boxes. There was insufficient evidence to either confirm or reject the influence of the decrease in the poaching of Loras and the decrease in local demand for pet Loras. A detailed review of evidence is in Supporting Information and a selection is summarized here. Government reports showed that the ratification of international nature conservation

Table 2. Factors perceived to have affected the population of the Lora on Bonaire since 1997 by at least of 3 out of 8 stakeholder groups surveyed.*

Factors with a positive effect	Factors with a negative effect
Convention on International Trade in Endangered Species	development on Bonaire
Cooperation between conservation groups	environmental events
Echo (local nonprofit organization)	international trade
Enforcement of environmental laws	invasive species
Environmental education in schools	habitat loss
Junior ranger program	human-parrot conflict
Decrease in local demand for pet Loras	
Pet parrot amnesty and registration program	
Decrease in poaching	
Nest-box provision or nest-cavity restoration	
Rare Pride campaign	
Salba Nos Lora campaign	

At least two-thirds of the participants within each group also had to agree the factor was important.

treaties in 1998 and 1999, including the Convention on International Trade in Endangered Species (CITES), legally forced the government to address illegal pet Loras (Montanus 2000). This resulted in the Pet Parrot Amnesty and Registration Program, a mandatory registration of all pet Loras (Montanus 2000). In 2002, 615 pet Loras were ringed, after which unringed Loras were considered illegal (Montanus 2003). The enforcement of environmental laws increased after 2002; 9 separate confiscations of unringed Loras were reported on in *The Bonaire Reporter* (e.g., Williams 2011) (Supporting Information). In 2011, an independent firm evaluated Bonaire's Nature Policy and found that the majority of goals related to CITES and to environmental law enforcement had been achieved (Debrot et al. 2011). Ongoing social marketing campaigns appeared to reinforce an awareness of the laws and raised awareness about the Lora's threatened status. For example, in 1999 a survey of 570 residents showed that 87% had been exposed to the Rare campaign and that 78% understood Loras were threatened (Scholtens & Butler 1999). A 2002 education campaign by Salba Nos Lora resulted in 95% of captive Loras being registered (Montanus 2003), and there were follow-up campaigns between 2003 and 2009 (Openbaar Lichaam Bonaire 2010). The work of Rare, Salba Nos Lora, and Echo also resulted in frequent media coverage of the Loras and related laws since 1997, including an ongoing column called ParrotWatch in *The Bonaire Reporter* (Supporting Information). Starting in 1997, environmental education in schools reinforced the message about the Lora's threatened status (STINAPA

2017). Reports showed that all schools on Bonaire were visited during the Rare Campaign to promote Lora conservation (Scholtens & Butler 1999) and that Lora-related activities were still part of the annual curriculum for grade 3 (STINAPA 2017). Conservation groups supported Lora conservation by collaborating on enforcement (DeSalvo & DeSalvo 2007) and behavior-change campaigns (Scholtens & Butler 1999).

Evidence in the literature was consistent with interview responses (Supporting Information). Some respondents noted the importance of the campaigns in galvanizing government action and enforcement,

> " . . . it's those three things: the Pride Campaign made it possible for the Amnesty to happen, and then the amnesty made it possible for the enforcement to happen."

Respondents also noted the importance of the ongoing campaigns and environmental education,

> "With continuity, by being there, by campaigning and by just standing their ground . . . just like what we're doing with education in schools."

A number of participants attributed the decrease in local demand to an improved awareness of the laws, one said,

> " . . . the primary most effective thing has been the perception that it's sort of an illegal activity . . . people who keep parrots as pets, they don't want to keep parrots as pets enough to break the law."

Through GEM, we reduced our original 29 factors to 11 positive factors and 3 causal pathways (Fig. 3). To create this final TOC, only the positive factors (12) were considered. Of the positive factors, 1 was excluded based on evidence, leaving 11 factors for inclusion. The final TOC included 9 positive factors that were triangulated by participants and supported by evidence and 2 positive factors (decrease in poaching and decrease in local demand for pet Loras) for which direct evidence was unavailable. The observed increase in the Lora population appeared largely attributed to the decrease in poaching and the concomitant decrease in local demand for pet Loras. Three causal pathways led to this decrease over the last 20 years: law enforcement, environmental education in schools, and social marketing campaigns. It was not possible to determine the relative contribution of each causal pathway due to the lack of more detailed data on the implementation of these different activities.
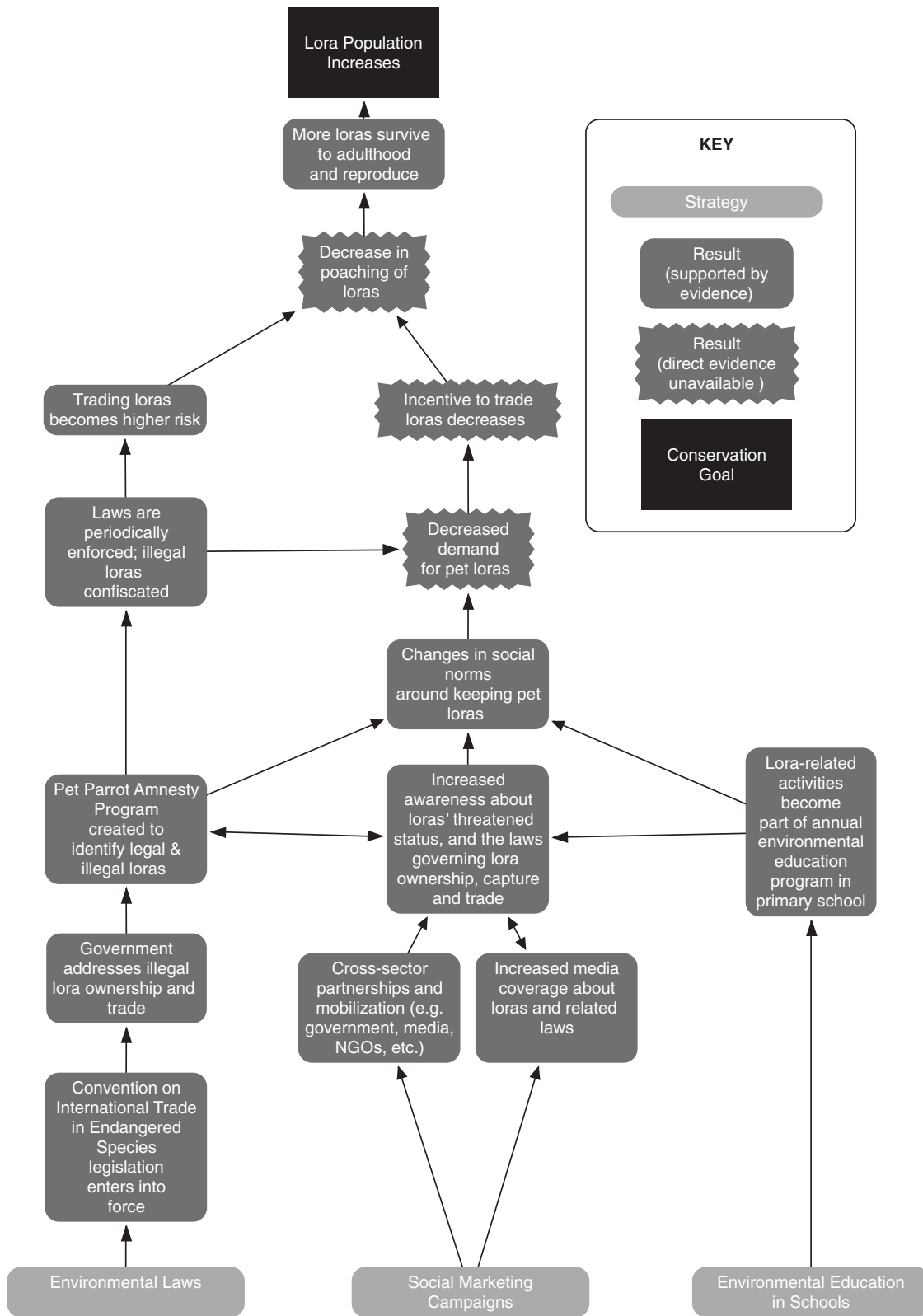
Figure 3. An overall theory of change showing the factors that led to the increase in the population of the Lora on Bonaire since 1997. This theory of change is based on interviews and is supported by at least 3 out of 8 stakeholder groups and two-thirds of members within each group. The theory was triangulated with available evidence from government reports, peer-reviewed literature, and newspapers; evidence was not found to directly support elements displayed with a jagged edge.

Discussion

We evaluated whether social marketing campaigns can have long-term impacts on human behavior and conservation outcomes. Our findings suggest that law enforcement, a suite of social marketing campaigns, and youth environmental education all contributed to the increase in the Lora population on Bonaire over the last 20 years. They also suggest that the social marketing campaigns contributed to this increase by helping to change behaviors towards Loras, by shifting social norms, and by increasing compliance with existing environmental laws. The campaigns also helped build local capacity for conservation, which increased the sustainability of behavior change efforts over the long term. Using GEM, we produced a TOC that was supported by diverse stakeholder groups and by data available in the literature.

Our results suggest that social marketing campaigns can change human behavior by supporting environmental laws and regulations, as found by Kennedy (2010). On Bonaire social marketing campaigns helped support compliance with existing environmental laws, even when active enforcement was sporadic. It is possible that outreach surrounding laws and illegal behaviors influences behavior by signaling to individuals that the illegal behavior is not the accepted norm. Nkonya et al. (2008) found that compliance is higher both when people are more aware of environmental laws and when laws are enacted by a local council, suggesting that compliance may be higher when laws are locally designed. Andriamalala et al. (2013) found a similar pattern in Madagascar, where a social marketing campaign helped shift social norms and build support for local environmental laws and resulted in a decrease in destructive fishing practices. These findings are important because resources for conservation are limited and practitioners need cost-effective techniques that maximize compliance (Keane et al. 2008).

Information, by itself, does not typically change human behavior (Schultz 2011). However, people are influenced by social norms and by the behavior of others (Cialdini & Trost 1998; Schultz 2011). On Bonaire our results suggest that the combination of social marketing campaigns and youth environmental education programs helped shift social norms and behaviors toward Loras over 20 years. Ardoin (2009) suggests that an integration of these strategies may be the most effective way to sustain behavior change.

It was not possible for us to separate the influence of the Rare Campaign from the influence of the other social marketing campaigns because ongoing campaigns often blended together, and some interviewees confused the different campaigns. It was also challenging to find individuals who had been on Bonaire for long enough to have experienced the campaigns, which limited our ability to find enough stakeholders to fill certain groups (e.g., customs officials). However, our results showed that the suite of campaigns influenced the Lora population by shifting social norms, changing behaviors towards Loras, and increasing compliance with environmental laws. Our results also support the role of the campaigns in local capacity building on Bonaire. For example, participants noted that the Rare campaign spurred the government into action, paved the way for the Pet Parrot Amnesty program, and built capacity for future environmental education and other social marketing efforts.

Although there is a growing body of literature on the impacts of social marketing campaigns on conservation (Andriamalala et al. 2013; Veríssimo et al. 2018), most evaluations take place in the short-term and measure impacts on human behavior rather than biodiversity outcomes. Our results contribute to the literature by showing how social marketing campaigns can influence both human behavior and biodiversity and how they interact with other interventions. Our research also contributes to the literature by providing an example of how qualitative methods can be used to efficiently understand causal attribution, as carrying out a similar study using quantitative methods would have required a much costlier large-scale and long-term research effort. Retrospective, long-term evaluations are important because impacts often occur outside the timeframe of conservation projects and because behavior change can be short-lived (De Young 1993).

Future Uses of GEM

Our study represents the first post hoc evaluation of a social marketing campaign aimed at biodiversity conservation using GEM. One of the strengths of GEM is that it minimizes common biases encountered by evaluators. First, GEM minimizes similar-person bias, or the tendency to seek out respondents with whom one agrees, by forcing the evaluator to seek out hypotheses from different groups (White & Phillips 2012). Second, it minimizes courtesy bias, where the respondent tells you what you want to hear, by considering the factor of interest (e.g., the Rare Campaign) as 1 of many possible causes of the impact of interest (e.g., the increase in the Lora population) rather than asking directly about the factor of interest (White & Phillips 2012). Third, GEM also reveals knowledge gaps in a system, as in the case of illegal poaching and local demand for pet Loras on Bonaire.

In the future, GEM could be used to evaluate other Rare campaigns. It would be interesting to test GEM in locations where additional social marketing campaigns have not taken place after a Rare campaign, to see if Rare campaigns make a long-term difference on their own. Future comparative research could also use GEM to evaluate the case of *Amazona barbadensis* on Margarita Island, Venezuela, where the parrot population has also increased over the last 20 years (Rodríguez & Rojas-Suárez 2015). Although we do not know what has driven

the increase, ongoing education programs and outreach campaigns have taken place on the island (Rodríguez & Rojas-Suárez 2015). Future case studies would need to have sufficient baseline data on the flagship species in question.

Qualitative evaluation approaches, such as GEM, offer an opportunity for the conservation community to learn from a wider range of conservation projects. It is not always feasible or desirable to carry out robust quantitative impact evaluations, which often require significant resources (Baylis et al. 2016). In contrast, qualitative methods can be used with less investment of time and money. Unlike quantitative methods, which often focus on the impact of an individual element or intervention, methods such as GEM also provide insight into the complexity of a case study and the interactions between the mechanisms that lead to conservation outcomes.

There are also limitations of GEM that should be addressed in future research. Although GEM outlines a set of logical steps to guide evaluations (Scriven 2008), the choice of tools is up to the evaluator (White & Phillips 2012). A number of decisions had the potential to influence results and should be considered in future applications of the methodology. First, when asking respondents to evaluate rival explanations, it is important to select factors that do not overlap. Second, we chose to triangulate the responses of different groups to increase efficiency in terms of time and to elicit a common vision for what has affected the Lora population. This method of triangulation risks ignoring hypotheses put forward by 1 or a handful of participants. The selection of higher thresholds of agreement also has the potential to exclude experiential or specialist knowledge from the TOC.

There is a clear need for evidence-based evaluations of social marketing interventions in conservation to ensure that limited resources are spent wisely (Sutherland et al. 2004). The GEM is 1 new method for evaluating the influences of social marketing campaigns on both human behavior and conservation outcomes.

Acknowledgments

Supporting Information

Resources used to create theory of change (Appendix S1), interview guide (Appendix S2), cards, codes used in NVIVO, and interview prompts (Appendix S3), analysis of thresholds (Appendix S4), list of keywords used to find evidence (Appendix S5), evidence supporting theory of change (Appendix S6), and quotes from interview participants (Appendix S7) are available online. The authors are solely responsible for the content and functionality of these materials. Queries (other than absence of the material) should be directed to the corresponding author.

Literature Cited

Andreasen A. 1995. Marketing social change: changing behavior to promote health, social development, and the environment. Jossy-Bass, San Francisco, California.

Andriamalala G, Peabody S, Gardner CJ, Westerman K. 2013. Using social marketing to foster sustainable behavior in traditional fishing communities of southwest Madagascar. Conservation Evidence **10:**37–41. http://www.conservationevidence.com/collection/25.

Ardoin N. 2009. Behavior change theories and free-choice environmental learning. Pages 57–76 in Falk JH, Heimlich JE, Foutz S, editors. Free-choice learning and the environment. AltaMira Press, Plymouth, United Kingdom.

Baylis K, Honey-Rosé J, Borner J, Corbera E, Ezzine-de-Blas D, Ferraro PJ, Lapeyre R, Persson UM, Pfaff A, Wunder S. 2016. Mainstreaming impact evaluation in nature conservation. Conservation Letters **9** https://doi.org/10.1111/conl.12180.

BirdLife International. 2017. *Amazona barbadensis*. The IUCN red list of threatened species 2017. Available from https://doi.org/10.2305/IUCN.UK.2017-1.RLTS.T22686325A110628721.en (accessed August 2017).

Bottrill M, Hockings M, Possingham H. 2011. In pursuit of knowledge: addressing barriers to effective conservation evaluation. Ecology and Society **16:**14.

Campbell JL, Quincy C, Osserman J, Pedersen OK. 2013. Coding in-depth semistructured interviews: problems of unitization and intercoder reliability and agreement. Sociological Methods & Research **42:**294–320.

Chen HT. 2012. Theory-driven evaluation: conceptual framework, application and advancement. Pages 17–40 in Strobl R, Lobermeier O, Heitmeyer W, editors. Evaluation von Programmen und Projekten für eine demokratische Kultur. Springer, Wiesbaden, Germany.

Cheng H, Kotler P, Lee, N. 2011. Social marketing for public health: global trends and success stories. Jones & Bartlett Learning, Burlington, Massachusetts.

Cialdini RB, Trost MR. 1998. Social influence: social norms, conformity, and compliance. Pages 151–102 in Gilbert DT, Fiske ST, Lindzey G, editors. The handbook of social psychology. 4th edition. Volume **2**. McGraw-Hill, New York.

DCBD (Dutch Caribbean Biodiversity Database). 2018. Yellow-shouldered parrot counts: number of parrots in roosts on Bonaire (1980 – 2018). DCBD, Bonaire, Netherlands Antilles. Available from http://www.dcbd.nl/monitoring/yellow-shouldered-parrot-counts (accessed January 2017).

Debrot AO, de Graaf M, Henkens R, Meesters HWG, Slijkerman DME. 2011. A status report of nature policy development and implementation in the Dutch Caribbean over the last 10 years and recommendations towards the Nature Policy Plan 2012 – 2017. Report C065/11. Institute for Marine Resources & Ecosystem Studies, Wageningen, The Netherlands. Available from https://www.wur.nl/en/Publication-details.htm?publicationId=publication-way-343131363438 (accessed July 2017).

DeSalvo L, DeSalvo G. 2007. Flotsam and jetsam. The Bonaire Reporter 26 January: 4. Available from http://ufdc.ufl.edu/UF00094093/00339/allvolumes (accessed July 2017).

De Young R. 1993. Changing behavior and making it stick: the conceptualization and management of conservation behavior. Environment and Behavior **25:**485–505.

Elo S, Kyngäs H. 2007. The qualitative content analysis process. Journal of Advanced Nursing **62:**107–115.

Ferraro PJ, Pattanayak SK. 2006. Money for nothing? A call for empirical evaluation of biodiversity conservation investments. PLoS Biology **4** (e105) https://doi.org/10.1371/journal.pbio.0040105.

Foundations of Success. 2007. Using results chains to improve strategy effectiveness. An FOS how-to guide. Foundations of Success, Bethesda, Maryland. Available from http://www.fosonline.org/resource/using-results-chains (accessed November 2017).

IUCN (International Union for the Conservation of Nature). 2012. Threats classification scheme Version 3.2. IUCN, Gland, Switzerland. Available from http://www.iucnredlist.org/technical-documents/classification-schemes/threats-classification-scheme (accessed July 2017).

Jenks B, Vaughan PW, Butler PJ. 2010. The evolution of Rare Pride: using evaluation to drive adaptive management in a biodiversity conservation organization. Evaluation and Program Planning **33:** 186–190.

Keane A, Jones JP, Edwards-Jones G, Milner-Gulland EJ. 2008. The sleeping policeman: understanding issues of enforcement and compliance in conservation. Animal Conservation **11:** 75–82.

Kennedy AL. 2010. Using community-based social marketing techniques to enhance environmental regulation. Sustainability **2:**1138–1160.

Kotler P, Lee NR. 2008. Social marketing: influencing behaviors for good. 3rd edition. Sage, Thousand Oaks, California.

McKenzie-Mohr D. 2011. Fostering sustainable behavior: an introduction to community-based social marketing. 3rd edition. New Society Press, British Columbia.

Montanus P. 2003. Handhavingsplan bescherming Lora. Openbaar Lichaam Bonaire, Bonaire, Netherlands Antilles.

Montanus P. 2000. Voorlichtings plan Lora registratie. Openbaar Lichaam Bonaire, Bonaire, Netherlands Antilles.

Nkonya E, Pender J, Kato E. 2008. Who knows, who cares? The determinants of enactment, awareness, and compliance with community Natural Resource Management regulations in Uganda. Environment and Development Economics **13:**79–101.

Openbaar Lichaam Bonaire. 2010. Evaluatierapport Natuurbeleidsplan Bonaire 1999 – 2004. Openbaar Lichaam Bonaire, Bonaire, Dutch Caribbean.

Rare. 2017. Pride campaigns. Rare, Arlington, Virginia. Available from https://www.rare.org/pride#.WYci11KZOgQ (accessed July 2017).

Rodríguez JP, Rojas-Suárez F. 2015. Libro rojo de la fauna Venezolana. 4th edition. Provita y Shell Venezuela, S.A., Caracas. Available from http://animalesamenazados.provita.org.ve (accessed July 2018).

Scholtens E, Butler P. 1999. Learning about the Lora: a campaign to promote pride in Bonaire's Yellow Shouldered Parrot. Rare, Arlington, Virginia. Available from http://www.rareplanet.org/sites/rareplanet.org/files/BONAIRE.pdf (accessed February 2017).

Schultz PW. 2011. Conservation means behavior. Conservation Biology **25:**1080–1083.

Scriven M. 2008. A summative evaluation of RCT methodology: and an alternative approach to causal research. Journal of Multidisciplinary Evaluation **5:**11–24.

STINAPA Bonaire (De Stichting Nationale Parken Bonaire). 2017. Nature and Environment Education. STINAPA, Bonaire, Netherlands Antilles. Available from http://stinapabonaire.org/school-programs/ (accessed July 2017).

Sutherland WJ, Pullin AS, Dolman PM, Knight TM. 2004. The need for evidence-based conservation. Trends in Ecology & Evolution **19:**305–308.

Veríssimo D, Bianchessi A, Arrivillaga A., Cadiz FC, Mancao R, Green K. 2018. Does it work for biodiversity? Experiences and challenges in the evaluation of social marketing campaigns. Social Marketing Quarterly **24:**18–34.

Veríssimo D. 2013. Influencing human behavior: an underutilised tool for biodiversity management. Conservation Evidence **10:**2931.

White H, Phillips D. 2012. Addressing attribution of cause and effect in small n impact evaluations: towards and integrated framework. Working paper 15. International Initiative for Impact Evaluation, New Delhi. Available from http://www.3ieimpact.org/media/filer_public/2012/06/29/working_paper_15.pdf (accessed July 2017).

Williams SR. 2011. Another illegal Lora is saved. The Bonaire Reporter 19 August:8. Available from http://ufdc.ufl.edu/UF00094093/00339/allvolumes (accessed July 2017).